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Pomegranate (Punica granatum L.) Fruits in the Quranic Hermeneutics and Scientific Perspectives

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Pomegranate (*Punica granatum* L.) fruits in the Quranic Hermeneutics and scientific perspectives

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Abstract

Pomegranate is popular fruits consumed because of their pleasant taste and high nutritional value having some health benefits to human health. In addition, pomegranate (*rumman* in Arabic) is one of stated fruit in Quran. Quranic Hermeneutic with a scientific approach has been a new model used by modern commentators to explore various kinds of sciences presented in the Quranic verses. Qur’an mentions a pomegranate three times. Classic commentators generally interpreted the pomegranate verses as a special fruit and served for the occupants of heaven. In contrast, modern scientific commentators stated that the fruit contains scientific miracles that are very beneficial for human’s health since this fruit had some phytochemicals reported to have some biological activities including antioxidant and antibacterial activity.

Keywords: Pomegranate, Quranic Hermeneutic, antioxidant, phenolics, antibacterial activities.

Introduction

Pomegranate fruits with scientific name of *Punica granatum* L. (belong to family of Punicaceae) are excellent sources of bioactive compounds mainly polyphenols. This plant is native to central Asia, but currently it is highly adaptable to a wide range of climatic and soil conditions, and is now grown in many different geographical regions including the Mediterranean basin, Asia, and California in the USA. Pomegranate fruit has been used extensively in the folk medicines of many cultures since ancient times including Greek, Ayurvedic, Unani and Egyptian (Reddy, 2018). This fruit is regarded as a 'super fruit', which is rich in antioxidant phytochemicals and is recognized for a myriad of health benefits. Pomegranate fruit is gaining popularity worldwide for its uniqueness, exclusive colour and taste, and associated health benefits (Hegazi *et al*., 2021).

Pomegranate is a type of tree from the family of Myrtaceae. Pomegranate (*rumman*) in a scientific term is called *Punica granatum* (Ṭalbah, 2011). Since thousands of years ago, human beings have enjoyed it both as food and medicine. The fruit is estimated to originate from West Asia and spread to the surrounding areas. Hebron, which is now a part of Israel territories, is well-known for pomegranate which has been planted since the time of the Prophet Moses. Egypt, Ancient Greece, and Rome are the civilizations known for harvesting this fruit. Several archaeological findings found the residues of pomegranate plants, such as its seeds and barks around Cyprus, Israel, Iraq, Jordan, Lebanon, Palestine, Syria, and Turkey. It is estimated to have existed since 3,000 years before A.D. (Potts, 2012).

Experts argue that the pomegranate habitat is in Southwest Asia (Middle East) or Northwest Asia (India). However, it has already spread and well-bred in the Mediterranean area. Then, it crosses over Iran, the Mediterranean Sea (Iraq and Syria), Egypt, Europe, and even flourishes in Southern China and Southeast Asia. This plant is easy to grow in areas with almost all climates and from low to high land. Despite its ignorance, pomegranate can flourish well on the dry loose land (Mubashir and Mahran, 2010).

Pomegranates are becoming more popular with consumers because of their pleasant taste and high nutritional value. Pomegranate fruit is constituted by peel, arils, and seeds in an approximate 50:40:10 ratio, respectively. As in the majority of fruits, the chemical composition of the pomegranate differs according to the climatic conditions, ripening degree of the fruit at the time of harvest (Guo *et al*., 2021). The edible part of pomegranate is about 57%–85% of the whole fruit, among which fruit juice accounts for 36%–63%. The taste of pomegranate is moderately sour and sweet throughout the flavouring improvement by modern cultivation technology. Pomegranate juice is considered as functional food due to some bioactive contents which are beneficial to human health. Pomegranate fruit contain 17 kinds of amino acids and minerals, vitamin C, calcium, iron, phosphorus, retinol, riboflavin, ferulic acid, and other phenolic compounds. Pomegranate seed oil is also valuable source of bioactive compounds with health-beneficial effects, but it is sensitive to oxidation due to high content of PUFA. Therefore, the oil was added with pomegranate peel extract or synthetic antioxidants to improve its stability toward oxidation (Drinić *et al*., 2020). This fruit is suitable for both young and old consumers; for example, pomegranate juice drinks are popular in daily life, and pomegranate extracts also serve as food additives, supplements, and for taste correction (Ge *et al*., 2021). Pomegranate extract and its polyphenols can be considered as cosmeceuticals because both revealed skin protective effects by ameliorating methylglyoxal (MGO)-induced DNA damage through restoring cell adhesion, migration, and wound healing capacity (Guo *et al.*, 2021). The regular consumption of this fruit has been associated with the prevention of gastric damage, cardiovascular disease, type 2 diabetes mellitus, and specific types of cancers, renal illnesses, liver complications, and osteoarthritis (Villa-Ruano *et al.*, 2020). In this review, pomegranate from Quranic and scientific perspectives are described. In scientific perspective, the antibacterial and antioxidant activities and polyphenols responsible for these activities are highlighted.

Methods

This descriptive-analytical paper used a thematic method based on literature review, referring to scientific articles from *Tafseer* books, reputed journals, book literature, and conference papers. During this study, some databases of Scopus, American Chemical Society, Science Direct, Springer, and Google Scholar covering abstract and full texts are downloaded and evaluated to be used as references during this review. Scientific studies on Pomegranate published in journals were also used as main references. In addition, other sources came from books related to scientific miracles of the Quran compiled by experts in their fields.

Pomegranate fruit

Pomegranate (*Punica granatum* L.), Figure 1, is a fruit plant that can grow up to 5-8 meters in sub-tropical areas to tropical ones, from lowland to below 1000 meters above sea level. It is a shrub or a small tree with 2-5 meters in height (Lansky and Newman, 2007). Its stem is woody with square twigs, a lot of branches, spikes on its axilla, weak in nature, brown-coloured when unripe, and turns into dirty green post ripe. The pomegranate tree has a single leaf with short stems, located in groups. The leaf sheet takes oval to lancet in shape, taper base, blunt tip, pinnate bones, shiny surface, 1-9 cm in length, 0.5-2.5 cm in width, and green-coloured (Ahmad, 2003).

Pomegranate is a berry fruit with a rounded shape and 5-12 cm in diameter, with various bark colours, such as purplish-green, white, reddish-brown, or blackish purple. The fruit is unique with its red-glazing seeds like crystals. The flower is called *Jullanar*. It is an antique fruit that has been known since ancient times. Many people gain some virtues and benefits found in it (Ṭayyāra, 2009). The pomegranate tree is a small posture with thin foliage and flatly shaped, having large and beautiful flowers, with a reddish colour, a fleshy shell of which contents are red-coloured cobs. The white flowers which lie in several separate places, one by one serve as a transparent lid. The Persians named this pomegranate *Jalnaz*, meaning the red fruit with seeds on it (Olivia, 2015).

In Indonesia, pomegranate is well-known by several names, depending on the regions it grows, such as *delima* (Malay), *glima* (Acehnese), *Glineu Mekah* (Gayonese), *dhalima* (Maduranese), *gangsalan* (Javanese), *dalima* (Sundanese), *teliman* (Sasaknese), *lele kase* and *rumu* (Timor). There are three types of pomegranate scattered over Indonesia, classified by its colours; they are white pomegranate, red pomegranate, and black pomegranate. Of these three types, the most famous is the red one. Pomegranate fruit is a symbol of prosperity and fertility, which is held in the form of a ceremony of seven months of a pregnancy ritual, conducted by Javanese people and other tribes in Indonesia (Olivia, 2015). Meanwhile, for Chinese people, it is one of the compulsory fruits in welcoming the Lunar New Year. They believe that many of the seeds are a symbol of abundant fortunes.

In general, pomegranate is various in types, in terms of shape, colour, sweetness level, acidity, or its seed’s shape and colour. The best is the very red one with thin bark and abundant water content (Ṭalbah, 2011). It has three flavours, that is, sweet, sour, and blends between sweet and sour. Each flavour has a diverse uniqueness. The fruit with a sweet taste has a 7-10% content of sugar, 81% of water, 0.6% of proteins, and 0.3% of fat. Moreover, sweet pomegranate also contains fiber as much as 2% as well as some tannin, inulin, and citric acid as much as 1%. It also contains minerals, mainly iron, phosphorus, sulfur, potassium, lime, manganese, and vitamin C (Lansky and Newman 2007). Pomegranate with sour taste comprises less sugar, with 2% of citric acids. This acid content is even higher than that on oranges. Meanwhile, its seeds cover 9% of proteins and fat as much as 7%. Its outer bark contains tannic acids; the material that can restrain bleeding. Therefore, its outer bark powder which has been dried can be used as a remedy to ward off diarrhea and dysentery. It can also be used to restrain blood discharge in the digestive tract (Al-Qabbani, 2009).

Today, Quran has not only become the main focus of merely studying objects and classical interpretations, but also the attention of various scientific studies, including scientific and medical fields. An effort to comprehend the Quran with a scientific and medical approach by experts is called scientific hermeneutic. This style of hermeneutic is an attempt to understand the verses of the Quran containing scientific cues from the perspectives of modern science. Scientific hermeneutic is also an interpreter’s striving effort to uncover the relationship between the verses of *kauniyah* in the Quran and scientific discoveries aimed at revealing its scientific miracles (Rahman, 1986).

Pomegranate in Quranic perspective

According to Al-Zahabi, this scientific hermeneutic seeks to explore the scientific dimension and uncover the secrets of its miracles related to scientific information that may not have been known to humankind during the descent, so it becomes evidence of the truth that the Quran is not a human work, but a revelation of the Creator instead (Zahabi, 2009). Dealing with this, many scientists have focused their studies on the Quran by attempting to put the verses of the Quran into logic and correlating them with treatments and medicines. Scientists have tried to combine the studies of plants mentioned in the Quran with medicines. The Quran does not mention all types of plants in general, just like modern botanical science does, but all types of plants mentioned by the Quran are certainly the top organisms of their respective species. For example, the fig tree (the fruits of heaven) is the top of the species of "*Ficus*" of "Moraceae" types according to botanists, its species reaches about 700 scattered around the world. Likewise, pomegranate, herbs of 1001 benefits, cure various diseases, internal and external ones (Ahmad, 2003).

Nowadays, there have been families who have started the 'no vegetables and fruits' campaign in their family menu. Fruits constitute a major part of the nutrients needed by a human. Besides being consumed as nutrients and vitamins, certain fruits have medicinal properties for certain diseases. This is based on knowledge in religious teachings. This fruit is pomegranate which is also mentioned several times in the Qur'an and contains many health benefits. Almost all parts of pomegranate plants are useful for medical treatments, starting from the pulp, seeds, flowers, leaves, fruit skins, bark, to the roots that can be formulated into medicine (Al-Najjar, 2006).

The Quran does not mention a type of plant unless it serves as the top organism of each species. Likewise, pomegranate, with the Latin name *Punica granatum*, is a type of fruit that belongs to the berry species. Pomegranate is a plant species that has been well-known since ancient Egyptian time, that is, the beginning era of Egyptian civilization. Ancient people recognized it as 'Arhamanie' derived from the Qibti name called 'Armen' or 'Rumen' which is derived from the Hebrew name called 'Rumon'. Then, it is translated into the Arabic word 'Rumman' (Shehab, 2011).

Pomegranate (*rumman*) is an ancient plant known to produce many benefits and to provide various virtues. The Pharaoh Kings of ancient Egyptian had used pomegranates as medicine (Ahmad, 2003). In Islamic literary treasures, pomegranate is classified into the fruit used as medicine for the Prophet. Ibn Qayyim wrote some of its virtues; the one with sweet taste is beneficial to the stomach, throat, chest, and lungs. It can also smoothen urine, reduce yellow substances in the liver, overcome diarrhea, and strengthen organs (Al-Jauziyah, 2012).

The Qur'an as the greatest miracle for Muslims comprises verses showing various scientific signs from modern science perspectives. The hermeneutic of verses that talk about science is known as *Tafsir Ilmi* (Scientific Interpretation) (Al-Qaraḍāwī, 1999). According to Husain al-Zahabi, scientific hermeneutic discusses scientific terms in narrating verses of the Qur'an, seeks to explore its scientific dimensions, and uncovers the secrets of miracles related to scientific information that may not have been known to humans at the time the Qur'an was revealed (Al-Żahabī, 1995). Hence, in modern times, this becomes another evidence that the Qur’an is not a human creation, rather a revelation of God, The Creator.

Muslim scientists have tried to uncover the contents of the Qur'an which leads to scientific discoveries or to keep some of the natural sciences which are not widely known by humans. They scientifically describe those contents in depth. Despite the Qur’an’s *zahir* (visible) characteristics, of which texts briefly talk about this issue, the scientists’ commentary can almost be proven by modern sciences (Al-Shirbaṣī, 1962).

This argument is based on the fact that all sciences obtained from the Qur'an, after being analyzed accurately, will lead people to think at a certain point that everything said in the Qur'an is all true.

This scientific hermeneutic employed a set of contemporary sciences, such as astronomy, geology, chemistry, biology, medical science, and other scientific tools (Al-Qaraḍāwī, 1999). Such interpretation with scientific approaches is not intended to justify the truth of scientific findings by the verses of the Qur'an, nor is it to compel the interpretation of the verses of the Qur'an to seemingly conform to the scientific findings. However, this scientific hermeneutic study initially arises from the awareness that the Qur'an is absolute, whilst its interpretation, both from commentary and scientific perspectives, is relative and tentative in nature (Hanafi, 2015).

Scientific hermeneutic has existed since the Abbasid dynasty. At that time, there were attempts made by some scholars to compromise Islamic teachings with translated foreign cultures, as well as pure sciences found among the Muslims (Abderrahman, 1986). Al-Ghazali was one of the figures who was persistent in supporting these interpretive ideas. In his monumental masterpiece, *Ihya 'Ulumiddin*, he put forward his argumentations to prove his stance (Al-Ghazālī, 2000). He said that all kinds of sciences, both preceding and subsequent ones, whether known or not, come from the Qur'an (Musbikin, 2014).

In another work, *Jawahir al-Qur'an*, Al-Ghazali also discussed his support for scientific hermeneutic. He stated that all sciences are gathered in one among several oceans of Allah's knowledge which has no end. Furthermore, he strengthened his arguments by saying that among Allah's deeds are to provide healing and pain, as He told about Prophet Abraham: " *And He ˹alone˺ heals me when I am sick.*" QC. Ash-Shu’ara: 80). Al-Gazali explained that medicine and diseases cannot be discovered except by those who are involved in the medical field (Al-Ghazālī, 2003). Thus, the verse is a signal dealing with medical science.

Besides al-Ghazali, Fakhruddin al-Razi was an expert commentator who tends to comply with scientific hermeneutic (Al-Rāzī, 2012). His monumental work, *Mafatih al-Gaib*, is filled with scientific discussions related to philosophy, natural sciences, theology, medicine, astronomy, and so on. Because of presenting the above discussions, this interpretation is known as a philosophical hermeneutic (Shihab, 1994). The same perspective is also carried out by Jauhari Tantawi, in his work, *Tafsir al-Jawahir*. His interpretation uncovers scientific theories and scientific reinforcement in every verse he interprets (Goldziher, 1955).

In this modern era, scientific hermeneutic is increasingly popular and used as a reference to study the sciences presented in the Quran. The development of scientific interpretation in the modern era was at least due to the influence of western technology and science (Europe and the United States) on the Arab world and Muslim regions, especially in the second half of the 19th century when most of the Islamic worlds were under the control of European countries (Jansen, 1980). This western hegemony has gradually led to resistance on one hand and on the other hand, advances in modern Arab scholars' thoughts in terms of religious and social sciences.

The development of scientific hermeneutic is also an implication of the change in the modern Muslims' perspectives on the verses of the Qur'an, especially with the exposure of modern scientific discoveries in the 20th century. For example, the word '*lamusi'un*', in the QC *al-Zariyat*: 47, "*We built the universe with ˹great˺ might, and We are certainly expanding ˹it˺*". Along with new scientific discoveries, astronomers concluded a scientific theory, stating that nebulae which lie outside the galaxy we live in continues to move away at different speeds, even celestial bodies in one galaxy are moving away from one another (Hanafi, 2015). This shows that the discoveries of modern science can provide new scientific meanings of the verses of the Qur'an.

An expert on scientific miracles, Nadya Tayyara, explained that he finally found out new information from several passages of the Qur'an verses that talk about fruits. This understanding is also a response to the exposure of biological diseases and their treatment mechanisms, and an understanding of the correlation between chronic diseases and immune disorders that can be cured by these fruits (Ṭayyāra, 2009). This statement was strengthened by Ibn Qayyim al-Jauziyah, claiming that the fruits mentioned in the Qur'an have efficacies that other fruits don't. All of these fruits can be used to cure certain diseases (Al-Jauziyah, 2012). By this context, the paper shows the scientific evidence that causes the pomegranate to be a special fruit as mentioned in the Koran. The disclosure of scientific facts means that the quranic hermeneutic is open to modern science. In interpreting the pomegranate verses must be based on botanical science data.

Pomegranate in commentators’ perspectives: a Quranic Hermeneutic

Pomegranate is a fruit mentioned in the Quran. Al-Shafii noted that pomegranate (*rumman*) is mentioned three times in the Quran; two of which are in the QC Al-An'am (6): verse 99 and 141, and another in the QC Al-Rahman (55): verse 68 (Al-Shāfi’ī, 2000). Hermeneutical interpretations of these verses were compiled in Table 1.

Al-Alusi mentions the hermeneutic of the shura al-An’am verses; 99 and 141, there is a similar redaction as referring to olive and pomegranate. In both verses, God speaks of the signs of His power for the believers. Among of which on earth is that He created a variety of trees, such as palm trees, olive trees, and pomegranate trees which take similar shapes and colours, despite the difference in taste (Al-Alusi, 1997).

Commenting on those verses above, Qatadah stated that the creation of this pomegranate fruit is similar in its shape, partly to some of the others, but different in the fruit it produces, either in terms of its colour, taste, or content. The power of God's creation on the pomegranate can be seen from the origin of its creation. At the initial phase, it is grain, then grows into a tree, and produces the same fruit colour but different taste and smell (Kathīr, 2000).

In the Quran chapter Al-Rahman (55) verses 68-69, God said: "*In both of them will be [all kinds of] fruit, and date-palms and pomegranates. Then which of your Lord's favors will you both deny?".* In this verse, God particularly mentions that there are kinds of fruits, dates, and pomegranates in heaven. Ibn al-Jauzi mentioned the word '*dates*'(*nakhl*) and '*pomegranates*' (*rumman*) after the word '*fakihah*' meaning fruits both are classified as fruits. This is to explain the virtue of both fruits (Al-Jauzi, 2002). Al-Tabari also stated that in the verse, there is a conjunction indicating a particular thing to the general one, mentioning the word 'fruits' followed by the word 'dates' (*nakhl*) and pomegranates (*rumman*) (Al-Tabari, 1998). However, the mention of the two words specifically shows the virtue of the two fruits over the others.

Al-Maragi stated that the series in *Al-Rahman* verses 62 to 77 describe that there is a tree of fruit grown with leafy green in heaven. Inside of it, there is a clear water spring that sparkles. Meanwhile, the dwellers and angels are leaning back on green pillows and beautiful carpets. The angels who happen to be the dwellers' servants have never been touched by any human beings nor genies. They can easily pick the fruit up close as the trees are short. Among the various fruits, the only special ones are dates and pomegranates which have been mentioned (Al-Maragi, 1996). *Then which of your Lord's favors will you deny?*

According to Al-Qurtubi, in this verse, dates, and pomegranates are mentioned after the other fruits as in line with the Arabs customs, dates and pomegranates are like wheat. For the Arabs, dates are the main course, while pomegranates are the dessert. Both fruits are mostly planted since the Arabs take benefits from them (Al-Qurṭubī, 2014). Whereas, according to Al-Rāzī, God mentions the two fruits, pomegranates and dates, because they are opposite each other; one tastes sweet and the other does not. In addition, one is hot and the other is cold; one is as a source of nutrients and the other is not; one grows in hot land and the other is in cold land; one with high trunk and the other with opposite trunk (Al-Rāzī, 2012). Whereas, a medieval commentator, Muhammad al-Shawkani, presented several opinions from the interpretation of *surah* al-Rahman: 68, pomegranate and dates mentioned in the verse belong to the heaven's second characteristics mentioned in the QC. al-Rahman: 62. Even though both are classified into fruits, but particularly mentioned because of their abundant benefits compared to other fruits. Both are also plants existing on the land of Arabs. Another opinion stated that pomegranate is a type of fruit that can be used for medication with extraordinary efficacies (Al-Shawkānī, 2014).

A modern Indonesian commentator, M. Quraish Shibab, tends to interpret the verses about pomegranate based on its efficacies which have empirically been examined. In his commentary book, *al-Misbah*, he explained that its juice contains very high levels of citric acid compared to other types of fruits, and when roasted, it is very helpful in reducing the acidity of urine and blood which in turn can prevent gout on the body. The citric acid contained in pomegranate can also help form some kidney stones. This juice also contains sufficient sugar levels, around 11%, to ease the roasting and produce energy (Shihab, 2002).

Polyphenols in pomegranate fruit

Some extraction techniques have been introduced to get high recovery of polyphenols. Rajha *et al.* (2019) have compared 5 extraction techniques namely conventional extraction (CE) based on liquid-solid extraction using water bath, extraction assisted by infrared irradiation (IR), ultrasound- assisted extraction (UAE), extraction using pulsed electric fields (PEF), and extraction using high-voltage electrical discharges (HVED). HVED assisted extraction offered the enhanced the recovery of polyphenols by approximately of 3 and 1.3 times as compared to US and PEF assisted extractions, respectively. The high recovery of polyphenols during extraction of HVED was caused by the ability of HVED technique to damage the microstructure of pomegranate skins strongly, as indicated from scanning electron microscopy (SEM) study.

With the advance of experimental design applied in extraction of phytochemicals, response surface methodology (RSM) was used to evaluate the effect of three factors namely (1) condition liquid/solid ratio, (2) extraction time and (3) ethanol percentage on ultrasonic assisted extraction (UAE) in obtaining the maximum of total polyphenols (TP), total flavonoids (TF) and condensed tannins (CD) from pomegranate peels. The optimum condition was obtained using liquid/solid ratio of 20, extraction time of 30.94 min and 59.26% of ethanol offered the highest contents of TP, TF and CT simultaneously. The results obtained during experimental design were in agreement in those with the predicted values (Hayder *et al*., 2021).

Pomegranate fruit is rich in polyphenol compounds that may potentially revealed some biological activities such as antioxidant, antibacterial and antifungal activities. The main phenolic compounds in pomegranate peel were anthocyanins, phenolic acids, and flavonoids. During storage, some changes in polyphenolic contents may occur. The study on the content changes of polyphenolic compounds of pomegranate peel and arils during storage for 50 days at temperature of 5^{o}C was undertaken. The change patterns of pomegranate peel and aril were different among different phenolic compounds. The concentrations of the major phenolic compounds detected in arils and peels decreased during storage, except for syringic acid, catechin acid, p-coumaric acid, chlorogenic acid, caffeic acid, epicatechin, and dihydroquercetin (in arils). In addition, some phenolics compounds were decreased in pomegranate peel except syringic acid, catechin acid, p-coumaric acid, dihydromyricetin during storage. These changes may relate to enzymatic activities. The information on changes in polyphenolic contents is useful for management during postharvest treatments to maintain the quality of pomegranate fruits (Liu *et al*., 2021).

Polyphenolics can be divided into two types: extractable (soluble in aqueous−organic solvents) and non-extractable polyphenols (NEPPs, which are not soluble in aqueous−organic solvents (Pérez-Ramírez *et al*., 2018). The main extractable phenolic compounds were anthocyanins, gallotannins and gallagyl derivatives, while the main non-extractable phenolic compounds include vanillic acid and dihydroxybenzoic acid. Six compounds were then isolated from the EtOAc extracts whose structures were identified as β-sitosterol-3-O-glycoside (1), β-sitosterol (2), ursolic acid (3), corosolic acid (4), asiatic acid (5) and arjunolic acid (6). Using supercritical extraction CO$_2$: EtOH, punicalagin α-anomer, punicalagin β–anome and ellagic acid were isolated (Harscoat-Schiavo *et al*., 2021).

The identified polyphenolic compounds in pomegranate fruit are grouped into (1) ellagitannins (hydrolyzable tannins) such as corilagin, granatin A and B, tellimagrandin, pedunculagin, punicalagin (an unique compound to pomegranate which is found in the seeds, peel, leaves and juice) with the chemical structure in Figure 2; (2)

anthocyanins and their derivatives (sugar derivatives of delphinidin, cyanidin and pelargonidin such as delphinidin-3-glucoside, delphinidin-3,5-diglucoside, cyanidin-3-gluco side, cyanidin-3,5-diglucoside, pelargonidin-3-glucoside and pelargonidin -3,5-diglucoside, and punicalin with chemical structures in Figure 3; (3) derivatives of ellagic acid; (4) flavanols such as kaempferol, quercetin and myricetin, flavones; (4) flavan-3-ols such as catechin, epicatechin and epigallactocatechin 3-gallate; (5) hydroxybenzoic acids and their derivatives; (6) hydroxycinnamic acids and their derivatives, as compiled in Table 2 (Topalović *et al*., 2021; Wong *et al*., 2021).

Biological activities of pomegranate polyphenols

Some biological activities on pomegranate polyphenols have been reported including antibacterial and antioxidants (Govindappa *et al*., 2021). The antibacterial activities and antioxidant activities of pomegranate peel extracts extracted using high pressure and enzymatic assisted extraction have been evaluated. The chemometrics of principal component analyses exhibited that antioxidant activity and phenolic compounds content were strongly related with antimicrobial activity (Alexandre *et al*., 2019).

Pomegranate is a very special fruit with a lot of efficacies and benefits. It is closely related to the fact that the Quran particularly mentions pomegranate in the QC. Al-Rahman verses 68-69, "*In both of them will be [all kinds of] fruit, and date-palms and pomegranates. Then which of your Lord’s favors will you both deny?”*. The Quran does not mention a type of vegetation unless it is the top organism of its species. Therefore, modern scientific commentators of the Quran state that pomegranate conceives scientific miracles, which is very beneficial for human life. These benefits did not only appear in the days when this verse was revealed but also had existed in ancient times. Pomegranate has been utilized for treatment in the times of the Pharaoh Kings to treat their people who were infected by certain diseases (Al-Muslih, 2009).

In the Islamic period, some scholars referred to some benefits that pomegranate has. Ibn al-Qayyim reported a hadith of treatment narrated by Ali R.A who heard the prophet P.B.U.H saying: "*Eat pomegranate with its fat because it can heal stomach*” (Hanbal, 2010). Ibn Qayyim said that pomegranate is very good to strengthen the stomach because it can soften it. It is also beneficial for the esophagus, chest, and lungs as well as efficacious for treating coughs. Its water can make the stomach feel relieved, facilitate nutrient supplies in the body, and strengthen memory (Al-Jauziyah, 2012).

In modern alternative medical treatment, all elements of the pomegranate fruit tree are efficacious for treatment, starting from its flesh of fruit, seeds, flowers, leaves, rinds, barks, to its root, which can serve as medicine. Pomegranate fruit produces anthocyanin, sugar, ascorbic acid, ellagic acid, gallic acid, caffeic acid; catechin, epigallocatechin gallate, and many minerals, especially iron, and amino acid (Jurenka, 2008). Fakhruddin al-Razi in his exegesis stated that sweet pomegranate serves to strain the shaft of male genitals; meanwhile, the sour one can eliminate sexual stimulus. The sweet pomegranate causes thirst, while the sour one relieves jaundice and discontinues vomiting (Al-Rāzī, 2012).

Besides, pomegranate can also cleanse and open the respiratory tract for people suffering from flu. Its juice may also serve as sweet thick syrup which is the most well-preserved acidity. This syrup can be added to any food and medically used to treat various diseases on the mouth and gums (Al-Najjar, 2006). Its antioxidant content is also higher than that in green tea, cranberry juice, and orange juice. The benefits of the fruit which grows a lot in Iran, northern India, and Southeast Asia-including Indonesia-are no longer just a myth nor advertising campaign. Even more, both red and white pomegranates are equally efficacious. They can serve as herbs to prevent cancer, antidiarrhea, increase or decrease weight, delay skin-aging, protect the heart and decrease cholesterol level (Menezes *et al*., 2006).

Pomegranate's root and bark comprise ellagitannins, including punicalin and punicalagin; piperidine alkaloids (Jurenka, 2008). Its root bark can be used to eradicate worms because it contains a lot of pelletierene alkaloids. To make such content in high doses is by boiling its root bark in 50 grams for every 1 L of water with a quarter-hour time. This stew is then consumed as many as approximately one glass each morning (Al-Husaini, 2015). This potion can sometimes result in indications of virulence, headache, nausea, and vomiting. To avoid the occurrence of these poisoning symptoms, this root bark should be mixed with other ingredients which can restrain bleeding, such as tannins. Thus, absorption of the solvent materials becomes slower. The root bark also comprises various materials which can restrain bleeding in high doses (Ahmad, 2003).

Meanwhile, pomegranate bark contains phenolic punicalagin, gallic acid, fatty acid; catechin, epigallocatechin gallate (EGCG), quercetin, rutin, flavonol, flavone, flavanone, anthocyanidin. Besides, its outer bark contains tannic acid, the materials which can restrain bleeding. Therefore, the dried pomegranate bark powder can serve as a remedy to ward off diarrhea and dysentery (Al-Futuh, 2006). It can also be used to withstand blood discharge in the digestive tract. Meanwhile, the boiled one also provides the same benefits and can be used to ward off caterpillars or worms, particularly tapeworms. This is because, on its bark, there are pelletierene alkaloid materials. The bark can also benefit people as anti-aging materials, so they make use of it to colour their skins along with the tree (Ṭayyāra, 2009).

Pomegranate is very beneficial for elderly women. Based on a study by Hidaka *et al*. (2005) it has an estrogenic effect, which is to ward off menopausal disorders and prevent reproductive organ cancer. By drinking a glass of pomegranate juice every day, people approaching menopause will get 100 mL of polyphenol antioxidant compounds. These compounds can paralyze cancer cells and restore artery wall hardening. The phytoestrogens content in pomegranate can reduce menopausal symptoms and strengthen bones.

Pomegranate is a fruit that refreshes the body and strengthens the heart and nerves. It is beneficial to cure people with weak nerves as well as to smoothen the digestive tract. Its juice which is dripped down the nose, either mixed with honey or not, can avoid the occurrence of polyps because it restrains blood vessels (Al-Bagdadi, 1994). The juice is a potion that is nutritious and refreshing, because it contains high enough carbohydrates, salt, and rich in vitamins, especially vitamin C. The juice can also exterminate germs with a comparison of 1:60 bacteria (Al-Audat, 1994). The bark, stem, and root of the pomegranate tree comprise no less than 20% of tannins. Pomegranate fruit is an easily hydrolyzed tannin, in the form of punicalagin. Punicalagin is an ellagitannin found only in pomegranate fruit. Punicalagin has isomer structures, that is, 2.3-(S)-Hexahydroxydiphenoyl-4.6-(S, S)-galagil-D-glucose (Kumari and Khatkar, 2016). Its bark, stem, and root contain no less than 20% of tannins. Of the existing tannins are four separate alkaloids; first, pelletierine alkaloid called also punicine; second, isopelletierine alkaloid; third, ethyl pelletierine alkaloid; and fourth, the pseudo-pelletierine alkaloid also called Methylgrantanine (Ṭalbah, 2011). Pomegranate also contains other polyphenol compounds, that is, catechin, and gallocatechin, as well as anthocyanin compounds such as prodelphinidin, delphinidin, cyanidin, and pelargonidin (Mertens-Talcott *et al*., 2006).

In Western countries, pomegranate usually appears in the fall. Now, food manufacturers add this fruit to chocolate, chewing gum, or made into juice. In 2005, 215 new foods and beverages were recorded containing pomegranate in the United States. Pomegranate is a versatile plant. Besides consumption, it is also made as juice for medication. This fruit contains many benefits. in addition to a great number of antioxidants, it helps prevent heart disease and stroke, and the seeds in each pomegranate grain contain fiber which is very beneficial for the body's immunity (Olivia, 2015).

1.1. Antibacterial activities

Antibacterial activities have been described in several studies using *in vitro* methods such as agar disc diffusion assays and/or minimum inhibitory concentration (MIC). Some extracts of Pomegranate peels extracted by conventional extraction (CE) based on liquid-solid extraction using water bath, extraction assisted by infrared irradiation (IR), ultrasound- assisted extraction (UAE), extraction using pulsed electric fields (PEF), and extraction using high-voltage electrical discharges (HVED) are evaluated for antibacterial activities using gram negative bacteria of *Escherichia coli* and gram positive bacteria of *Staphylococcus aureus*. The inhibition of polyphenol rich extracts are assessed using ELISA technique. Based on HPLC studies, all extract contains high levels of ellagic and gallic acids (polyphenols). All extracts exhibited antibacterial activities with the inhibition efficiency toward *S. aureus* up to approximately of 80% as compared to *E. coli* (up to approximately 33%) (Rajha *et al*., 2019). Phloretin and coumaric acid present in pomegranate fruit exhibited potent antimicrobial activity against *Staphylococcus epidermidis*, while punigratane revealed the most substantial antimicrobial effect on *Micrococcus kristinae* (Nazeam *et al*., 2020).

Giménez-Bastida *et al*. (2021) have compared the antibacterial activities of different parts of pomegranate fruit. The pomegranate peel revealed strong antibacterial activities, compared the other parts (flower, leaf, and stem), against *Salmonella enterica, Escherichia coli, Shigella sonnei, Enterococcus faecalis, Staphylococcus aureus* and *Bacillus subtilis*. These antimicrobial activities are primarily attributed to the polyphenolic compounds, including high tannin content especially punicalagin. The other polyphenolic compounds identified are gallic acid, punicalagin-α, punicalagin-β, catechin, chlorogenic acid, epicatechin, and ellagic acid. However, it is believed that the antimicrobial activities not only depend on a single or an individual component but also due to a various metabolite.

The antibacterial activity of water extract of black peel pomegranate and silver nanoparticles synthesized by water extract toward strains of gram-positive and gram-negative. Both extract and silver nanoparticles exhibited potent the antibacterial activities toward *Pseudomonas aeruginosa* (gram negative) and *Staphylococcus aureus* (gram-positive), although *P. aeruginosa* was less sensitive to both samples. The nanoparticles made from water extracts were more effective as bacteriostatic than water extracts with minimum bacteriostatic concentration of nanoparticles of 40–65 μg/mL. From this result, silver nanoparticles synthesized by water extract of black peel pomegranate can be considered as a high potential agent to combat infectious diseases due to its significant bacteriostatic activity (Khorrami *et al*., 2020).

1.2. Antioxidant activities

Antioxidant activities of pomegranate fruits and its parts either *in vitro* or *in vivo* in animal models have been reported (Akuru *et al*., 2020). In vitro, the antioxidant activities of pomegranate were evaluated by radical scavenging of DPPH (2,2’-diphenyl-1-picrylhydrazyl), ABTS (2,2’-azino-*bis* (3-ethylbenzothiazoline-6-sulphonic acid), FRAP (ferric-reducing antioxidant), metal chelating activity, reducing power assay, β-carotene bleaching assay, ORAC (oxygen radical absorbance capacity assay, NBT (nitroblue tetrazolium chloride) assay, TOSC (total oxyradical scavenging capacity) assay, ferrous ion chelating, superoxide radical scavenging activity and lipid peroxidation inhibitory activity (Smaoui *et al.*, 2019). Polyphenols extracted from pomegranate peel using ultrasound-assisted extraction (UAE) revealed high antioxidant activities using radical scavenging activity of DPPH of 94.91%, due to high content of punicalagin (143.64 mg/g dry matter) as determined by HPLC analysis (Kaderides *et al.*, 2019).

The antioxidant activities of 70% ethanolic extract of pomegranate peel and its fractions (petroleum ether, ethyl acetate, butanol and water) obtained using liquid-liquid extractions have been evaluated by *in vitro* methods. Butanol and ethyl acetate were the most active fractions as radical scavenger toward DPPH ABTS radicals. In addition, water fraction showed the strongest activity in FRAP and β-carotene bleaching tests (Šavikin *et al.*, 2018).

Some clinical studies have been conducted related to the health benefits of pomegranate juices and extracts. Giménez-Bastida *et al*. (2021) informed that the most promising effects in clinical studies are related to improvement of the blood pressure. In addition, the activities related to inflammation, cancer, cognitive function, physical activity are less evidence. The evidence on human during clinical studies remains inconsistent, making it difficult to support most claimed health effects. The difference on clinical study results might be attributable to design limitations, including insufficient product characterization and inter individual variability which influence the efficiency of pomegranate polyphenols.

Conclusion

Pomegranate is mentioned three times in the Qur'an. Classic commentators have different ways of interpreting it from modern ones who relate it to scientific hermeneutics. The former generally interpreted the verses on pomegranate as a special fruit which is mentioned by the Qur’an besides dates. Meanwhile, the latter stated that pomegranate contains scientific miracles, which are very beneficial for humans’ life since its tree components have medical efficacies, starting from its pulp, seeds, flowers, leaves, rind, bark, to roots which can be formulated into cosmetic and herbal medication. From scientific perspective, pomegranate fruit and its part contained bioactive compounds, especially polyphenols, having some biological activities which are beneficial to human health.

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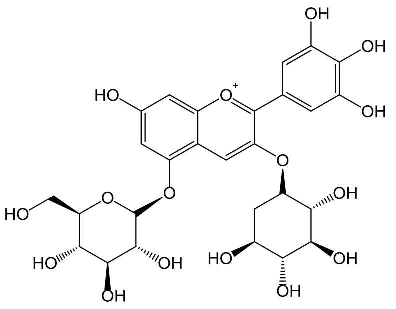
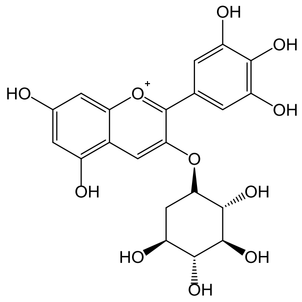
Pomegranate Juice and Fruit

Pomegranate Tree

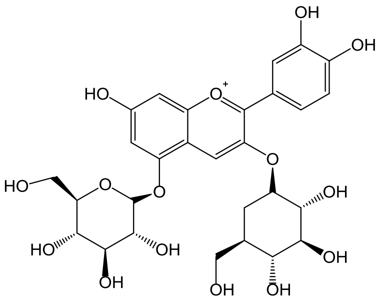
Figure 1. Pomegranate fruit, pomegranate juice and pomegranate tree.



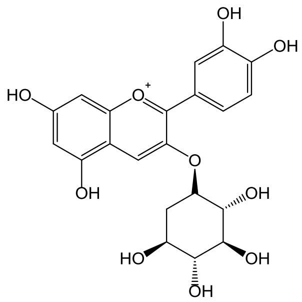
Delphinidin-3,5-diglucoside



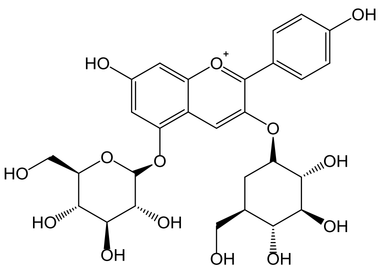
Delphinidin-3-glucoside



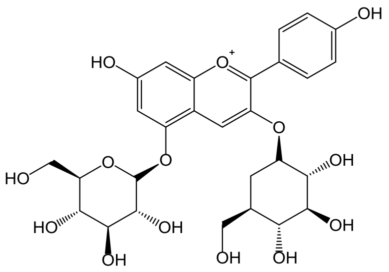
Cyanidin-3,5-diglucoside



Cyanidin-3-glucoside

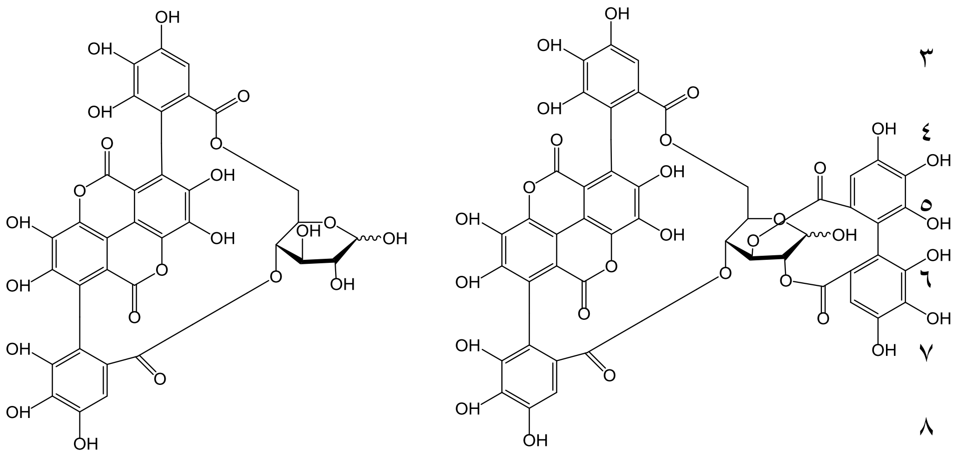


pelargonidin-3,5-diglucoside

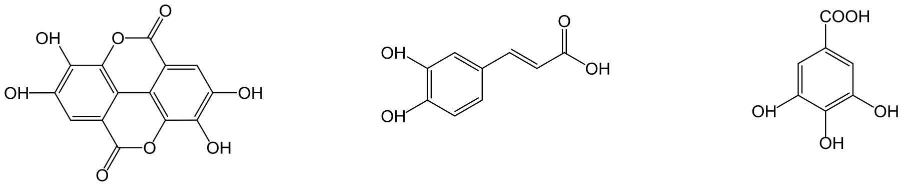


pelargonidin-3-diglucoside

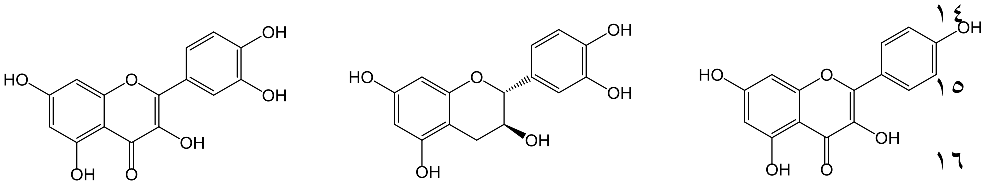
Figure 2. Anthocyanins present in pomegranate fruit (Wong *et al*., 2021).



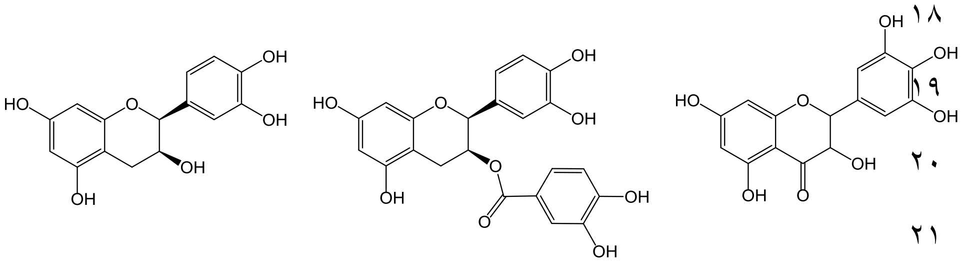
Punicalin **Punicalagin**



Ellagic **Caffeic acid** **Garllic acid**



Quercetin **Catechin** **Kaempferol**



Epicatechin **Epicatechin gallate** **Myricetin**

Figure 3. The representative structures of phenolic compounds identified in pomegranate

Table 1. The Quranic Hermeneutics of pomegranate verses

Pomegranate verses	**Commentators**	**Quranic Hermeneutic**
Shura al-An'am verses 99 and 141.	Al-Alusi	There is a similarity between the 3 fruits; palm, olive, and pomegranate. But have a different taste.
	Ibnu Kathir	There is a process similarity between 3 fruits - palm, olive, and pomegranate- from their seed shapes, trees, and fruit colors. However, it has a different taste and smell.
Shura al-Rahman verses 68-69	Ibn al-Jauzi	palms and pomegranates are called after the word of *fakihah* (fruits) means that both of them have virtues.
	Al-Tabari	The word *fakihah* (fruits) relies on the words *nakhl* (palm) and *rumman* (pomegranate) giving the meaning that both have an advantage over other fruits.
	Al-Maragi	This verse is related to Qs. Al-Rahman: 62 to 77 series that describes the fruits in heaven which are green and fresh. The ones mentioned are palms and pomegranates.
	Al-Qurtubi	Palms are the staple food of Arabs and pomegranate is the fruit. Both are widely grown because the Arabs need benefits from them.
	Al-Razi	Allah mentioned the palms and pomegranates because they have opposing characteristics. One is sweet, the other is not. One grows in hot places, the other in cold places. One provides nutrition, the other does not.
	Al-Shawkani	Palms and pomegranates are heavenly fruits that have advantages, benefits, and efficacies for the body. Both of them can be found in the Arab region.
	M. Quraish Shihab	The efficacy of pomegranate has been tested empirically. It contains high citric acid that can help reduce the acidity of urine and blood, thereby preventing gout. Pomegranate also contains a sugar content of about 11% which is useful for easier burning and producing energy

Table 2. Some phenolics compounds identified in pomegranate fruits (Topalović *et al.*, 2021).

Anthocyanins and their derivative • Cyanidin-3,5-caffeoyl hexoside • Cyanidin-3,5-diglucoside • Cyanidin-3,5-pentoside hexoside • Cyanidin-3-galactoside • Cyanidin-3-glucoside • Delphinidin-3,5-pentoside hexoside • Delphinidin-3-glucoside • Delphinidin-caffeoyl • Delphinidin-dihexoside • Delphinidin-trihexoside • Epiafzelechin-cyanidin-dihexoside • Epiafzelechin-cyanidin-hexoside • Epiafzelechin-delphinidin-hexoside • Epicatechin-cyanidin-3,5-dihexoside • Epicatechin-delphinidin-3,5-dihexoside • Epicatechin-delphinidin-hexoside • Epicatechin-pelargonidin-hexoside • Epigallocatechin-cyanidin-3,5-dihexoside • Epigallocatechin-cyanidin-hexoside • Epigallocatechin-delphinidin-3,5-dihexoside • Epigallocatechin-delphinidin-hexoside • Pelargonidin-3,5-diglucoside • Pelargonidin-3,5-pentoside hexoside	Ellagitannins and derivatives of ellagic acid • Brevifolin carboxylic acid • Casuarinin • Ellagic acid • Ellagic acid (p-coumaroyl) hexoside • Ellagic acid derivative • Ellagic acid dihexoside • Ellagic acid galloyl hexoside • Ellagic acid hexoside • Ellagic acid pentoside 1 • Ellagic acid pentoside 2 • Ellagic acid rhamnoside • Ellagitannin 1 • Ellagitannin 10 • Ellagitannin 11 • Ellagitannin 2 • Ellagitannin 3 • Ellagitannin 4 • Ellagitannin 5 • Ellagitannin 6 • Ellagitannin 7 • Ellagitannin 8 • Ellagitannin 9 • Granatin A • Lagerstannin A • Lagerstannin C • Pedunculagin 1 • Pedunculagin 2 • Pedunculagin 3 • Pedunculagin 4 • Pedunculagin derivative • Punicalin derivative 1 • Punicalin derivative 2 • Punigluconin 1 • Punigluconin 2
Flavonol glycosides • Kaempferol hexoside • Dihydrokaempferol hexoside • Syringetin hexoside 1 • Syringetin hexoside 2 Flavones • Apigenin rhamnoside	Flavanols • Catechin • Epicatechin • Procyanidin dimer 1 • Procyanidin dimer 2 • Procyanidin dimer 3 • Procyanidin dimer 4 • Procyanidin dimer 5 • Procyanidin trimer 1 • Procyanidin trimer 2 • Procyanidin trimer 3
Hydroxybenzoic acids and their derivatives • Gallic acid	Hydroxycinnamic acids and their derivatives

• Vanillic acid hexoside • Monogalloyl hexoside • Hexahydroxydiphenic acid hexoside • Digalloyl-hexoside 1 • Digalloyl hexoside 2 • Vanillic acid dihexoside • Gallagic acid • Galloyl ester • Digalloyl hexahydroxydiphenic acid hexoside 1 • Digalloyl-hexahydroxydiphenic acid hexoside 2 • Gallotannin • Galloyl gallagyl hexoside Gallagyl ester 1 Gallagyl ester 2 • Tri-hexahydroxydiphenic acid hexoside 1 • Tri-hexahydroxydiphenic acid hexoside 2	• p-coumaric acid hexoside • 4-p-coumaroylquinic acid • Caffeic acid hexoside 1 • Caffeic acid hexoside 2 • 3-caffeoylquinic acid • 5-caffeoylquinic acid 1 • 5-caffeoylquinic acid 2

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MANUSCRIPT EVALUATION FORM

Date : 10th July 2021

Manuscript ID : FR-2021-504

Please return by : 10th August 2021

Title of Manuscript : Pomegranate (*Punica granatum* L.) fruits in the Quranic Hermeneutics and scientific perspectives

1. IF YOU CANNOT REVIEW THIS MANUSCRIPT OR MEET THE DEADLINE, PLEASE INFORM US WITHOUT DELAY.

2. Your review should consider the article's scholarly merit including originality of the research issue and/or methodology, adequacy and rigor of the research methodology and techniques used, quality and rigor of data analysis, comprehensiveness of literature review, and the readability and presentation of the article. Please provide detailed and specific comments to all items. Also, where appropriate please provide suggestions for revision.

COMMENT SHEET

Using item 2 in page 1 as a guideline, please indicate the reasons for your recommendations. Most author(s) will appreciate frankness, combined with a modicum of tact. Even if you recommend that the manuscript be accepted for publication, please provide some general comments to the author(s).

Evaluation Criteria	Grade				
	A (Excellent)	B	C	D	E (Worst)
1. Appropriateness of Contents	√				
2. Originality of Topic		√			
3. Manuscript Format		√			
4. Research Methodology			√		
5. Data Analysis			√		
6. Relevance to the Journal		√			

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	(REVIEWER'S SECTION) **REVIEWER'S COMMENTS/SUGGESTIONS**	**(AUTHOR'S SECTION)** **AUTHOR'S ACTION/RESPONSE** ***NOTE FOR AUTHOR: Please state your response to the reviewer's comments/suggestion below**
1.	**Title** *It should reflect the article* Ok	Thank you
2.	**Abstract** *Background, Aim, Methodology and Conclusion* It is worth mentioning the purpose and method used in writing this manuscript	We have added "This review highlighted the Quranic hermeneutics and scientific perspective of Pomegranate for human health. To accomplish this review article, numerous reputable databases such as Scopus, American Chemical Society, Science Direct, Springer, and Google Scholar related with this review were downloaded and evaluated."
3.	**Keywords** *Min. 3 and Max. 6* Write keywords that are not in the title	We have written 3 keywords other than those in the article title
4.	**Introduction** *Concise with sufficient background*	-
5.	**Research design/Methodology** *Clearly described and reproducible* This section does not appear, maybe caused this manuscript is a review?	The methodology this review was at page 4, line 7
6.	**Data Analysis** *Results well presented and discussed* This section does not appear	There is no data analysis in this article review.
7.	**Conclusion** *A clear summary of the study* Good	Thank you
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	Ok	
9.	**English Proficiency** Very good	Thank you
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Overall Evaluation

Please choose one.

Accept		**Major Revision**	
Minor Revision	√	**Reject**	

Please return Manuscript and/or Review Comments to:
Professor Dr. Son Radu
Food Research
Email: foodresearch.my@outlook.com

07 July 2021

Dear: Professor Dr. Son Radu
Editor in Chief Food Research
Submission of manuscript to Food Research

It is my great pleasure to submit our paper entitled "**Pomegranate (*Punica granatum* L.) fruits in the Quranic Hermeneutics and scientific perspectives**" to be published in your esteem journal. Please contact me if you need further information regarding the paper.

The potential reviewers are:

1. Dr. Nurrulhidayah Ahmad Fadzillah
   Institute of Halal Research and Training, IIUM Malaysia
   Email: nurrulhidayah@iium.edu.my
2. Anjar Windarsih
   Research Unit for Natural Product Technology (BPTBA), Indonesian Institute of Sciences (LIPI), Indonesia
   Email: anjarwindarsih2@gmail.com
3. Dr. Ansar
   Department of Agricultural Engineering, Faculty of Food Technology and Agroindustries, University of Mataram
   Email: ansar72@unram.ac.id.

We hope our manuscript could be considered for publication in this journal.

Thank you in advance for your cooperation.
Sincerely, The corresponding author

Abdul Rohman, PhD
Laboratory of Analytical Chemistry

Prof. Abdul Rohman, PhD
Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Gadjah Mada University 55281. Yogyakarta, Indonesia. Email: abdulkimfar@gmail.com or abdul_kimfar@ugm.ac.id

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MANUSCRIPT SUBMISSION FORM

Please fill in your manuscript details in **'New Manuscript Submission Section'** and submit this form together with your manuscript.

Authors are requested to suggest at least 3 – 4 potential reviewers by filling in their particulars in the **'Suggested Reviewer'** section.

NEW MANUSCRIPT SUBMISSION

Manuscript Title	Pomegranate (*Punica granatum* L.) fruits in the Quranic Hermeneutics and scientific perspectives
Manuscript Type *(Please Bold)*	Original Article Short Communication **Review** Technical Notes
Authors	Atabik, A., Muqtada, M.R., Suhadi, Irnawati and Rohman, A.
Corresponding Author *(Only one)*	Abdul Rohman
Email address of the Corresponding Author	abdulkimfar@gmail.com

SUGGESTED REVIEWERS

Name	Nurrulhidayah Ahmad Fadzillah
Salutation	Dr
Area of Expertise *(Please use comma for more than one)*	Halal product science
Email	nurrulhidayah@iium.edu.my

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Salutation	Dr
Area of Expertise *(Please use comma for more than one)*	Food Analysis
Email	anjarwindarsih2@gmail.com

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Salutation	Dr
Area of Expertise *(Please use comma for more than one)*	Agricultural Engineering
Email	ansar72@unram.ac.id

Name	
Salutation	
Area of Expertise *(Please use comma for more than one)*	
Email	

muhammad rikza muqtada <mrmuqtada@iainkudus.ac.id>

Fwd: Submission

1 pesan

Ahmad Atabik <ahmad.atabik@iainkudus.ac.id> 12 April 2023 pukul 14.47
Kepada: mrmuqtada@iainkudus.ac.id

---------- Forwarded message ---------
Dari: **irnawati irens** <irnawati.vhina@gmail.com>
Date: Jum, 31 Mar 2023 05.10
Subject: Fwd: Submission
To: ahmad.atabik@iainkudus.ac.id <ahmad.atabik@iainkudus.ac.id>

Assalamu alaikum,
Berikut Bukti Submit artikel

Salam
---------- Forwarded message ---------
From: **irnawati irens** <irnawati.vhina@gmail.com>
Date: Wed, Mar 29, 2023 at 7:03 PM
Subject: Fwd: Submission
To: abdul rohman <abdulkimfar@gmail.com>

Prof berikut bukti Submit pomegranate

Salam

---------- Forwarded message ---------
Dari: **irnawati irens** <irnawati.vhina@gmail.com>
Date: Sab, 10 Jul 2021 09.54
Subject: Re: Submission
To: Food Research <foodresearch.my@outlook.com>

Dear Prof. Dr. Son Radu

Chief Editor of Food Research

The potential reviewers for our manuscript titled "Pomegranate (*Punica granatum* L.) fruits in the Quranic Hermeneutics and scientific perspectives" are:

1. Ansar
Department of Agricultural Engineering, Faculty of Food Technology and Agroindustries, University of Mataram
Email: ansar72@unram.ac.id.
2. Awal Prichatin Kusumadewi
Medicinal Plant and Traditonal Medicine Research and Development Center, Tawangmangu, Central Java.
Email: awalmadewa@gmail.com
3. Lily Arsanti Lestari
Department of Nutrition and Health, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, Yogyakarta, 55281, Indonesia
Email: lily_al@ugm.ac.id

Best regards
Irnawati

On Fri, Jul 9, 2021 at 10:45 PM Food Research <foodresearch.my@outlook.com> wrote:

> Dear Irnawati,
> Received with thanks. Kindly provide us another 2 or 3 more reviewers as to not burden Dr. Nurrulhidayah and Dr. Anjar as they are still in the process of reviewing previous submissions. Thank you.
> Best regards,
> Son Radu, PhD
> Chief Editor
>
> ---
>
> **From:** irnawati irens <irnawati.vhina@gmail.com>
> **Sent:** Friday, 9 July, 2021 6:41 AM
> **To:** Food Research <foodresearch.my@outlook.com>
> **Subject:** Re: Submission
>
> Dear Son Radu Ph.D
> Chief editor of Food Research
>
> I has attached our revision manuscript,
> Thank You for your comment
>
> Best regard
> Irnawati
>
> On Thu, Jul 8, 2021 at 1:36 AM Food Research <foodresearch.my@outlook.com> wrote:
>
>> Dear Inarwati,
>>
>> Thank you for your submission to Food Research.
>> Kindly revise the manuscript according to the comments attached.
>> The references should be revised according to Food Research format before we begin the reviewing process.
>>
>> Best regards,
>> Son Radu, PhD
>> Chief Editor
>>
>> ---
>>
>> **From:** irnawati irens <irnawati.vhina@gmail.com>
>> **Sent:** Wednesday, 7 July, 2021 2:08 PM
>> **To:** Food Research <foodresearch.my@outlook.com>
>> **Subject:** Submission
>>
>> Dear Professor Dr. Son Radu
>>
>> Editor in Chief Food Research
>>
>> It is my great pleasure to submit our paper to be published in your esteem journal.
>>
>> Best regards
>>
>> Irnawati

muhammad rikza muqtada <mrmuqtada@iainkudus.ac.id>

Fwd: FR-2021-504 - Decision on your manuscript

1 pesan

Ahmad Atabik <ahmad.atabik@iainkudus.ac.id> 12 April 2023 pukul 14.48
Kepada: mrmuqtada@iainkudus.ac.id

---------- Forwarded message ---------
Dari: **irnawati irens** <irnawati.vhina@gmail.com>
Date: Jum, 31 Mar 2023 05.15
Subject: Fwd: FR-2021-504 - Decision on your manuscript
To: <ahmad.atabik@iainkudus.ac.id>

Pak, Berikut Bukti penerimaan artikel

Salam

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From: **irnawati irens** <irnawati.vhina@gmail.com>
Date: Wed, Mar 29, 2023 at 7:07 PM
Subject: Fwd: FR-2021-504 - Decision on your manuscript
To: abdul rohman <abdulkimfar@gmail.com>

Decision

---------- Forwarded message ---------
Dari: **Food Research** <foodresearch.my@outlook.com>
Date: Kam, 16 Des 2021 20.23
Subject: FR-2021-504 - Decision on your manuscript
To: irnawati irens <irnawati.vhina@gmail.com>
Cc: abdul rohman <abdulkimfar@gmail.com>

Dear Dr Irnawati,

It is a pleasure to accept your manuscript for publication in Food Research journal. Please refer to the attachment for your acceptance letter. I will contact you again once the galley proof is ready for viewing and approval.
Due to high volumes of manuscripts in production, please expect some delay.

Thank you for your fine contribution. We look forward to your continued contributions to the Journal.

Sincerely,
Dr Vivian New
Editor
Food Research

From: Food Research <foodresearch.my@outlook.com>
Sent: Thursday, 26 August, 2021 10:36 PM
To: irnawati irens <irnawati.vhina@gmail.com>
Subject: Re: Manuscript ID: FR-2021-504

Dear Irnawati,

Thank you for the revised copy of your manuscript. We will contact you again for further processing.

Best regards,
Son Radu, PhD
Chief Editor

From: irnawati irens <irnawati.vhina@gmail.com>
Sent: Thursday, 26 August, 2021 10:02 AM
To: Food Research <foodresearch.my@outlook.com>
Subject: Re: Manuscript ID: FR-2021-504

Dear Professor Son Radu, Ph.D

I attached our revised manuscript titled "Pomegranate (*Punica granatum* L.) fruits in the Quranic Hermeneutics and scientific perspectives"

Thank you
Best regards
Irnawati

On Mon, Aug 23, 2021 at 3:41 PM Food Research <foodresearch.my@outlook.com> wrote:

> Dear Irnawati,
>
> Kindly revise the manuscript according to the comments attached and revert to us at your earliest convenience.
> Adhering to Food Research format is greatly appreciated
>
> Best regards,
> Son Radu, PhD
> Chief Editor
>
> ---
>
> **From:** irnawati irens <irnawati.vhina@gmail.com>
> **Sent:** Sunday, 22 August, 2021 3:07 PM
> **To:** Food Research <foodresearch.my@outlook.com>
> **Subject:** Re: Manuscript ID: FR-2021-504
>
> Dear Professor Son Radu, Ph.D
>
> I attached our revised manuscript and the evaluation form for article titled "Pomegranate (*Punica granatum* L.) fruits in the Quranic Hermeneutics and scientific perspectives"
>
> Thank you
> Best regards
> Irnawati
>
> On Fri, Aug 20, 2021 at 10:14 AM irnawati irens <irnawati.vhina@gmail.com> wrote:
>
>> Assalamu alaikum Prof, berikut hasil review dari artikel pomegranate
>>
>> Salam hormat 🙏
>>
>> ---------- Forwarded message ---------
>> Dari: **Food Research** <foodresearch.my@outlook.com>
>> Date: Jum, 20 Agt 2021 02:19

Subject: Re: Manuscript ID: FR-2021-504
To: irnawati irens <irnawati.vhina@gmail.com>

Dear Professor Dr. Abdul Rohman,

Manuscript FR-2021-504 entitled " Pomegranate (Punica granatum L.) fruits in the Quranic Hermeneutics and scientific perspectives " which you submitted to Food Research, has been reviewed. The comments of the reviewer(s) are included in the attached file.

The reviewer(s) have recommended publication, but also suggest some revisions to your manuscript. Therefore, I invite you to respond to the reviewer(s)' comments and revise your manuscript. Once the revised manuscript is prepared, please send it back to me for further processing.

Because we are trying to facilitate timely publication of manuscripts submitted to Food Research, your revised manuscript should be submitted before or by 30th August 2021. If it is not possible for you to submit your revision by this date, please let us know.

Once again, thank you for submitting your manuscript to Food Research and I look forward to receiving your revised manuscript.

Sincerely,

Son Radu, PhD
Chief Editor, Food Research
foodresearch.my@outlook.com

From: Food Research <foodresearch.my@outlook.com>
Sent: Saturday, 10 July, 2021 11:38 PM
To: irnawati irens <irnawati.vhina@gmail.com>
Subject: Manuscript ID: FR-2021-504

Dear Professor Dr. Abdul Rohman,

This message is to acknowledge receipt of the above manuscript that you submitted via email to Food Research. Your manuscript has been successfully checked-in. Please refer to the assigned manuscript ID number in any correspondence with the Food Research Editorial Office or with the editor.

Your paper will be reviewed by three or more reviewers assigned by the Food Research editorial board and final decision made by the editor will be informed by email in due course. Reviewers' suggestions and editor's comments will be then made available via email attached file. You can monitor the review process for your paper by emailing us on the "Status of my manuscript".

If your manuscript is accepted for publication, Food Research editorial office will contact you for the production of your manuscript.

Thank you very much for submitting your manuscript to Food Research.

Sincerely,

Son Radu, Ph.D.

YVdlR0tCWjdJT0M5UVdacXQ2Y1FZQlVEdEZaMDA5ZkVpZ2l0ST0iLDg4OiJz
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Zmt6SlNzYWlJc081aityQWRKRkc2VGJaK1VuMGhJYUI2Vm

FR-2021-504 Acceptance Letter.pdf
132K

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16th December 2021

Dear Professor Dr Rohman,

ACCEPTANCE LETTER

Food Research is pleased to inform you that the following manuscript has been accepted for publication in Food Research journal.

Manuscript Title : Pomegranate (*Punica granatum* L.) fruits in the Quranic Hermeneutics and scientific perspectives

Authors : Atabik, A., Muqtada, M.R., Suhadi, Irnawati and Rohman, A.

We thank you for your fine contribution to the Food Research journal and encourage you to submit other articles to the Journal.

Yours sincerely,

Son Radu

Professor Dr. Son Radu
Chief Editor
Food Research

✉ foodresearch.my@outlook.com www. http://www.myfoodresearch.com

Pomegranate (*Punica granatum* L.) fruits in the Quranic Hermeneutics and scientific perspectives

Abstract

This review highlighted the Quranic hermeneutics and scientific perspective of Pomegranate for human health. To accomplish this review article, numerous reputable databases such as Scopus, American Chemical Society, Science Direct, Springer, and Google Scholar related with this review were downloaded and evaluated. Pomegranate is popular fruits consumed because of their pleasant taste and high nutritional value having some health benefits to human health. In addition, pomegranate (*rumman* in Arabic) is one of stated fruit in Quran. Quranic Hermeneutic with a scientific approach has been a new model used by modern commentators to explore various kinds of sciences presented in the Quranic verses. Qur'an mentions a pomegranate three times. Classic commentators generally interpreted the pomegranate verses as a special fruit and served for the occupants of heaven. In contrast, modern scientific commentators stated that the fruit contains scientific miracles that are very beneficial for human's health since this fruit had some phytochemicals reported to have some biological activities including antioxidant and antibacterial activity.

Keywords: Pomegranate, Quranic Hermeneutic, antioxidant, phenolics, antibacterial activities.

1. Introduction

Pomegranate fruits with scientific name of *Punica granatum* L. (belong to family of Punicaceae) are excellent sources of bioactive compounds mainly polyphenols. This plant is native to central Asia, but currently it is highly adaptable to a wide range of climatic and soil conditions, and is now grown in many different geographical regions including the Mediterranean basin, Asia, and California in the USA. Pomegranate fruit has been used extensively in the folk medicines of many cultures since ancient times including Greek, Ayurvedic, Unani and Egyptian (Reddy, 2018). This fruit is regarded as a ‘super fruit’, which is rich in antioxidant phytochemicals and is recognized for a myriad of health benefits. Pomegranate fruit is gaining popularity worldwide for its uniqueness, exclusive colour and taste, and associated health benefits (Hegazi *et al*., 2021).

Pomegranate is a type of tree from the family of Myrtaceae. Pomegranate (*rumman*) in a scientific term is called *Punica granatum* (Ṭalbah, 2011). Since thousands of years ago, human beings have enjoyed it both as food and medicine. The fruit is estimated to originate from West Asia and spread to the surrounding areas. Hebron, which is now a part of Israel territories, is well-known for pomegranate which has been planted since the time of the Prophet Moses. Egypt, Ancient Greece, and Rome are the civilizations known for harvesting this fruit. Several archaeological findings found the residues of pomegranate plants, such as its seeds and barks around Cyprus, Israel, Iraq, Jordan, Lebanon, Palestine, Syria, and Turkey. It is estimated to have existed since 3,000 years before A.D. (Potts, 2012).

Experts argue that the pomegranate habitat is in Southwest Asia (Middle East) or Northwest Asia (India). However, it has already spread and well-bred in the Mediterranean area. Then, it crosses over Iran, the Mediterranean Sea (Iraq and Syria),

Egypt, Europe, and even flourishes in Southern China and Southeast Asia. This plant is easy to grow in areas with almost all climates and from low to high land. Despite its ignorance, pomegranate can flourish well on the dry loose land (Mubashir and Mahran, 2010).

Pomegranates are becoming more popular with consumers because of their pleasant taste and high nutritional value. Pomegranate fruit is constituted by peel, arils, and seeds in an approximate 50:40:10 ratio, respectively. As in the majority of fruits, the chemical composition of the pomegranate differs according to the climatic conditions, ripening degree of the fruit at the time of harvest (Guo *et al*., 2021). The edible part of pomegranate is about 57%–85% of the whole fruit, among which fruit juice accounts for 36%–63%. The taste of pomegranate is moderately sour and sweet throughout the flavouring improvement by modern cultivation technology. Pomegranate juice is considered as functional food due to some bioactive contents which are beneficial to human health. Pomegranate fruit contain 17 kinds of amino acids and minerals, vitamin C, calcium, iron, phosphorus, retinol, riboflavin, ferulic acid, and other phenolic compounds. Pomegranate seed oil is also valuable source of bioactive compounds with health-beneficial effects, but it is sensitive to oxidation due to high content of PUFA. Therefore, the oil was added with pomegranate peel extract or synthetic antioxidants to improve its stability toward oxidation (Drinić *et al*., 2020). This fruit is suitable for both young and old consumers; for example, pomegranate juice drinks are popular in daily life, and pomegranate extracts also serve as food additives, supplements, and for taste correction (Ge *et al*., 2021). Pomegranate extract and its polyphenols can be considered as cosmeceuticals because both revealed skin protective effects by ameliorating methylglyoxal (MGO)-induced DNA damage through restoring cell adhesion, migration, and wound healing capacity (Guo *et al*., 2021). The regular

consumption of this fruit has been associated with the prevention of gastric damage, cardiovascular disease, type 2 diabetes mellitus, and specific types of cancers, renal illnesses, liver complications, and osteoarthritis (Villa-Ruano *et al.*, 2020). In this review, pomegranate from Quranic and scientific perspectives are described. In scientific perspective, the antibacterial and antioxidant activities and polyphenols responsible for these activities are highlighted.

2. Methods

This descriptive-analytical paper used a thematic method based on literature review, referring to scientific articles from *Tafseer* books, reputed journals, book literature, and conference papers. During this study, some databases of Scopus, American Chemical Society, Science Direct, Springer, and Google Scholar covering abstract and full texts are downloaded and evaluated to be used as references during this review. Scientific studies on Pomegranate published in journals were also used as main references. In addition, other sources came from books related to scientific miracles of the Quran compiled by experts in their fields.

3. Pomegranate fruit

Pomegranate (*Punica granatum* L.), Figure 1, is a fruit plant that can grow up to 5-8 meters in sub-tropical areas to tropical ones, from lowland to below 1000 meters above sea level. It is a shrub or a small tree with 2-5 meters in height (Lansky and Newman, 2007). Its stem is woody with square twigs, a lot of branches, spikes on its axilla, weak in nature, brown-coloured when unripe, and turns into dirty green post ripe. The pomegranate tree has a single leaf with short stems, located in groups. The leaf sheet takes oval to lancet in shape, taper base, blunt tip, pinnate bones, shiny surface, 1-9 cm in length, 0.5-2.5 cm in width, and green-coloured (Ahmad, 2003).

Pomegranate is a berry fruit with a rounded shape and 5-12 cm in diameter, with various bark colours, such as purplish-green, white, reddish-brown, or blackish purple. The fruit is unique with its red-glazing seeds like crystals. The flower is called *Jullanar*. It is an antique fruit that has been known since ancient times. Many people gain some virtues and benefits found in it (Ṭayyāra, 2009). The pomegranate tree is a small posture with thin foliage and flatly shaped, having large and beautiful flowers, with a reddish colour, a fleshy shell of which contents are red-coloured cobs. The white flowers which lie in several separate places, one by one serve as a transparent lid. The Persians named this pomegranate *Jalnaz*, meaning the red fruit with seeds on it (Olivia, 2015).

In Indonesia, pomegranate is well-known by several names, depending on the regions it grows, such as *delima* (Malay), *glima* (Acehnese), *Glineu Mekah* (Gayonese), *dhalima* (Maduranese), *gangsalan* (Javanese), *dalima* (Sundanese), *teliman* (Sasaknese), *lele kase* and *rumu* (Timor). There are three types of pomegranate scattered over Indonesia, classified by its colours; they are white pomegranate, red pomegranate, and black pomegranate. Of these three types, the most famous is the red one. Pomegranate fruit is a symbol of prosperity and fertility, which is held in the form of a ceremony of seven months of a pregnancy ritual, conducted by Javanese people and other tribes in Indonesia (Olivia, 2015). Meanwhile, for Chinese people, it is one of the compulsory fruits in welcoming the Lunar New Year. They believe that many of the seeds are a symbol of abundant fortunes.

In general, pomegranate is various in types, in terms of shape, colour, sweetness level, acidity, or its seed's shape and colour. The best is the very red one with thin bark and abundant water content (Ṭalbah, 2011). It has three flavours, that is, sweet, sour, and blends between sweet and sour. Each flavour has a diverse uniqueness. The fruit with a sweet taste has a 7-10% content of sugar, 81% of water, 0.6% of proteins, and

0.3% of fat. Moreover, sweet pomegranate also contains fiber as much as 2% as well as some tannin, inulin, and citric acid as much as 1%. It also contains minerals, mainly iron, phosphorus, sulfur, potassium, lime, manganese, and vitamin C (Lansky and Newman 2007). Pomegranate with sour taste comprises less sugar, with 2% of citric acids. This acid content is even higher than that on oranges. Meanwhile, its seeds cover 9% of proteins and fat as much as 7%. Its outer bark contains tannic acids; the material that can restrain bleeding. Therefore, its outer bark powder which has been dried can be used as a remedy to ward off diarrhea and dysentery. It can also be used to restrain blood discharge in the digestive tract (Al-Qabbani, 2009).

Today, Quran has not only become the main focus of merely studying objects and classical interpretations, but also the attention of various scientific studies, including scientific and medical fields. An effort to comprehend the Quran with a scientific and medical approach by experts is called scientific hermeneutic. This style of hermeneutic is an attempt to understand the verses of the Quran containing scientific cues from the perspectives of modern science. Scientific hermeneutic is also an interpreter's striving effort to uncover the relationship between the verses of *kauniyah* in the Quran and scientific discoveries aimed at revealing its scientific miracles (Rahman, 1986).

4. Pomegranate in Quranic perspective

According to Al-Zahabi, this scientific hermeneutic seeks to explore the scientific dimension and uncover the secrets of its miracles related to scientific information that may not have been known to humankind during the descent, so it becomes evidence of the truth that the Quran is not a human work, but a revelation of the Creator instead (Zahabi, 2009). Dealing with this, many scientists have focused their studies on the Quran by attempting to put the verses of the Quran into logic and

correlating them with treatments and medicines. Scientists have tried to combine the studies of plants mentioned in the Quran with medicines. The Quran does not mention all types of plants in general, just like modern botanical science does, but all types of plants mentioned by the Quran are certainly the top organisms of their respective species. For example, the fig tree (the fruits of heaven) is the top of the species of "*Ficus*" of "Moraceae" types according to botanists, its species reaches about 700 scattered around the world. Likewise, pomegranate, herbs of 1001 benefits, cure various diseases, internal and external ones (Ahmad, 2003).

Nowadays, there have been families who have started the 'no vegetables and fruits' campaign in their family menu. Fruits constitute a major part of the nutrients needed by a human. Besides being consumed as nutrients and vitamins, certain fruits have medicinal properties for certain diseases. This is based on knowledge in religious teachings. This fruit is pomegranate which is also mentioned several times in the Qur'an and contains many health benefits. Almost all parts of pomegranate plants are useful for medical treatments, starting from the pulp, seeds, flowers, leaves, fruit skins, bark, to the roots that can be formulated into medicine (Al-Najjar, 2006).

The Quran does not mention a type of plant unless it serves as the top organism of each species. Likewise, pomegranate, with the Latin name *Punica granatum*, is a type of fruit that belongs to the berry species. Pomegranate is a plant species that has been well-known since ancient Egyptian time, that is, the beginning era of Egyptian civilization. Ancient people recognized it as 'Arhamanie' derived from the Qibti name called 'Armen' or 'Rumen' which is derived from the Hebrew name called 'Rumon'. Then, it is translated into the Arabic word 'Rumman' (Shehab, 2011).

Pomegranate (*rumman*) is an ancient plant known to produce many benefits and to provide various virtues. The Pharaoh Kings of ancient Egyptian had used

pomegranates as medicine (Ahmad, 2003). In Islamic literary treasures, pomegranate is classified into the fruit used as medicine for the Prophet. Ibn Qayyim wrote some of its virtues; the one with sweet taste is beneficial to the stomach, throat, chest, and lungs. It can also smoothen urine, reduce yellow substances in the liver, overcome diarrhea, and strengthen organs (Al-Jauziyah, 2012).

The Qur'an as the greatest miracle for Muslims comprises verses showing various scientific signs from modern science perspectives. The hermeneutic of verses that talk about science is known as *Tafsir Ilmi* (Scientific Interpretation) (Al-Qaraḍāwī, 1999). According to Husain al-Zahabi, scientific hermeneutic discusses scientific terms in narrating verses of the Qur'an, seeks to explore its scientific dimensions, and uncovers the secrets of miracles related to scientific information that may not have been known to humans at the time the Qur'an was revealed (Al-Żahabī, 1995). Hence, in modern times, this becomes another evidence that the Qur’an is not a human creation, rather a revelation of God, The Creator.

Muslim scientists have tried to uncover the contents of the Qur'an which leads to scientific discoveries or to keep some of the natural sciences which are not widely known by humans. They scientifically describe those contents in depth. Despite the Qur’an’s *zahir* (visible) characteristics, of which texts briefly talk about this issue, the scientists’ commentary can almost be proven by modern sciences (Al-Shirbaṣī, 1962). This argument is based on the fact that all sciences obtained from the Qur'an, after being analyzed accurately, will lead people to think at a certain point that everything said in the Qur'an is all true.

This scientific hermeneutic employed a set of contemporary sciences, such as astronomy, geology, chemistry, biology, medical science, and other scientific tools (Al-Qaraḍāwī, 1999). Such interpretation with scientific approaches is not intended to

justify the truth of scientific findings by the verses of the Qur'an, nor is it to compel the interpretation of the verses of the Qur'an to seemingly conform to the scientific findings. However, this scientific hermeneutic study initially arises from the awareness that the Qur'an is absolute, whilst its interpretation, both from commentary and scientific perspectives, is relative and tentative in nature (Hanafi, 2015).

Scientific hermeneutic has existed since the Abbasid dynasty. At that time, there were attempts made by some scholars to compromise Islamic teachings with translated foreign cultures, as well as pure sciences found among the Muslims (Abderrahman, 1986). Al-Ghazali was one of the figures who was persistent in supporting these interpretive ideas. In his monumental masterpiece, *Ihya 'Ulumiddin*, he put forward his argumentations to prove his stance (Al-Ghazālī, 2000). He said that all kinds of sciences, both preceding and subsequent ones, whether known or not, come from the Qur'an (Musbikin, 2014).

In another work, *Jawahir al-Qur'an*, Al-Ghazali also discussed his support for scientific hermeneutic. He stated that all sciences are gathered in one among several oceans of Allah's knowledge which has no end. Furthermore, he strengthened his arguments by saying that among Allah's deeds are to provide healing and pain, as He told about Prophet Abraham: " *And He ˹alone˺ heals me when I am sick.*" QC. Ash-Shu’ara: 80). Al-Gazali explained that medicine and diseases cannot be discovered except by those who are involved in the medical field (Al-Ghazālī, 2003). Thus, the verse is a signal dealing with medical science.

Besides al-Ghazali, Fakhruddin al-Razi was an expert commentator who tends to comply with scientific hermeneutic (Al-Rāzī, 2012). His monumental work, *Mafatih al-Gaib*, is filled with scientific discussions related to philosophy, natural sciences, theology, medicine, astronomy, and so on. Because of presenting the above discussions,

this interpretation is known as a philosophical hermeneutic (Shihab, 1994). The same perspective is also carried out by Jauhari Tantawi, in his work, *Tafsir al-Jawahir*. His interpretation uncovers scientific theories and scientific reinforcement in every verse he interprets (Goldziher, 1955).

In this modern era, scientific hermeneutic is increasingly popular and used as a reference to study the sciences presented in the Quran. The development of scientific interpretation in the modern era was at least due to the influence of western technology and science (Europe and the United States) on the Arab world and Muslim regions, especially in the second half of the 19th century when most of the Islamic worlds were under the control of European countries (Jansen, 1980). This western hegemony has gradually led to resistance on one hand and on the other hand, advances in modern Arab scholars' thoughts in terms of religious and social sciences.

The development of scientific hermeneutic is also an implication of the change in the modern Muslims’ perspectives on the verses of the Qur'an, especially with the exposure of modern scientific discoveries in the 20th century. For example, the word '*lamusi'un'*, in the QC *al-Zariyat*: 47, "*We built the universe with ˹great˺ might, and We are certainly expanding ˹it˺*". Along with new scientific discoveries, astronomers concluded a scientific theory, stating that nebulae which lie outside the galaxy we live in continues to move away at different speeds, even celestial bodies in one galaxy are moving away from one another (Hanafi, 2015). This shows that the discoveries of modern science can provide new scientific meanings of the verses of the Qur'an.

An expert on scientific miracles, Nadya Tayyara, explained that he finally found out new information from several passages of the Qur'an verses that talk about fruits. This understanding is also a response to the exposure of biological diseases and their treatment mechanisms, and an understanding of the correlation between chronic

diseases and immune disorders that can be cured by these fruits (Ṭayyāra, 2009). This statement was strengthened by Ibn Qayyim al-Jauziyah, claiming that the fruits mentioned in the Qur'an have efficacies that other fruits don't. All of these fruits can be used to cure certain diseases (Al-Jauziyah, 2012). By this context, the paper shows the scientific evidence that causes the pomegranate to be a special fruit as mentioned in the Koran. The disclosure of scientific facts means that the quranic hermeneutic is open to modern science. In interpreting the pomegranate verses must be based on botanical science data.

5. Pomegranate in commentators’ perspectives: a Quranic Hermeneutic

Pomegranate is a fruit mentioned in the Quran. Al-Shafii noted that pomegranate (*rumman*) is mentioned three times in the Quran; two of which are in the QC Al-An'am (6): verse 99 and 141, and another in the QC Al-Rahman (55): verse 68 (Al-Shāfī’ī, 2000). Hermeneutical interpretations of these verses were compiled in Table 1.

Al-Alusi mentions the hermeneutic of the shura al-An’am verses; 99 and 141, there is a similar redaction as referring to olive and pomegranate. In both verses, God speaks of the signs of His power for the believers. Among of which on earth is that He created a variety of trees, such as palm trees, olive trees, and pomegranate trees which take similar shapes and colours, despite the difference in taste (Al-Alusi, 1997). Commenting on those verses above, Qatadah stated that the creation of this pomegranate fruit is similar in its shape, partly to some of the others, but different in the fruit it produces, either in terms of its colour, taste, or content. The power of God's creation on the pomegranate can be seen from the origin of its creation. At the initial phase, it is grain, then grows into a tree, and produces the same fruit colour but different taste and smell (Kathīr, 2000).

In the Quran chapter Al-Rahman (55) verses 68-69, God said: "*In both of them will be [all kinds of] fruit, and date-palms and pomegranates. Then which of your Lord’s favors will you both deny?”.* In this verse, God particularly mentions that there are kinds of fruits, dates, and pomegranates in heaven. Ibn al-Jauzi mentioned the word '*dates*’(*nakhl*) and ‘*pomegranates*’ (*rumman*) after the word ‘*fakihah*’ meaning fruits both are classified as fruits. This is to explain the virtue of both fruits (Al-Jauzi, 2002). Al-Tabari also stated that in the verse, there is a conjunction indicating a particular thing to the general one, mentioning the word 'fruits' followed by the word 'dates' (*nakhl*) and pomegranates (*rumman*) (Al-Tabari, 1998). However, the mention of the two words specifically shows the virtue of the two fruits over the others.

Al-Maragi stated that the series in *Al-Rahman* verses 62 to 77 describe that there is a tree of fruit grown with leafy green in heaven. Inside of it, there is a clear water spring that sparkles. Meanwhile, the dwellers and angels are leaning back on green pillows and beautiful carpets. The angels who happen to be the dwellers' servants have never been touched by any human beings nor genies. They can easily pick the fruit up close as the trees are short. Among the various fruits, the only special ones are dates and pomegranates which have been mentioned (Al-Maragi, 1996). *Then which of your Lord’s favors will you deny?*

According to Al-Qurtubi, in this verse, dates, and pomegranates are mentioned after the other fruits as in line with the Arabs customs, dates and pomegranates are like wheat. For the Arabs, dates are the main course, while pomegranates are the dessert. Both fruits are mostly planted since the Arabs take benefits from them (Al-Qurṭubī, 2014). Whereas, according to Al-Rāzī, God mentions the two fruits, pomegranates and dates, because they are opposite each other; one tastes sweet and the other does not. In addition, one is hot and the other is cold; one is as a source of nutrients and the other is

not; one grows in hot land and the other is in cold land; one with high trunk and the other with opposite trunk (Al-Rāzī, 2012). Whereas, a medieval commentator, Muhammad al-Shawkani, presented several opinions from the interpretation of *surah* al-Rahman: 68, pomegranate and dates mentioned in the verse belong to the heaven's second characteristics mentioned in the QC. al-Rahman: 62. Even though both are classified into fruits, but particularly mentioned because of their abundant benefits compared to other fruits. Both are also plants existing on the land of Arabs. Another opinion stated that pomegranate is a type of fruit that can be used for medication with extraordinary efficacies (Al-Shawkānī, 2014).

A modern Indonesian commentator, M. Quraish Shibab, tends to interpret the verses about pomegranate based on its efficacies which have empirically been examined. In his commentary book, *al-Misbah*, he explained that its juice contains very high levels of citric acid compared to other types of fruits, and when roasted, it is very helpful in reducing the acidity of urine and blood which in turn can prevent gout on the body. The citric acid contained in pomegranate can also help form some kidney stones. This juice also contains sufficient sugar levels, around 11%, to ease the roasting and produce energy (Shihab, 2002).

6. Polyphenols in pomegranate fruit

Some extraction techniques have been introduced to get high recovery of polyphenols. Rajha *et al.* (2019) have compared 5 extraction techniques namely conventional extraction (CE) based on liquid-solid extraction using water bath, extraction assisted by infrared irradiation (IR), ultrasound- assisted extraction (UAE), extraction using pulsed electric fields (PEF), and extraction using high-voltage electrical discharges (HVED). HVED assisted extraction offered the enhanced the recovery of polyphenols by approximately of 3 and 1.3 times as compared to US and PEF assisted

extractions, respectively. The high recovery of polyphenols during extraction of HVED was caused by the ability of HVED technique to damage the microstructure of pomegranate skins strongly, as indicated from scanning electron microscopy (SEM) study.

With the advance of experimental design applied in extraction of phytochemicals, response surface methodology (RSM) was used to evaluate the effect of three factors namely (1) condition liquid/solid ratio, (2) extraction time and (3) ethanol percentage on ultrasonic assisted extraction (UAE) in obtaining the maximum of total polyphenols (TP), total flavonoids (TF) and condensed tannins (CD) from pomegranate peels. The optimum condition was obtained using liquid/solid ratio of 20, extraction time of 30.94 min and 59.26% of ethanol offered the highest contents of TP, TF and CT simultaneously. The results obtained during experimental design were in agreement in those with the predicted values (Hayder *et al*., 2021).

Pomegranate fruit is rich in polyphenol compounds that may potentially revealed some biological activities such as antioxidant, antibacterial and antifungal activities. The main phenolic compounds in pomegranate peel were anthocyanins, phenolic acids, and flavonoids. During storage, some changes in polyphenolic contents may occur. The study on the content changes of polyphenolic compounds of pomegranate peel and arils during storage for 50 days at temperature of 5^{o}C was undertaken. The change patterns of pomegranate peel and aril were different among different phenolic compounds. The concentrations of the major phenolic compounds detected in arils and peels decreased during storage, except for syringic acid, catechin acid, p-coumaric acid, chlorogenic acid, caffeic acid, epicatechin, and dihydroquercetin (in arils). In addition, some phenolics compounds were decreased in pomegranate peel except syringic acid, catechin acid, p-coumaric acid, dihydromyricetin during storage.

These changes may relate to enzymatic activities. The information on changes in polyphenolic contents is useful for management during postharvest treatments to maintain the quality of pomegranate fruits (Liu *et al*., 2021).

Polyphenolics can be divided into two types: extractable (soluble in aqueous‒organic solvents) and non-extractable polyphenols (NEPPs, which are not soluble in aqueous‒organic solvents (Pérez-Ramírez *et al*., 2018). The main extractable phenolic compounds were anthocyanins, gallotannins and gallagyl derivatives, while the main non-extractable phenolic compounds include vanillic acid and dihydroxybenzoic acid. Six compounds were then isolated from the EtOAc extracts whose structures were identified as β-sitosterol-3-O-glycoside (1), β-sitosterol (2), ursolic acid (3), corosolic acid (4), asiatic acid (5) and arjunolic acid (6). Using supercritical extraction CO_2: EtOH, punicalagin α-anomer, punicalagin β–anome and ellagic acid were isolated (Harscoat-Schiavo *et al*., 2021).

The identified polyphenolic compounds in pomegranate fruit are grouped into (1) ellagitannins (hydrolyzable tannins) such as corilagin, granatin A and B, tellimagrandin, pedunculagin, punicalagin (an unique compound to pomegranate which is found in the seeds, peel, leaves and juice) with the chemical structure in Figure 2; (2) anthocyanins and their derivatives (sugar derivatives of delphinidin, cyanidin and pelargonidin such as delphinidin-3-glucoside, delphinidin-3,5-diglucoside, cyanidin-3-gluco side, cyanidin-3,5-diglucoside, pelargonidin-3-glucoside and pelargonidin -3,5-diglucoside, and punicalin with chemical structures in Figure 3; (3) derivatives of ellagic acid; (4) flavanols such as kaempferol, quercetin and myricetin, flavones; (4) flavan-3-ols such as catechin, epicatechin and epigallactocatechin 3-gallate; (5) hydroxybenzoic acids and their derivatives; (6) hydroxycinnamic acids and their derivatives, as compiled in Table 2 (Topalović *et al*., 2021; Wong *et al*., 2021).

7. Biological activities of pomegranate polyphenols

Some biological activities on pomegranate polyphenols have been reported including antibacterial and antioxidants (Govindappa *et al*., 2021). The antibacterial activities and antioxidant activities of pomegranate peel extracts extracted using high pressure and enzymatic assisted extraction have been evaluated. The chemometrics of principal component analyses exhibited that antioxidant activity and phenolic compounds content were strongly related with antimicrobial activity (Alexandre *et al*., 2019).

Pomegranate is a very special fruit with a lot of efficacies and benefits. It is closely related to the fact that the Quran particularly mentions pomegranate in the QC. Al-Rahman verses 68-69, "*In both of them will be [all kinds of] fruit, and date-palms and pomegranates*. *Then which of your Lord’s favors will you both deny?”*. The Quran does not mention a type of vegetation unless it is the top organism of its species. Therefore, modern scientific commentators of the Quran state that pomegranate conceives scientific miracles, which is very beneficial for human life. These benefits did not only appear in the days when this verse was revealed but also had existed in ancient times. Pomegranate has been utilized for treatment in the times of the Pharaoh Kings to treat their people who were infected by certain diseases (Al-Muslih, 2009).

In the Islamic period, some scholars referred to some benefits that pomegranate has. Ibn al-Qayyim reported a hadith of treatment narrated by Ali R.A who heard the prophet P.B.U.H saying: "*Eat pomegranate with its fat because it can heal stomach*” (Hanbal, 2010). Ibn Qayyim said that pomegranate is very good to strengthen the stomach because it can soften it. It is also beneficial for the esophagus, chest, and lungs as well as efficacious for treating coughs. Its water can make the stomach feel relieved, facilitate nutrient supplies in the body, and strengthen memory (Al-Jauziyah, 2012).

In modern alternative medical treatment, all elements of the pomegranate fruit tree are efficacious for treatment, starting from its flesh of fruit, seeds, flowers, leaves, rinds, barks, to its root, which can serve as medicine. Pomegranate fruit produces anthocyanin, sugar, ascorbic acid, ellagic acid, gallic acid, caffeic acid; catechin, epigallocatechin gallate, and many minerals, especially iron, and amino acid (Jurenka, 2008). Fakhruddin al-Razi in his exegesis stated that sweet pomegranate serves to strain the shaft of male genitals; meanwhile, the sour one can eliminate sexual stimulus. The sweet pomegranate causes thirst, while the sour one relieves jaundice and discontinues vomiting (Al-Rāzī, 2012).

Besides, pomegranate can also cleanse and open the respiratory tract for people suffering from flu. Its juice may also serve as sweet thick syrup which is the most well-preserved acidity. This syrup can be added to any food and medically used to treat various diseases on the mouth and gums (Al-Najjar, 2006). Its antioxidant content is also higher than that in green tea, cranberry juice, and orange juice. The benefits of the fruit which grows a lot in Iran, northern India, and Southeast Asia-including Indonesia-are no longer just a myth nor advertising campaign. Even more, both red and white pomegranates are equally efficacious. They can serve as herbs to prevent cancer, antidiarrhea, increase or decrease weight, delay skin-aging, protect the heart and decrease cholesterol level (Menezes *et al*., 2006).

Pomegranate's root and bark comprise ellagitannins, including punicalin and punicalagin; piperidine alkaloids (Jurenka, 2008). Its root bark can be used to eradicate worms because it contains a lot of pelletierene alkaloids. To make such content in high doses is by boiling its root bark in 50 grams for every 1 L of water with a quarter-hour time. This stew is then consumed as many as approximately one glass each morning (Al-Husaini, 2015). This potion can sometimes result in indications of virulence,

headache, nausea, and vomiting. To avoid the occurrence of these poisoning symptoms, this root bark should be mixed with other ingredients which can restrain bleeding, such as tannins. Thus, absorption of the solvent materials becomes slower. The root bark also comprises various materials which can restrain bleeding in high doses (Ahmad, 2003).

Meanwhile, pomegranate bark contains phenolic punicalagin, gallic acid, fatty acid; catechin, epigallocatechin gallate (EGCG), quercetin, rutin, flavonol, flavone, flavanone, anthocyanidin. Besides, its outer bark contains tannic acid, the materials which can restrain bleeding. Therefore, the dried pomegranate bark powder can serve as a remedy to ward off diarrhea and dysentery (Al-Futuh, 2006). It can also be used to withstand blood discharge in the digestive tract. Meanwhile, the boiled one also provides the same benefits and can be used to ward off caterpillars or worms, particularly tapeworms. This is because, on its bark, there are pelletierene alkaloid materials. The bark can also benefit people as anti-aging materials, so they make use of it to colour their skins along with the tree (Ṭayyāra, 2009).

Pomegranate is very beneficial for elderly women. Based on a study by Hidaka *et al*. (2005) it has an estrogenic effect, which is to ward off menopausal disorders and prevent reproductive organ cancer. By drinking a glass of pomegranate juice every day, people approaching menopause will get 100 mL of polyphenol antioxidant compounds. These compounds can paralyze cancer cells and restore artery wall hardening. The phytoestrogens content in pomegranate can reduce menopausal symptoms and strengthen bones.

Pomegranate is a fruit that refreshes the body and strengthens the heart and nerves. It is beneficial to cure people with weak nerves as well as to smoothen the digestive tract. Its juice which is dripped down the nose, either mixed with honey or not, can avoid the occurrence of polyps because it restrains blood vessels (Al-Bagdadi,

1994). The juice is a potion that is nutritious and refreshing, because it contains high enough carbohydrates, salt, and rich in vitamins, especially vitamin C. The juice can also exterminate germs with a comparison of 1:60 bacteria (Al-Audat, 1994). The bark, stem, and root of the pomegranate tree comprise no less than 20% of tannins. Pomegranate fruit is an easily hydrolyzed tannin, in the form of punicalagin. Punicalagin is an ellagitannin found only in pomegranate fruit. Punicalagin has isomer structures, that is, 2.3-(S)-Hexahydroxydiphenoyl-4.6-(S, S)-galagil-D-glucose (Kumari and Khatkar, 2016). Its bark, stem, and root contain no less than 20% of tannins. Of the existing tannins are four separate alkaloids; first, pelletierine alkaloid called also punicine; second, isopelletierine alkaloid; third, ethyl pelletierine alkaloid; and fourth, the pseudo-pelletierine alkaloid also called Methylgrantanine (Ṭalbah, 2011). Pomegranate also contains other polyphenol compounds, that is, catechin, and gallocatechin, as well as anthocyanin compounds such as prodelphinidin, delphinidin, cyanidin, and pelargonidin (Mertens-Talcott *et al*., 2006).

In Western countries, pomegranate usually appears in the fall. Now, food manufacturers add this fruit to chocolate, chewing gum, or made into juice. In 2005, 215 new foods and beverages were recorded containing pomegranate in the United States. Pomegranate is a versatile plant. Besides consumption, it is also made as juice for medication. This fruit contains many benefits. in addition to a great number of antioxidants, it helps prevent heart disease and stroke, and the seeds in each pomegranate grain contain fiber which is very beneficial for the body's immunity (Olivia, 2015).

7.1. Antibacterial activities

Antibacterial activities have been described in several studies using *in vitro* methods such as agar disc diffusion assays and/or minimum inhibitory concentration

(MIC). Some extracts of Pomegranate peels extracted by conventional extraction (CE) based on liquid-solid extraction using water bath, extraction assisted by infrared irradiation (IR), ultrasound- assisted extraction (UAE), extraction using pulsed electric fields (PEF), and extraction using high-voltage electrical discharges (HVED) are evaluated for antibacterial activities using gram negative bacteria of *Escherichia coli* and gram positive bacteria of *Staphylococcus aureus*. The inhibition of polyphenol rich extracts are assessed using ELISA technique. Based on HPLC studies, all extract contains high levels of ellagic and gallic acids (polyphenols). All extracts exhibited antibacterial activities with the inhibition efficiency toward *S. aureus* up to approximately of 80% as compared to *E. coli* (up to approximately 33%) (Rajha *et al*., 2019). Phloretin and coumaric acid present in pomegranate fruit exhibited potent antimicrobial activity against *Staphylococcus epidermidis*, while punigratane revealed the most substantial antimicrobial effect on *Micrococcus kristinae* (Nazeam *et al*., 2020).

Giménez-Bastida *et al*. (2021) have compared the antibacterial activities of different parts of pomegranate fruit. The pomegranate peel revealed strong antibacterial activities, compared the other parts (flower, leaf, and stem), against *Salmonella enterica, Escherichia coli, Shigella sonnei, Enterococcus faecalis, Staphylococcus aureus* and *Bacillus subtilis*. These antimicrobial activities are primarily attributed to the polyphenolic compounds, including high tannin content especially punicalagin. The other polyphenolic compounds identified are gallic acid, punicalagin-α, punicalagin-β, catechin, chlorogenic acid, epicatechin, and ellagic acid. However, it is believed that the antimicrobial activities not only depend on a single or an individual component but also due to a various metabolite.

The antibacterial activity of water extract of black peel pomegranate and silver nanoparticles synthesized by water extract toward strains of gram-positive and gram-negative. Both extract and silver nanoparticles exhibited potent the antibacterial activities toward *Pseudomonas aeruginosa* (gram negative) and *Staphylococcus aureus* (gram-positive), although *P. aeruginosa* was less sensitive to both samples. The nanoparticles made from water extracts were more effective as bacteriostatic than water extracts with minimum bacteriostatic concentration of nanoparticles of 40–65 μg/mL. From this result, silver nanoparticles synthesized by water extract of black peel pomegranate can be considered as a high potential agent to combat infectious diseases due to its significant bacteriostatic activity (Khorrami *et al*., 2020).

7.2. Antioxidant activities

Antioxidant activities of pomegranate fruits and its parts either *in vitro* or *in vivo* in animal models have been reported (Akuru *et al*., 2020). In vitro, the antioxidant activities of pomegranate were evaluated by radical scavenging of DPPH (2,2’-diphenyl-1-picrylhydrazyl), ABTS (2,2’-azino-*bis* (3-ethylbenzothiazoline-6-sulphonic acid), FRAP (ferric-reducing antioxidant), metal chelating activity, reducing power assay, β-carotene bleaching assay, ORAC (oxygen radical absorbance capacity assay, NBT (nitroblue tetrazolium chloride) assay, TOSC (total oxyradical scavenging capacity) assay, ferrous ion chelating, superoxide radical scavenging activity and lipid peroxidation inhibitory activity (Smaoui *et al*., 2019). Polyphenols extracted from pomegranate peel using ultrasound-assisted extraction (UAE) revealed high antioxidant activities using radical scavenging activity of DPPH of 94.91%, due to high content of punicalagin (143.64 mg/g dry matter) as determined by HPLC analysis (Kaderides *et al*., 2019).

The antioxidant activities of 70% ethanolic extract of pomegranate peel and its fractions (petroleum ether, ethyl acetate, butanol and water) obtained using liquid-liquid extractions have been evaluated by *in vitro* methods. Butanol and ethyl acetate were the most active fractions as radical scavenger toward DPPH ABTS radicals. In addition, water fraction showed the strongest activity in FRAP and β-carotene bleaching tests (Šavikin *et al.*, 2018).

Some clinical studies have been conducted related to the health benefits of pomegranate juices and extracts. Giménez-Bastida *et al.* (2021) informed that the most promising effects in clinical studies are related to improvement of the blood pressure. In addition, the activities related to inflammation, cancer, cognitive function, physical activity are less evidence. The evidence on human during clinical studies remains inconsistent, making it difficult to support most claimed health effects. The difference on clinical study results might be attributable to design limitations, including insufficient product characterization and inter individual variability which influence the efficiency of pomegranate polyphenols.

8. Conclusion

Pomegranate is mentioned three times in the Qur'an. Classic commentators have different ways of interpreting it from modern ones who relate it to scientific hermeneutics. The former generally interpreted the verses on pomegranate as a special fruit which is mentioned by the Qur’an besides dates. Meanwhile, the latter stated that pomegranate contains scientific miracles, which are very beneficial for humans’ life since its tree components have medical efficacies, starting from its pulp, seeds, flowers, leaves, rind, bark, to roots which can be formulated into cosmetic and herbal medication. From scientific perspective, pomegranate fruit and its part contained

bioactive compounds, especially polyphenols, having some biological activities which are beneficial to human health.

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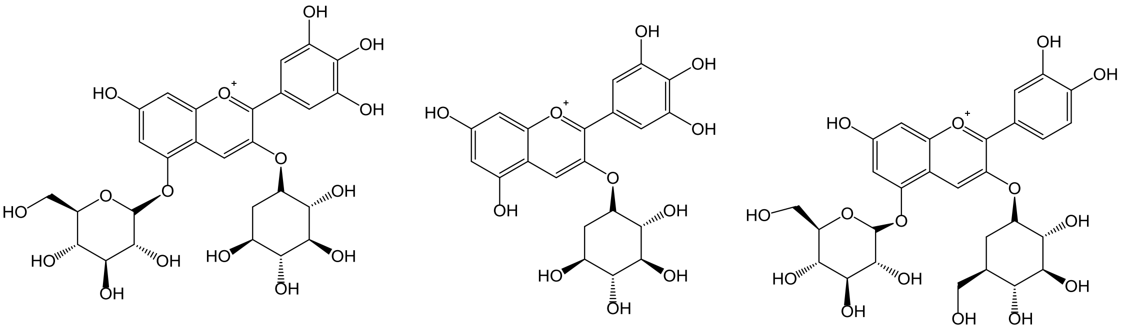
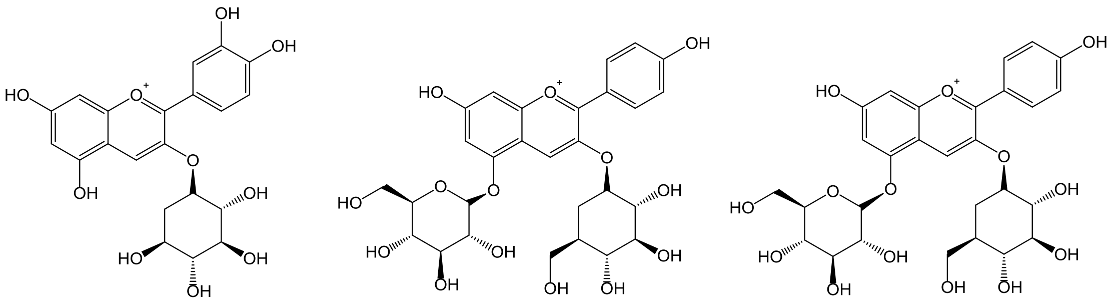
Pomegranate Juice and Fruit

Pomegranate Tree

Figure 1. Pomegranate fruit, pomegranate juice and pomegranate tree.

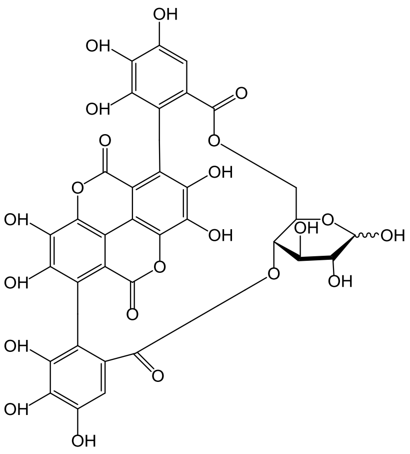


Delphinidin-3,5-diglucoside **Delphinidin-3-glucoside** **Cyanidin-3,5-diglucoside**

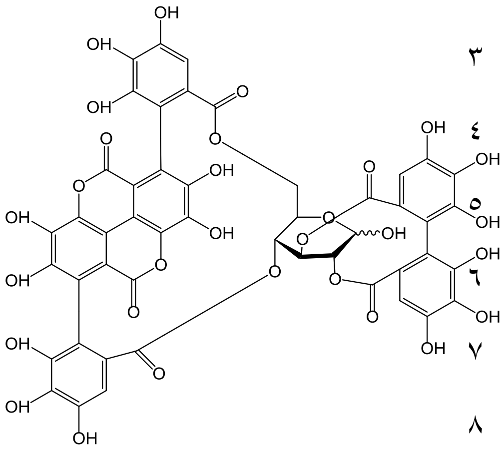


Cyanidin-3-glucoside **pelargonidin-3,5-diglucoside** **pelargonidin-3-diglucoside**

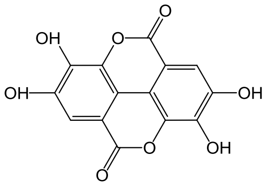
Figure 2. Anthocyanins present in pomegranate fruit (Wong *et al.*, 2021).



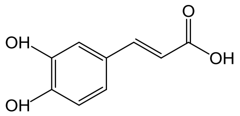
Punicalin



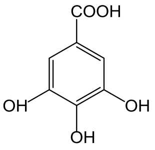
Punicalagin



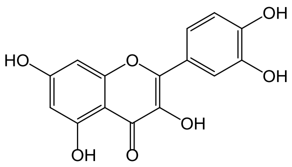
Ellagic



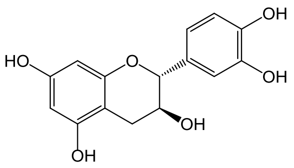
Caffeic acid



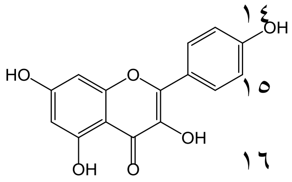
Garllic acid



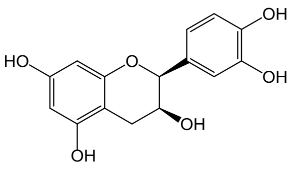
Quercetin



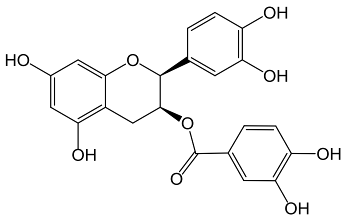
Catechin



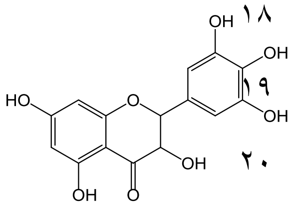
Kaempferol



Epicatechin



Epicatechin gallate



Myricetin

Figure 3. The representative structures of phenolic compounds identified in pomegranate

Table 1. The Quranic Hermeneutics of pomegranate verses

Pomegranate verses	**Commentators**	**Quranic Hermeneutic**
Shura al-An'am verses 99 and 141.	Al-Alusi	There is a similarity between the 3 fruits; palm, olive, and pomegranate. But have a different taste.
	Ibnu Kathir	There is a process similarity between 3 fruits -palm, olive, and pomegranate- from their seed shapes, trees, and fruit colors. However, it has a different taste and smell.
Shura al-Rahman verses 68-69	Ibn al-Jauzi	palms and pomegranates are called after the word of *fakihah* (fruits) means that both of them have virtues.
	Al-Tabari	The word *fakihah* (fruits) relies on the words *nakhl* (palm) and *rumman* (pomegranate) giving the meaning that both have an advantage over other fruits.
	Al-Maragi	This verse is related to Qs. Al-Rahman: 62 to 77 series that describes the fruits in heaven which are green and fresh. The ones mentioned are palms and pomegranates.
	Al-Qurtubi	Palms are the staple food of Arabs and pomegranate is the fruit. Both are widely grown because the Arabs need benefits from them.
	Al-Razi	Allah mentioned the palms and pomegranates because they have opposing characteristics. One is sweet, the other is not. One grows in hot places, the other in cold places. One provides nutrition, the other does not.
	Al-Shawkani	Palms and pomegranates are heavenly fruits that have advantages, benefits, and efficacies for the body. Both of them can be found in the Arab region.
	M. Quraish Shihab	The efficacy of pomegranate has been tested empirically. It contains high citric acid that can help reduce the acidity of urine and blood, thereby preventing gout. Pomegranate also contains a sugar content of about 11% which is useful for easier burning and producing energy

Table 2. Some phenolics compounds identified in pomegranate fruits (Topalović *et al.*, 2021).

Anthocyanins and their derivative • Cyanidin-3,5-caffeoyl hexoside • Cyanidin-3,5-diglucoside • Cyanidin-3,5-pentoside hexoside • Cyanidin-3-galactoside • Cyanidin-3-glucoside • Delphinidin-3,5-pentoside hexoside • Delphinidin-3-glucoside • Delphinidin-caffeoyl • Delphinidin-dihexoside • Delphinidin-trihexoside • Epiafzelechin-cyanidin-dihexoside • Epiafzelechin-cyanidin-hexoside • Epiafzelechin-delphinidin-hexoside • Epicatechin-cyanidin-3,5-dihexoside • Epicatechin-delphinidin-3,5-dihexoside • Epicatechin-delphinidin-hexoside • Epicatechin-pelargonidin-hexoside • Epigallocatechin-cyanidin-3,5-dihexoside • Epigallocatechin-cyanidin-hexoside • Epigallocatechin-delphinidin-3,5-dihexoside • Epigallocatechin-delphinidin-hexoside • Pelargonidin-3,5-diglucoside • Pelargonidin-3,5-pentoside hexoside	Ellagitannins and derivatives of ellagic acid • Brevifolin carboxylic acid • Casuarinin • Ellagic acid • Ellagic acid (p-coumaroyl) hexoside • Ellagic acid derivative • Ellagic acid dihexoside • Ellagic acid galloyl hexoside • Ellagic acid hexoside • Ellagic acid pentoside 1 • Ellagic acid pentoside 2 • Ellagic acid rhamnoside • Ellagitannin 1 • Ellagitannin 10 • Ellagitannin 11 • Ellagitannin 2 • Ellagitannin 3 • Ellagitannin 4 • Ellagitannin 5 • Ellagitannin 6 • Ellagitannin 7 • Ellagitannin 8 • Ellagitannin 9 • Granatin A • Lagerstannin A • Lagerstannin C • Pedunculagin 1 • Pedunculagin 2 • Pedunculagin 3 • Pedunculagin 4 • Pedunculagin derivative • Punicalin derivative 1 • Punicalin derivative 2 • Punigluconin 1 • Punigluconin 2
Flavonol glycosides • Kaempferol hexoside • Dihydrokaempferol hexoside • Syringetin hexoside 1 • Syringetin hexoside 2 Flavones • Apigenin rhamnoside	Flavanols • Catechin • Epicatechin • Procyanidin dimer 1 • Procyanidin dimer 2 • Procyanidin dimer 3 • Procyanidin dimer 4 • Procyanidin dimer 5 • Procyanidin trimer 1 • Procyanidin trimer 2 • Procyanidin trimer 3
Hydroxybenzoic acids and their derivatives • Gallic acid	Hydroxycinnamic acids and their derivatives

• Vanillic acid hexoside • Monogalloyl hexoside • Hexahydroxydiphenic acid hexoside • Digalloyl-hexoside 1 • Digalloyl hexoside 2 • Vanillic acid dihexoside • Gallagic acid • Galloyl ester • Digalloyl hexahydroxydiphenic acid hexoside 1 • Digalloyl-hexahydroxydiphenic acid hexoside 2 • Gallotannin • Galloyl gallagyl hexoside Gallagyl ester 1 Gallagyl ester 2 • Tri-hexahydroxydiphenic acid hexoside 1 • Tri-hexahydroxydiphenic acid hexoside 2	• p-coumaric acid hexoside • 4-p-coumaroylquinic acid • Caffeic acid hexoside 1 • Caffeic acid hexoside 2 • 3-caffeoylquinic acid • 5-caffeoylquinic acid 1 • 5-caffeoylquinic acid 2

Pomegranate (*Punica granatum* L.) fruits in the Quranic Hermeneutics and scientific perspectives

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Abstract

This review highlighted the Quranic hermeneutics and scientific perspective of Pomegranate for human health. To accomplish this review article, numerous reputable databases such as Scopus, American Chemical Society, Science Direct, Springer, and Google Scholar related with this review were downloaded and evaluated. Pomegranate is popular fruits consumed because of their pleasant taste and high nutritional value having some health benefits to human health. In addition, pomegranate (*rumman* in Arabic) is one of stated fruit in Quran. Quranic Hermeneutic with a scientific approach has been a new model used by modern commentators to explore various kinds of sciences presented in the Quranic verses. Qur’an mentions a pomegranate three times. Classic commentators generally interpreted the pomegranate verses as a special fruit and served for the occupants of heaven. In contrast, modern scientific commentators stated that the fruit contains scientific miracles that are very beneficial for human’s health since this fruit had some phytochemicals reported to have some biological activities including antioxidant and antibacterial activity.

Keywords: *rumman*, human health, antioxidant, phenolics, antibacterial activities.

1. Introduction

Pomegranate fruits with scientific name of *Punica granatum* L. (belong to family of Punicaceae) are excellent sources of bioactive compounds mainly polyphenols. This plant is native to central Asia, but currently it is highly adaptable to a wide range of climatic and soil conditions, and is now grown in many different geographical regions including the Mediterranean basin, Asia, and California in the USA. Pomegranate fruit has been used extensively in the folk medicines of many cultures since ancient times including Greek, Ayurvedic, Unani and Egyptian (Reddy, 2018). This fruit is regarded as a ‘super fruit’, which is rich in antioxidant phytochemicals and is recognized for a myriad of health benefits. Pomegranate fruit is gaining popularity worldwide for its uniqueness, exclusive colour and taste, and associated health benefits (Hegazi *et al*., 2021).

Pomegranate is a type of tree from the family of Myrtaceae. Pomegranate (*rumman*) in a scientific term is called *Punica granatum* (Ṭalbah, 2011). Since thousands of years ago, human beings have enjoyed it both as food and medicine. The fruit is estimated to originate from West Asia and spread to the surrounding areas. Hebron, which is now a part of Israel territories, is well-known for pomegranate which has been planted since the time of the Prophet Moses. Egypt, Ancient Greece, and Rome are the civilizations known for harvesting this fruit. Several archaeological findings found the residues of pomegranate plants, such as its seeds and barks around Cyprus, Israel, Iraq, Jordan, Lebanon, Palestine, Syria, and Turkey. It is estimated to have existed since 3,000 years before A.D. (Potts, 2012).

Experts argue that the pomegranate habitat is in Southwest Asia (Middle East) or Northwest Asia (India). However, it has already spread and well-bred in the Mediterranean area. Then, it crosses over Iran, the Mediterranean Sea (Iraq and Syria),

Egypt, Europe, and even flourishes in Southern China and Southeast Asia. This plant is easy to grow in areas with almost all climates and from low to high land. Despite its ignorance, pomegranate can flourish well on the dry loose land (Mubashir and Mahran, 2010).

Pomegranates are becoming more popular with consumers because of their pleasant taste and high nutritional value. Pomegranate fruit is constituted by peel, arils, and seeds in an approximate 50:40:10 ratio, respectively. As in the majority of fruits, the chemical composition of the pomegranate differs according to the climatic conditions, ripening degree of the fruit at the time of harvest (Guo *et al*., 2021). The edible part of pomegranate is about 57%–85% of the whole fruit, among which fruit juice accounts for 36%–63%. The taste of pomegranate is moderately sour and sweet throughout the flavouring improvement by modern cultivation technology. Pomegranate juice is considered as functional food due to some bioactive contents which are beneficial to human health. Pomegranate fruit contain 17 kinds of amino acids and minerals, vitamin C, calcium, iron, phosphorus, retinol, riboflavin, ferulic acid, and other phenolic compounds. Pomegranate seed oil is also valuable source of bioactive compounds with health-beneficial effects, but it is sensitive to oxidation due to high content of PUFA. Therefore, the oil was added with pomegranate peel extract or synthetic antioxidants to improve its stability toward oxidation (Drinić *et al*., 2020). This fruit is suitable for both young and old consumers; for example, pomegranate juice drinks are popular in daily life, and pomegranate extracts also serve as food additives, supplements, and for taste correction (Ge *et al*., 2021). Pomegranate extract and its polyphenols can be considered as cosmeceuticals because both revealed skin protective effects by ameliorating methylglyoxal (MGO)-induced DNA damage through restoring cell adhesion, migration, and wound healing capacity (Guo *et al*., 2021). The regular

consumption of this fruit has been associated with the prevention of gastric damage, cardiovascular disease, type 2 diabetes mellitus, and specific types of cancers, renal illnesses, liver complications, and osteoarthritis (Villa-Ruano *et al.*, 2020). In this review, pomegranate from Quranic and scientific perspectives are described. In scientific perspective, the antibacterial and antioxidant activities and polyphenols responsible for these activities are highlighted.

2. Methods

This descriptive-analytical paper used a thematic method based on literature review, referring to scientific articles from *Tafseer* books, reputed journals, book literature, and conference papers. During this study, some databases of Scopus, American Chemical Society, Science Direct, Springer, and Google Scholar covering abstract and full texts are downloaded and evaluated to be used as references during this review. Scientific studies on Pomegranate published in journals were also used as main references. In addition, other sources came from books related to scientific miracles of the Quran compiled by experts in their fields.

3. Pomegranate fruit

Pomegranate (*Punica granatum* L.), Figure 1, is a fruit plant that can grow up to 5-8 meters in sub-tropical areas to tropical ones, from lowland to below 1000 meters above sea level. It is a shrub or a small tree with 2-5 meters in height (Lansky and Newman, 2007). Its stem is woody with square twigs, a lot of branches, spikes on its axilla, weak in nature, brown-coloured when unripe, and turns into dirty green post ripe. The pomegranate tree has a single leaf with short stems, located in groups. The leaf sheet takes oval to lancet in shape, taper base, blunt tip, pinnate bones, shiny surface, 1-9 cm in length, 0.5-2.5 cm in width, and green-coloured (Ahmad, 2003).

Pomegranate is a berry fruit with a rounded shape and 5-12 cm in diameter, with various bark colours, such as purplish-green, white, reddish-brown, or blackish purple. The fruit is unique with its red-glazing seeds like crystals. The flower is called *Jullanar*. It is an antique fruit that has been known since ancient times. Many people gain some virtues and benefits found in it (Ṭayyāra, 2009). The pomegranate tree is a small posture with thin foliage and flatly shaped, having large and beautiful flowers, with a reddish colour, a fleshy shell of which contents are red-coloured cobs. The white flowers which lie in several separate places, one by one serve as a transparent lid. The Persians named this pomegranate *Jalnaz,* meaning the red fruit with seeds on it (Olivia, 2015).

In Indonesia, pomegranate is well-known by several names, depending on the regions it grows, such as *delima* (Malay), *glima* (Acehnese), *Glineu Mekah* (Gayonese), *dhalima* (Maduranese), *gangsalan* (Javanese), *dalima* (Sundanese), *teliman* (Sasaknese), *lele kase* and *rumu* (Timor). There are three types of pomegranate scattered over Indonesia, classified by its colours; they are white pomegranate, red pomegranate, and black pomegranate. Of these three types, the most famous is the red one. Pomegranate fruit is a symbol of prosperity and fertility, which is held in the form of a ceremony of seven months of a pregnancy ritual, conducted by Javanese people and other tribes in Indonesia (Olivia, 2015). Meanwhile, for Chinese people, it is one of the compulsory fruits in welcoming the Lunar New Year. They believe that many of the seeds are a symbol of abundant fortunes.

In general, pomegranate is various in types, in terms of shape, colour, sweetness level, acidity, or its seed's shape and colour. The best is the very red one with thin bark and abundant water content (Ṭalbah, 2011). It has three flavours, that is, sweet, sour, and blends between sweet and sour. Each flavour has a diverse uniqueness. The fruit with a sweet taste has a 7-10% content of sugar, 81% of water, 0.6% of proteins, and

0.3% of fat. Moreover, sweet pomegranate also contains fiber as much as 2% as well as some tannin, inulin, and citric acid as much as 1%. It also contains minerals, mainly iron, phosphorus, sulphur, potassium, lime, manganese, and vitamin C (Lansky and Newman 2007). Pomegranate with sour taste comprises less sugar, with 2% of citric acids. This acid content is even higher than that on oranges. Meanwhile, its seeds cover 9% of proteins and fat as much as 7%. Its outer bark contains tannic acids; the material that can restrain bleeding. Therefore, its outer bark powder which has been dried can be used as a remedy to ward off diarrhoea and dysentery. It can also be used to restrain blood discharge in the digestive tract (Al-Qabbani, 2009).

Today, Quran has not only become the main focus of merely studying objects and classical interpretations, but also the attention of various scientific studies, including scientific and medical fields. An effort to comprehend the Quran with a scientific and medical approach by experts is called scientific hermeneutic. This style of hermeneutic is an attempt to understand the verses of the Quran containing scientific cues from the perspectives of modern science. Scientific hermeneutic is also an interpreter's striving effort to uncover the relationship between the verses of *kauniyah* in the Quran and scientific discoveries aimed at revealing its scientific miracles (Rahman, 1986).

4. Pomegranate in Quranic perspective

According to Al-Zahabi, this scientific hermeneutic seeks to explore the scientific dimension and uncover the secrets of its miracles related to scientific information that may not have been known to humankind during the descent, so it becomes evidence of the truth that the Quran is not a human work, but a revelation of the Creator instead (Zahabi, 2009). Dealing with this, many scientists have focused their studies on the Quran by attempting to put the verses of the Quran into logic and

correlating them with treatments and medicines. Scientists have tried to combine the studies of plants mentioned in the Quran with medicines. The Quran does not mention all types of plants in general, just like modern botanical science does, but all types of plants mentioned by the Quran are certainly the top organisms of their respective species. For example, the fig tree (the fruits of heaven) is the top of the species of "*Ficus*" of "Moraceae" types according to botanists, its species reaches about 700 scattered around the world. Likewise, pomegranate, herbs of 1001 benefits, cure various diseases, internal and external ones (Ahmad, 2003).

Nowadays, there have been families who have started the 'no vegetables and fruits' campaign in their family menu. Fruits constitute a major part of the nutrients needed by a human. Besides being consumed as nutrients and vitamins, certain fruits have medicinal properties for certain diseases. This is based on knowledge in religious teachings. This fruit is pomegranate which is also mentioned several times in the Qur'an and contains many health benefits. Almost all parts of pomegranate plants are useful for medical treatments, starting from the pulp, seeds, flowers, leaves, fruit skins, bark, to the roots that can be formulated into medicine (Al-Najjar, 2006).

The Quran does not mention a type of plant unless it serves as the top organism of each species. Likewise, pomegranate, with the Latin name *Punica granatum,* is a type of fruit that belongs to the berry species. Pomegranate is a plant species that has been well-known since ancient Egyptian time, that is, the beginning era of Egyptian civilization. Ancient people recognized it as 'Arhamanie' derived from the Qibti name called 'Armen' or 'Rumen' which is derived from the Hebrew name called 'Rumon'. Then, it is translated into the Arabic word 'Rumman' (Shehab, 2011).

Pomegranate (*rumman*) is an ancient plant known to produce many benefits and to provide various virtues. The Pharaoh Kings of ancient Egyptian had used

pomegranates as medicine (Ahmad, 2003). In Islamic literary treasures, pomegranate is classified into the fruit used as medicine for the Prophet. Ibn Qayyim wrote some of its virtues; the one with sweet taste is beneficial to the stomach, throat, chest, and lungs. It can also smoothen urine, reduce yellow substances in the liver, overcome diarrhea, and strengthen organs (Al-Jauziyah, 2012).

The Qur'an as the greatest miracle for Muslims comprises verses showing various scientific signs from modern science perspectives. The hermeneutic of verses that talk about science is known as *Tafsir Ilmi* (Scientific Interpretation) (Al-Qaraḍāwī, 1999). According to Husain al-Zahabi, scientific hermeneutic discusses scientific terms in narrating verses of the Qur'an, seeks to explore its scientific dimensions, and uncovers the secrets of miracles related to scientific information that may not have been known to humans at the time the Qur'an was revealed (Al-Żahabī, 1995). Hence, in modern times, this becomes another evidence that the Qur’an is not a human creation, rather a revelation of God, The Creator.

Muslim scientists have tried to uncover the contents of the Qur'an which leads to scientific discoveries or to keep some of the natural sciences which are not widely known by humans. They scientifically describe those contents in depth. Despite the Qur’an’s *zahir* (visible) characteristics, of which texts briefly talk about this issue, the scientists’ commentary can almost be proven by modern sciences (Al-Shirbaṣī, 1962). This argument is based on the fact that all sciences obtained from the Qur'an, after being analyzed accurately, will lead people to think at a certain point that everything said in the Qur'an is all true.

This scientific hermeneutic employed a set of contemporary sciences, such as astronomy, geology, chemistry, biology, medical science, and other scientific tools (Al-Qaraḍāwī, 1999). Such interpretation with scientific approaches is not intended to

justify the truth of scientific findings by the verses of the Qur'an, nor is it to compel the interpretation of the verses of the Qur'an to seemingly conform to the scientific findings. However, this scientific hermeneutic study initially arises from the awareness that the Qur'an is absolute, whilst its interpretation, both from commentary and scientific perspectives, is relative and tentative in nature (Hanafi, 2015).

Scientific hermeneutic has existed since the Abbasid dynasty. At that time, there were attempts made by some scholars to compromise Islamic teachings with translated foreign cultures, as well as pure sciences found among the Muslims (Abderrahman, 1986). Al-Ghazali was one of the figures who was persistent in supporting these interpretive ideas. In his monumental masterpiece, *Ihya 'Ulumiddin*, he put forward his argumentations to prove his stance (Al-Ghazālī, 2000). He said that all kinds of sciences, both preceding and subsequent ones, whether known or not, come from the Qur'an (Musbikin, 2014).

In another work, *Jawahir al-Qur'an*, Al-Ghazali also discussed his support for scientific hermeneutic. He stated that all sciences are gathered in one among several oceans of Allah's knowledge which has no end. Furthermore, he strengthened his arguments by saying that among Allah's deeds are to provide healing and pain, as He told about Prophet Abraham: " *And He ˹alone˺ heals me when I am sick.*" QC. Ash-Shu’ara: 80). Al-Gazali explained that medicine and diseases cannot be discovered except by those who are involved in the medical field (Al-Ghazālī, 2003). Thus, the verse is a signal dealing with medical science.

Besides al-Ghazali, Fakhruddin al-Razi was an expert commentator who tends to comply with scientific hermeneutic (Al-Rāzī, 2012). His monumental work, *Mafatih al-Gaib*, is filled with scientific discussions related to philosophy, natural sciences, theology, medicine, astronomy, and so on. Because of presenting the above discussions,

this interpretation is known as a philosophical hermeneutic (Shihab, 1994). The same perspective is also carried out by Jauhari Tantawi, in his work, *Tafsir al-Jawahir*. His interpretation uncovers scientific theories and scientific reinforcement in every verse he interprets (Goldziher, 1955).

In this modern era, scientific hermeneutic is increasingly popular and used as a reference to study the sciences presented in the Quran. The development of scientific interpretation in the modern era was at least due to the influence of western technology and science (Europe and the United States) on the Arab world and Muslim regions, especially in the second half of the 19th century when most of the Islamic worlds were under the control of European countries (Jansen, 1980). This western hegemony has gradually led to resistance on one hand and on the other hand, advances in modern Arab scholars' thoughts in terms of religious and social sciences.

The development of scientific hermeneutic is also an implication of the change in the modern Muslims' perspectives on the verses of the Qur'an, especially with the exposure of modern scientific discoveries in the 20th century. For example, the word '*lamusi'un'*, in the QC *al-Zariyat*: 47, "*We built the universe with ˹great˺ might, and We are certainly expanding ˹it˺*". Along with new scientific discoveries, astronomers concluded a scientific theory, stating that nebulae which lie outside the galaxy we live in continues to move away at different speeds, even celestial bodies in one galaxy are moving away from one another (Hanafi, 2015). This shows that the discoveries of modern science can provide new scientific meanings of the verses of the Qur'an.

An expert on scientific miracles, Nadya Tayyara, explained that he finally found out new information from several passages of the Qur'an verses that talk about fruits. This understanding is also a response to the exposure of biological diseases and their treatment mechanisms, and an understanding of the correlation between chronic

diseases and immune disorders that can be cured by these fruits (Ṭayyāra, 2009). This statement was strengthened by Ibn Qayyim al-Jauziyah, claiming that the fruits mentioned in the Qur'an have efficacies that other fruits don't. All of these fruits can be used to cure certain diseases (Al-Jauziyah, 2012). By this context, the paper shows the scientific evidence that causes the pomegranate to be a special fruit as mentioned in the Koran. The disclosure of scientific facts means that the quranic hermeneutic is open to modern science. In interpreting the pomegranate verses must be based on botanical science data.

5. Pomegranate in commentators’ perspectives: a Quranic Hermeneutic

Pomegranate is a fruit mentioned in the Quran. Al-Shafii noted that pomegranate (*rumman*) is mentioned three times in the Quran; two of which are in the QC Al-An'am (6): verse 99 and 141, and another in the QC Al-Rahman (55): verse 68 (Al-Shāfī’ī, 2000). Hermeneutical interpretations of these verses were compiled in Table 1.

Al-Alusi mentions the hermeneutic of the shura al-An’am verses; 99 and 141, there is a similar redaction as referring to olive and pomegranate. In both verses, God speaks of the signs of His power for the believers. Among of which on earth is that He created a variety of trees, such as palm trees, olive trees, and pomegranate trees which take similar shapes and colours, despite the difference in taste (Al-Alusi, 1997). Commenting on those verses above, Qatadah stated that the creation of this pomegranate fruit is similar in its shape, partly to some of the others, but different in the fruit it produces, either in terms of its colour, taste, or content. The power of God's creation on the pomegranate can be seen from the origin of its creation. At the initial phase, it is grain, then grows into a tree, and produces the same fruit colour but different taste and smell (Kathīr, 2000).

In the Quran chapter Al-Rahman (55) verses 68-69, God said: "*In both of them will be [all kinds of] fruit, and date-palms and pomegranates. Then which of your Lord's favors will you both deny?".* In this verse, God particularly mentions that there are kinds of fruits, dates, and pomegranates in heaven. Ibn al-Jauzi mentioned the word '*dates*'(*nakhl*) and '*pomegranates*' (*rumman*) after the word '*fakihah*' meaning fruits both are classified as fruits. This is to explain the virtue of both fruits (Al-Jauzi, 2002). Al-Tabari also stated that in the verse, there is a conjunction indicating a particular thing to the general one, mentioning the word 'fruits' followed by the word 'dates' (*nakhl*) and pomegranates (*rumman*) (Al-Tabari, 1998). However, the mention of the two words specifically shows the virtue of the two fruits over the others.

Al-Maragi stated that the series in *Al-Rahman* verses 62 to 77 describe that there is a tree of fruit grown with leafy green in heaven. Inside of it, there is a clear water spring that sparkles. Meanwhile, the dwellers and angels are leaning back on green pillows and beautiful carpets. The angels who happen to be the dwellers' servants have never been touched by any human beings nor genies. They can easily pick the fruit up close as the trees are short. Among the various fruits, the only special ones are dates and pomegranates which have been mentioned (Al-Maragi, 1996). *Then which of your Lord's favors will you deny?*

According to Al-Qurtubi, in this verse, dates, and pomegranates are mentioned after the other fruits as in line with the Arabs customs, dates and pomegranates are like wheat. For the Arabs, dates are the main course, while pomegranates are the dessert. Both fruits are mostly planted since the Arabs take benefits from them (Al-Qurṭubī, 2014). Whereas, according to Al-Rāzī, God mentions the two fruits, pomegranates and dates, because they are opposite each other; one tastes sweet and the other does not. In addition, one is hot and the other is cold; one is as a source of nutrients and the other is

not; one grows in hot land and the other is in cold land; one with high trunk and the other with opposite trunk (Al-Rāzī, 2012). Whereas, a medieval commentator, Muhammad al-Shawkani, presented several opinions from the interpretation of *surah* al-Rahman: 68, pomegranate and dates mentioned in the verse belong to the heaven's second characteristics mentioned in the QC. al-Rahman: 62. Even though both are classified into fruits, but particularly mentioned because of their abundant benefits compared to other fruits. Both are also plants existing on the land of Arabs. Another opinion stated that pomegranate is a type of fruit that can be used for medication with extraordinary efficacies (Al-Shawkānī, 2014).

A modern Indonesian commentator, M. Quraish Shibab, tends to interpret the verses about pomegranate based on its efficacies which have empirically been examined. In his commentary book, *al-Misbah*, he explained that its juice contains very high levels of citric acid compared to other types of fruits, and when roasted, it is very helpful in reducing the acidity of urine and blood which in turn can prevent gout on the body. The citric acid contained in pomegranate can also help form some kidney stones. This juice also contains sufficient sugar levels, around 11%, to ease the roasting and produce energy (Shihab, 2002).

6. Polyphenols in pomegranate fruit

Some extraction techniques have been introduced to get high recovery of polyphenols. Rajha *et al.* (2019) have compared 5 extraction techniques namely conventional extraction (CE) based on liquid-solid extraction using water bath, extraction assisted by infrared irradiation (IR), ultrasound- assisted extraction (UAE), extraction using pulsed electric fields (PEF), and extraction using high-voltage electrical discharges (HVED). HVED assisted extraction offered the enhanced the recovery of polyphenols by approximately of 3 and 1.3 times as compared to US and PEF assisted

extractions, respectively. The high recovery of polyphenols during extraction of HVED was caused by the ability of HVED technique to damage the microstructure of pomegranate skins strongly, as indicated from scanning electron microscopy (SEM) study.

With the advance of experimental design applied in extraction of phytochemicals, response surface methodology (RSM) was used to evaluate the effect of three factors namely (1) condition liquid/solid ratio, (2) extraction time and (3) ethanol percentage on ultrasonic assisted extraction (UAE) in obtaining the maximum of total polyphenols (TP), total flavonoids (TF) and condensed tannins (CD) from pomegranate peels. The optimum condition was obtained using liquid/solid ratio of 20, extraction time of 30.94 min and 59.26% of ethanol offered the highest contents of TP, TF and CT simultaneously. The results obtained during experimental design were in agreement in those with the predicted values (Hayder *et al.*, 2021).

Pomegranate fruit is rich in polyphenol compounds that may potentially revealed some biological activities such as antioxidant, antibacterial and antifungal activities. The main phenolic compounds in pomegranate peel were anthocyanins, phenolic acids, and flavonoids. During storage, some changes in polyphenolic contents may occur. The study on the content changes of polyphenolic compounds of pomegranate peel and arils during storage for 50 days at temperature of 5^{o}C was undertaken. The change patterns of pomegranate peel and aril were different among different phenolic compounds. The concentrations of the major phenolic compounds detected in arils and peels decreased during storage, except for syringic acid, catechin acid, p-coumaric acid, chlorogenic acid, caffeic acid, epicatechin, and dihydroquercetin (in arils). In addition, some phenolics compounds were decreased in pomegranate peel except syringic acid, catechin acid, p-coumaric acid, dihydromyricetin during storage.

These changes may relate to enzymatic activities. The information on changes in polyphenolic contents is useful for management during postharvest treatments to maintain the quality of pomegranate fruits (Liu *et al*., 2021).

Polyphenolics can be divided into two types: extractable (soluble in aqueous–organic solvents) and non-extractable polyphenols (NEPPs, which are not soluble in aqueous–organic solvents (Pérez-Ramírez *et al*., 2018). The main extractable phenolic compounds were anthocyanins, gallotannins and gallagyl derivatives, while the main non-extractable phenolic compounds include vanillic acid and dihydroxybenzoic acid. Six compounds were then isolated from the EtOAc extracts whose structures were identified as β-sitosterol-3-O-glycoside (1), β-sitosterol (2), ursolic acid (3), corosolic acid (4), asiatic acid (5) and arjunolic acid (6). Using supercritical extraction CO_2: EtOH, punicalagin α-anomer, punicalagin β–anome and ellagic acid were isolated (Harscoat-Schiavo *et al*., 2021).

The identified polyphenolic compounds in pomegranate fruit are grouped into (1) ellagitannins (hydrolyzable tannins) such as corilagin, granatin A and B, tellimagrandin, pedunculagin, punicalagin (an unique compound to pomegranate which is found in the seeds, peel, leaves and juice) with the chemical structure in Figure 2; (2) anthocyanins and their derivatives (sugar derivatives of delphinidin, cyanidin and pelargonidin such as delphinidin-3-glucoside, delphinidin-3,5-diglucoside, cyanidin-3-gluco side, cyanidin-3,5-diglucoside, pelargonidin-3-glucoside and pelargonidin -3,5-diglucoside, and punicalin with chemical structures in Figure 3; (3) derivatives of ellagic acid; (4) flavanols such as kaempferol, quercetin and myricetin, flavones; (4) flavan-3-ols such as catechin, epicatechin and epigallactocatechin 3-gallate; (5) hydroxybenzoic acids and their derivatives; (6) hydroxycinnamic acids and their derivatives, as compiled in Table 2 (Topalović *et al*., 2021; Wong *et al*., 2021).

7. Biological activities of pomegranate polyphenols

Some biological activities on pomegranate polyphenols have been reported including antibacterial and antioxidants (Govindappa *et al.*, 2021). The antibacterial activities and antioxidant activities of pomegranate peel extracts extracted using high pressure and enzymatic assisted extraction have been evaluated. The chemometrics of principal component analyses exhibited that antioxidant activity and phenolic compounds content were strongly related with antimicrobial activity (Alexandre *et al.*, 2019).

Pomegranate is a very special fruit with a lot of efficacies and benefits. It is closely related to the fact that the Quran particularly mentions pomegranate in the QC. Al-Rahman verses 68-69, "*In both of them will be [all kinds of] fruit, and date-palms and pomegranates*. *Then which of your Lord’s favors will you both deny?”*. The Quran does not mention a type of vegetation unless it is the top organism of its species. Therefore, modern scientific commentators of the Quran state that pomegranate conceives scientific miracles, which is very beneficial for human life. These benefits did not only appear in the days when this verse was revealed but also had existed in ancient times. Pomegranate has been utilized for treatment in the times of the Pharaoh Kings to treat their people who were infected by certain diseases (Al-Muslih, 2009).

In the Islamic period, some scholars referred to some benefits that pomegranate has. Ibn al-Qayyim reported a hadith of treatment narrated by Ali R.A who heard the prophet P.B.U.H saying: "*Eat pomegranate with its fat because it can heal stomach*” (Hanbal, 2010). Ibn Qayyim said that pomegranate is very good to strengthen the stomach because it can soften it. It is also beneficial for the esophagus, chest, and lungs as well as efficacious for treating coughs. Its water can make the stomach feel relieved, facilitate nutrient supplies in the body, and strengthen memory (Al-Jauziyah, 2012).

In modern alternative medical treatment, all elements of the pomegranate fruit tree are efficacious for treatment, starting from its flesh of fruit, seeds, flowers, leaves, rinds, barks, to its root, which can serve as medicine. Pomegranate fruit produces anthocyanin, sugar, ascorbic acid, ellagic acid, gallic acid, caffeic acid; catechin, epigallocatechin gallate, and many minerals, especially iron, and amino acid (Jurenka, 2008). Fakhruddin al-Razi in his exegesis stated that sweet pomegranate serves to strain the shaft of male genitals; meanwhile, the sour one can eliminate sexual stimulus. The sweet pomegranate causes thirst, while the sour one relieves jaundice and discontinues vomiting (Al-Rāzī, 2012).

Besides, pomegranate can also cleanse and open the respiratory tract for people suffering from flu. Its juice may also serve as sweet thick syrup which is the most well-preserved acidity. This syrup can be added to any food and medically used to treat various diseases on the mouth and gums (Al-Najjar, 2006). Its antioxidant content is also higher than that in green tea, cranberry juice, and orange juice. The benefits of the fruit which grows a lot in Iran, northern India, and Southeast Asia-including Indonesia-are no longer just a myth nor advertising campaign. Even more, both red and white pomegranates are equally efficacious. They can serve as herbs to prevent cancer, antidiarrhea, increase or decrease weight, delay skin-aging, protect the heart and decrease cholesterol level (Menezes *et al*., 2006).

Pomegranate's root and bark comprise ellagitannins, including punicalin and punicalagin; piperidine alkaloids (Jurenka, 2008). Its root bark can be used to eradicate worms because it contains a lot of pelletierene alkaloids. To make such content in high doses is by boiling its root bark in 50 grams for every 1 L of water with a quarter-hour time. This stew is then consumed as many as approximately one glass each morning (Al-Husaini, 2015). This potion can sometimes result in indications of virulence,

headache, nausea, and vomiting. To avoid the occurrence of these poisoning symptoms, this root bark should be mixed with other ingredients which can restrain bleeding, such as tannins. Thus, absorption of the solvent materials becomes slower. The root bark also comprises various materials which can restrain bleeding in high doses (Ahmad, 2003).

Meanwhile, pomegranate bark contains phenolic punicalagin, gallic acid, fatty acid; catechin, epigallocatechin gallate (EGCG), quercetin, rutin, flavonol, flavone, flavanone, anthocyanidin. Besides, its outer bark contains tannic acid, the materials which can restrain bleeding. Therefore, the dried pomegranate bark powder can serve as a remedy to ward off diarrhea and dysentery (Al-Futuh, 2006). It can also be used to withstand blood discharge in the digestive tract. Meanwhile, the boiled one also provides the same benefits and can be used to ward off caterpillars or worms, particularly tapeworms. This is because, on its bark, there are pelletierene alkaloid materials. The bark can also benefit people as anti-aging materials, so they make use of it to colour their skins along with the tree (Ṭayyāra, 2009).

Pomegranate is very beneficial for elderly women. Based on a study by Hidaka *et al*. (2005) it has an estrogenic effect, which is to ward off menopausal disorders and prevent reproductive organ cancer. By drinking a glass of pomegranate juice every day, people approaching menopause will get 100 mL of polyphenol antioxidant compounds. These compounds can paralyze cancer cells and restore artery wall hardening. The phytoestrogens content in pomegranate can reduce menopausal symptoms and strengthen bones.

Pomegranate is a fruit that refreshes the body and strengthens the heart and nerves. It is beneficial to cure people with weak nerves as well as to smoothen the digestive tract. Its juice which is dripped down the nose, either mixed with honey or not, can avoid the occurrence of polyps because it restrains blood vessels (Al-Bagdadi,

1994). The juice is a potion that is nutritious and refreshing, because it contains high enough carbohydrates, salt, and rich in vitamins, especially vitamin C. The juice can also exterminate germs with a comparison of 1:60 bacteria (Al-Audat, 1994). The bark, stem, and root of the pomegranate tree comprise no less than 20% of tannins. Pomegranate fruit is an easily hydrolyzed tannin, in the form of punicalagin. Punicalagin is an ellagitannin found only in pomegranate fruit. Punicalagin has isomer structures, that is, 2.3-(S)-Hexahydroxydiphenoyl-4.6-(S, S)-galagil-D-glucose (Kumari and Khatkar, 2016). Its bark, stem, and root contain no less than 20% of tannins. Of the existing tannins are four separate alkaloids; first, pelletierine alkaloid called also punicine; second, isopelletierine alkaloid; third, ethyl pelletierine alkaloid; and fourth, the pseudo-pelletierine alkaloid also called Methylgrantanine (Ṭalbah, 2011). Pomegranate also contains other polyphenol compounds, that is, catechin, and gallocatechin, as well as anthocyanin compounds such as prodelphinidin, delphinidin, cyanidin, and pelargonidin (Mertens-Talcott *et al*., 2006).

In Western countries, pomegranate usually appears in the fall. Now, food manufacturers add this fruit to chocolate, chewing gum, or made into juice. In 2005, 215 new foods and beverages were recorded containing pomegranate in the United States. Pomegranate is a versatile plant. Besides consumption, it is also made as juice for medication. This fruit contains many benefits. in addition to a great number of antioxidants, it helps prevent heart disease and stroke, and the seeds in each pomegranate grain contain fiber which is very beneficial for the body's immunity (Olivia, 2015).

7.1. Antibacterial activities

Antibacterial activities have been described in several studies using *in vitro* methods such as agar disc diffusion assays and/or minimum inhibitory concentration

(MIC). Some extracts of Pomegranate peels extracted by conventional extraction (CE) based on liquid-solid extraction using water bath, extraction assisted by infrared irradiation (IR), ultrasound- assisted extraction (UAE), extraction using pulsed electric fields (PEF), and extraction using high-voltage electrical discharges (HVED) are evaluated for antibacterial activities using gram negative bacteria of *Escherichia coli* and gram positive bacteria of *Staphylococcus aureus*. The inhibition of polyphenol rich extracts are assessed using ELISA technique. Based on HPLC studies, all extract contains high levels of ellagic and gallic acids (polyphenols). All extracts exhibited antibacterial activities with the inhibition efficiency toward *S. aureus* up to approximately of 80% as compared to *E. coli* (up to approximately 33%) (Rajha *et al*., 2019). Phloretin and coumaric acid present in pomegranate fruit exhibited potent antimicrobial activity against *Staphylococcus epidermidis,* while punigratane revealed the most substantial antimicrobial effect on *Micrococcus kristinae* (Nazeam *et al*., 2020).

Giménez-Bastida *et al*. (2021) have compared the antibacterial activities of different parts of pomegranate fruit. The pomegranate peel revealed strong antibacterial activities, compared the other parts (flower, leaf, and stem), against *Salmonella enterica, Escherichia coli, Shigella sonnei, Enterococcus faecalis, Staphylococcus aureus* and *Bacillus subtilis*. These antimicrobial activities are primarily attributed to the polyphenolic compounds, including high tannin content especially punicalagin. The other polyphenolic compounds identified are gallic acid, punicalagin-α, punicalagin-β, catechin, chlorogenic acid, epicatechin, and ellagic acid. However, it is believed that the antimicrobial activities not only depend on a single or an individual component but also due to a various metabolite.

The antibacterial activity of water extract of black peel pomegranate and silver nanoparticles synthesized by water extract toward strains of gram-positive and gram-negative. Both extract and silver nanoparticles exhibited potent the antibacterial activities toward *Pseudomonas aeruginosa* (gram negative) and *Staphylococcus aureus* (gram-positive), although *P. aeruginosa* was less sensitive to both samples. The nanoparticles made from water extracts were more effective as bacteriostatic than water extracts with minimum bacteriostatic concentration of nanoparticles of 40–65 μg/mL. From this result, silver nanoparticles synthesized by water extract of black peel pomegranate can be considered as a high potential agent to combat infectious diseases due to its significant bacteriostatic activity (Khorrami *et al*., 2020).

7.2. Antioxidant activities

Antioxidant activities of pomegranate fruits and its parts either *in vitro* or *in vivo* in animal models have been reported (Akuru *et al*., 2020). In vitro, the antioxidant activities of pomegranate were evaluated by radical scavenging of DPPH (2,2'-diphenyl-1-picrylhydrazyl), ABTS (2,2'-azino-*bis* (3-ethylbenzothiazoline-6-sulphonic acid), FRAP (ferric-reducing antioxidant), metal chelating activity, reducing power assay, β-carotene bleaching assay, ORAC (oxygen radical absorbance capacity assay, NBT (nitroblue tetrazolium chloride) assay, TOSC (total oxyradical scavenging capacity) assay, ferrous ion chelating, superoxide radical scavenging activity and lipid peroxidation inhibitory activity (Smaoui *et al*., 2019). Polyphenols extracted from pomegranate peel using ultrasound-assisted extraction (UAE) revealed high antioxidant activities using radical scavenging activity of DPPH of 94.91%, due to high content of punicalagin (143.64 mg/g dry matter) as determined by HPLC analysis (Kaderides *et al*., 2019).

The antioxidant activities of 70% ethanolic extract of pomegranate peel and its fractions (petroleum ether, ethyl acetate, butanol and water) obtained using liquid-liquid extractions have been evaluated by *in vitro* methods. Butanol and ethyl acetate were the most active fractions as radical scavenger toward DPPH ABTS radicals. In addition, water fraction showed the strongest activity in FRAP and β-carotene bleaching tests (Šavikin *et al.*, 2018).

Some clinical studies have been conducted related to the health benefits of pomegranate juices and extracts. Giménez-Bastida *et al.* (2021) informed that the most promising effects in clinical studies are related to improvement of the blood pressure. In addition, the activities related to inflammation, cancer, cognitive function, physical activity are less evidence. The evidence on human during clinical studies remains inconsistent, making it difficult to support most claimed health effects. The difference on clinical study results might be attributable to design limitations, including insufficient product characterization and inter individual variability which influence the efficiency of pomegranate polyphenols.

8. Conclusion

Pomegranate is mentioned three times in the Qur'an. Classic commentators have different ways of interpreting it from modern ones who relate it to scientific hermeneutics. The former generally interpreted the verses on pomegranate as a special fruit which is mentioned by the Qur’an besides dates. Meanwhile, the latter stated that pomegranate contains scientific miracles, which are very beneficial for humans’ life since its tree components have medical efficacies, starting from its pulp, seeds, flowers, leaves, rind, bark, to roots which can be formulated into cosmetic and herbal medication. From scientific perspective, pomegranate fruit and its part contained

bioactive compounds, especially polyphenols, having some biological activities which are beneficial to human health.

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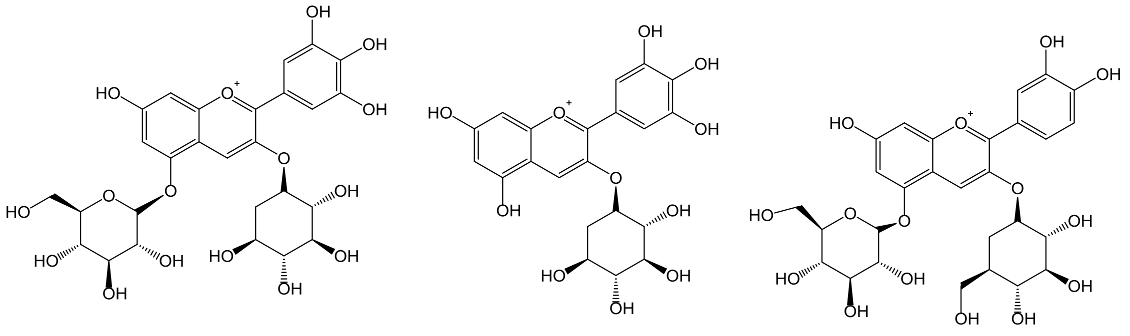
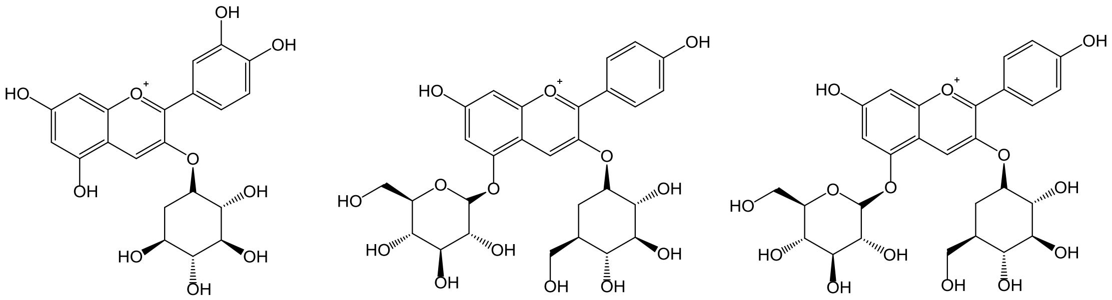
Pomegranate Juice and Fruit

Pomegranate Tree

Figure 1. Pomegranate fruit, pomegranate juice and pomegranate tree.

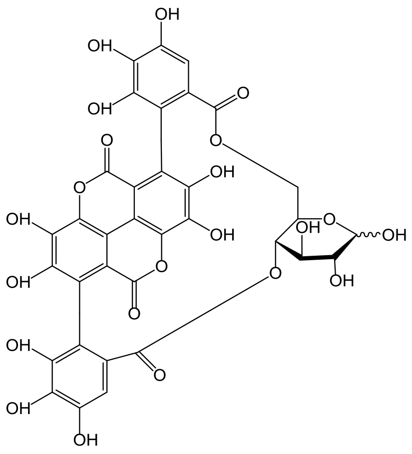


Delphinidin-3,5-diglucoside **Delphinidin-3-glucoside** **Cyanidin-3,5-diglucoside**

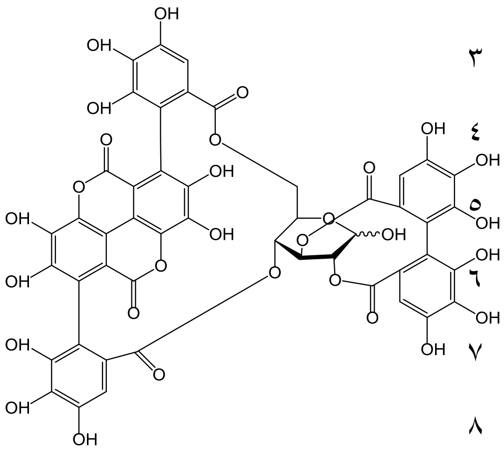


Cyanidin-3-glucoside **pelargonidin-3,5-diglucoside** **pelargonidin-3-diglucoside**

Figure 2. Anthocyanins present in pomegranate fruit (Wong *et al*., 2021).



Punicalin



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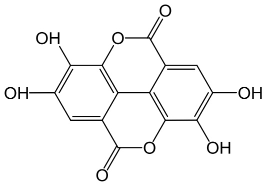

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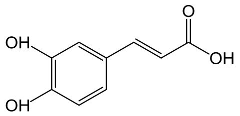

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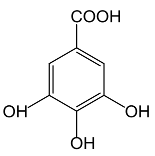

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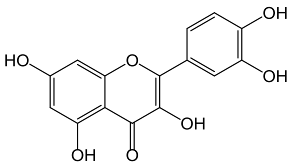
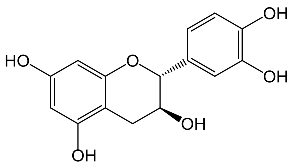
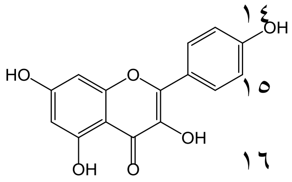


Quercetin



Catechin



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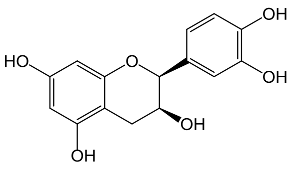
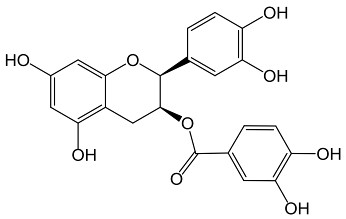
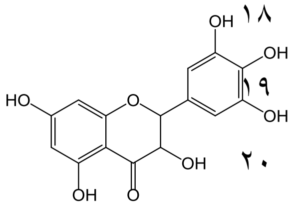


Epicatechin



Epicatechin gallate



Myricetin

Figure 3. The representative structures of phenolic compounds identified in pomegranate

Table 1. The Quranic Hermeneutics of pomegranate verses

Pomegranate verses	**Commentators**	**Quranic Hermeneutic**
Shura al-An'am verses 99 and 141.	Al-Alusi	There is a similarity between the 3 fruits; palm, olive, and pomegranate. But have a different taste.
	Ibnu Kathir	There is a process similarity between 3 fruits - palm, olive, and pomegranate- from their seed shapes, trees, and fruit colors. However, it has a different taste and smell.
Shura al-Rahman verses 68-69	Ibn al-Jauzi	palms and pomegranates are called after the word of *fakihah* (fruits) means that both of them have virtues.
	Al-Tabari	The word *fakihah* (fruits) relies on the words *nakhl* (palm) and *rumman* (pomegranate) giving the meaning that both have an advantage over other fruits.
	Al-Maragi	This verse is related to Qs. Al-Rahman: 62 to 77 series that describes the fruits in heaven which are green and fresh. The ones mentioned are palms and pomegranates.
	Al-Qurtubi	Palms are the staple food of Arabs and pomegranate is the fruit. Both are widely grown because the Arabs need benefits from them.
	Al-Razi	Allah mentioned the palms and pomegranates because they have opposing characteristics. One is sweet, the other is not. One grows in hot places, the other in cold places. One provides nutrition, the other does not.
	Al-Shawkani	Palms and pomegranates are heavenly fruits that have advantages, benefits, and efficacies for the body. Both of them can be found in the Arab region.
	M. Quraish Shihab	The efficacy of pomegranate has been tested empirically. It contains high citric acid that can help reduce the acidity of urine and blood, thereby preventing gout. Pomegranate also contains a sugar content of about 11% which is useful for easier burning and producing energy

Table 2. Some phenolics compounds identified in pomegranate fruits (Topalović *et al.*, 2021).

Anthocyanins and their derivative • Cyanidin-3,5-caffeoyl hexoside • Cyanidin-3,5-diglucoside • Cyanidin-3,5-pentoside hexoside • Cyanidin-3-galactoside • Cyanidin-3-glucoside • Delphinidin-3,5-pentoside hexoside • Delphinidin-3-glucoside • Delphinidin-caffeoyl • Delphinidin-dihexoside • Delphinidin-trihexoside • Epiafzelechin-cyanidin-dihexoside • Epiafzelechin-cyanidin-hexoside • Epiafzelechin-delphinidin-hexoside • Epicatechin-cyanidin-3,5-dihexoside • Epicatechin-delphinidin-3,5-dihexoside • Epicatechin-delphinidin-hexoside • Epicatechin-pelargonidin-hexoside • Epigallocatechin-cyanidin-3,5-dihexoside • Epigallocatechin-cyanidin-hexoside • Epigallocatechin-delphinidin-3,5-dihexoside • Epigallocatechin-delphinidin-hexoside • Pelargonidin-3,5-diglucoside • Pelargonidin-3,5-pentoside hexoside	Ellagitannins and derivatives of ellagic acid • Brevifolin carboxylic acid • Casuarinin • Ellagic acid • Ellagic acid (p-coumaroyl) hexoside • Ellagic acid derivative • Ellagic acid dihexoside • Ellagic acid galloyl hexoside • Ellagic acid hexoside • Ellagic acid pentoside 1 • Ellagic acid pentoside 2 • Ellagic acid rhamnoside • Ellagitannin 1 • Ellagitannin 10 • Ellagitannin 11 • Ellagitannin 2 • Ellagitannin 3 • Ellagitannin 4 • Ellagitannin 5 • Ellagitannin 6 • Ellagitannin 7 • Ellagitannin 8 • Ellagitannin 9 • Granatin A • Lagerstannin A • Lagerstannin C • Pedunculagin 1 • Pedunculagin 2 • Pedunculagin 3 • Pedunculagin 4 • Pedunculagin derivative • Punicalin derivative 1 • Punicalin derivative 2 • Punigluconin 1 • Punigluconin 2
Flavonol glycosides • Kaempferol hexoside • Dihydrokaempferol hexoside • Syringetin hexoside 1 • Syringetin hexoside 2 Flavones • Apigenin rhamnoside	Flavanols • Catechin • Epicatechin • Procyanidin dimer 1 • Procyanidin dimer 2 • Procyanidin dimer 3 • Procyanidin dimer 4 • Procyanidin dimer 5 • Procyanidin trimer 1 • Procyanidin trimer 2 • Procyanidin trimer 3
Hydroxybenzoic acids and their derivatives • Gallic acid	Hydroxycinnamic acids and their derivatives

• Vanillic acid hexoside • Monogalloyl hexoside • Hexahydroxydiphenic acid hexoside • Digalloyl-hexoside 1 • Digalloyl hexoside 2 • Vanillic acid dihexoside • Gallagic acid • Galloyl ester • Digalloyl hexahydroxydiphenic acid hexoside 1 • Digalloyl-hexahydroxydiphenic acid hexoside 2 • Gallotannin • Galloyl gallagyl hexoside Gallagyl ester 1 Gallagyl ester 2 • Tri-hexahydroxydiphenic acid hexoside 1 • Tri-hexahydroxydiphenic acid hexoside 2	• p-coumaric acid hexoside • 4-p-coumaroylquinic acid • Caffeic acid hexoside 1 • Caffeic acid hexoside 2 • 3-caffeoylquinic acid • 5-caffeoylquinic acid 1 • 5-caffeoylquinic acid 2

muhammad rikza muqtada <mrmuqtada@iainkudus.ac.id>

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Dear Professor Rohman,

Please refer to the attachment for the galley proof of your manuscript FR-2021-504 entitled 'Pomegranate (*Punica granatum* L.) fruits in the Quranic Hermeneutics and scientific perspectives' . Please check the content of the galley proof. If there are any mistakes, please comment and highlight in the PDF itself and revert to us within two (2) days of receipt. Once we have finalized the PDF version, your manuscript will be published online for early viewing.

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Cc: abdul rohman <abdulkimfar@gmail.com>
Subject: FR-2021-504 - Decision on your manuscript

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It is a pleasure to accept your manuscript for publication in Food Research journal. Please refer to the attachment for your acceptance letter. I will contact you again once the galley proof is ready for viewing and approval.
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Thank you for your fine contribution. We look forward to your continued contributions to the Journal.

Sincerely,
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Editor
Food Research

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Subject: Re: Manuscript ID: FR-2021-504

Dear Irnawati,

Thank you for the revised copy of your manuscript. We will contact you again for further processing.

Best regards,
Son Radu, PhD
Chief Editor

From: irnawati irens <irnawati.vhina@gmail.com>
Sent: Thursday, 26 August, 2021 10:02 AM
To: Food Research <foodresearch.my@outlook.com>
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Dear Professor Son Radu, Ph.D

I attached our revised manuscript titled "Pomegranate (*Punica granatum* L.) fruits in the Quranic Hermeneutics and scientific perspectives"

Thank you
Best regards
Irnawati

On Mon, Aug 23, 2021 at 3:41 PM Food Research <foodresearch.my@outlook.com> wrote:

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>
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> Adhering to Food Research format is greatly appreciated
>
> Best regards,
> Son Radu, PhD
> Chief Editor

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To: Food Research <foodresearch.my@outlook.com>
Subject: Re: Manuscript ID: FR-2021-504

Dear Professor Son Radu, Ph.D

I attached our revised manuscript and the evaluation form for article titled "Pomegranate (*Punica granatum* L.) fruits in the Quranic Hermeneutics and scientific perspectives"

Thank you
Best regards
Irnawati

On Fri, Aug 20, 2021 at 10:14 AM irnawati irens <irnawati.vhina@gmail.com> wrote:

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> Salam hormat 🙏
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> Dear Professor Dr. Abdul Rohman,
>
> Manuscript FR-2021-504 entitled " Pomegranate (Punica granatum L.) fruits in the Quranic Hermeneutics and scientific perspectives " which you submitted to Food Research, has been reviewed. The comments of the reviewer(s) are included in the attached file.
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> The reviewer(s) have recommended publication, but also suggest some revisions to your manuscript. Therefore, I invite you to respond to the reviewer(s)' comments and revise your manuscript. Once the revised manuscript is prepared, please send it back to me for further processing.
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>
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> Chief Editor, Food Research
> foodresearch.my@outlook.com
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> > > > It is my great pleasure to submit our paper to be published in your esteem journal.
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> > > > Irnawati

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Pomegranate (*Punica granatum* L.) fruits in the Quranic Hermeneutics and scientific perspectives

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Abstract

Pomegranate is popular fruits consumed because of their pleasant taste and high nutritional value having some health benefits to human health. In addition, pomegranate (*rumman* in Arabic) is one of stated fruit in Quran. Quranic Hermeneutic with a scientific approach has been a new model used by modern commentators to explore various kinds of sciences presented in the Quranic verses. Qur’an mentions a pomegranate three times. Classic commentators generally interpreted the pomegranate verses as a special fruit and served for the occupants of heaven. In contrast, modern scientific commentators stated that the fruit contains scientific miracles that are very beneficial for human’s health since this fruit had some phytochemicals reported to have some biological activities including antioxidant and antibacterial activity.

Keywords: Pomegranate, Quranic Hermeneutic, antioxidant, phenolics, antibacterial activities.

1. Introduction

Pomegranate fruits with scientific name of *Punica granatum* L. (belong to family of Punicaceae) are excellent sources of bioactive compounds mainly polyphenols. This plant is native to central Asia, but currently it is highly adaptable to a wide range of climatic and soil conditions, and is now grown in many different geographical regions including the Mediterranean basin, Asia, and California in the USA. Pomegranate fruit has been used extensively in the folk medicines of many cultures since ancient times including Greek, Ayurvedic, Unani and Egyptian (Reddy, 2018). This fruit is regarded as a ‘super fruit’, which is rich in antioxidant phytochemicals and is recognized for a myriad of health benefits. Pomegranate fruit is gaining popularity worldwide for its uniqueness, exclusive colour and taste, and associated health benefits (Hegazi *et al*., 2021).

Pomegranate is a type of tree from the family of Myrtaceae. Pomegranate (*rumman*) in a scientific term is called *Punica granatum* (Ṭalbah, 2011). Since thousands of years ago, human beings have enjoyed it both as food and medicine. The fruit is estimated to originate from West Asia and spread to the surrounding areas. Hebron, which is now a part of Israel territories, is well-known for pomegranate which has been planted since the time of the Prophet Moses. Egypt, Ancient Greece, and Rome are the civilizations known for harvesting this fruit. Several archaeological findings found the residues of pomegranate plants, such as its seeds and barks around Cyprus, Israel, Iraq, Jordan, Lebanon, Palestine, Syria, and Turkey. It is estimated to have existed since 3,000 years before A.D. (Potts, 2012).

Experts argue that the pomegranate habitat is in Southwest Asia (Middle East) or Northwest Asia (India). However, it has already spread and well-bred in the Mediterranean area. Then, it crosses over Iran, the Mediterranean Sea (Iraq and Syria),

Egypt, Europe, and even flourishes in Southern China and Southeast Asia. This plant is easy to grow in areas with almost all climates and from low to high land. Despite its ignorance, pomegranate can flourish well on the dry loose land (Mubashir and Mahran, 2010).

Pomegranates are becoming more popular with consumers because of their pleasant taste and high nutritional value. Pomegranate fruit is constituted by peel, arils, and seeds in an approximate 50:40:10 ratio, respectively. As in the majority of fruits, the chemical composition of the pomegranate differs according to the climatic conditions, ripening degree of the fruit at the time of harvest (Guo *et al*., 2021). The edible part of pomegranate is about 57%–85% of the whole fruit, among which fruit juice accounts for 36%–63%. The taste of pomegranate is moderately sour and sweet throughout the flavouring improvement by modern cultivation technology. Pomegranate juice is considered as functional food due to some bioactive contents which are beneficial to human health. Pomegranate fruit contain 17 kinds of amino acids and minerals, vitamin C, calcium, iron, phosphorus, retinol, riboflavin, ferulic acid, and other phenolic compounds. Pomegranate seed oil is also valuable source of bioactive compounds with health-beneficial effects, but it is sensitive to oxidation due to high content of PUFA. Therefore, the oil was added with pomegranate peel extract or synthetic antioxidants to improve its stability toward oxidation (Drinić *et al*., 2020). This fruit is suitable for both young and old consumers; for example, pomegranate juice drinks are popular in daily life, and pomegranate extracts also serve as food additives, supplements, and for taste correction (Ge *et al*., 2021). Pomegranate extract and its polyphenols can be considered as cosmeceuticals because both revealed skin protective effects by ameliorating methylglyoxal (MGO)-induced DNA damage through restoring cell adhesion, migration, and wound healing capacity (Guo *et al*., 2021). The regular

consumption of this fruit has been associated with the prevention of gastric damage, cardiovascular disease, type 2 diabetes mellitus, and specific types of cancers, renal illnesses, liver complications, and osteoarthritis (Villa-Ruano *et al.*, 2020). In this review, pomegranate from Quranic and scientific perspectives are described. In scientific perspective, the antibacterial and antioxidant activities and polyphenols responsible for these activities are highlighted.

2. Methods

This descriptive-analytical paper used a thematic method based on literature review, referring to scientific articles from *Tafseer* books, reputed journals, book literature, and conference papers. During this study, some databases of Scopus, American Chemical Society, Science Direct, Springer, and Google Scholar covering abstract and full texts are downloaded and evaluated to be used as references during this review. Scientific studies on Pomegranate published in journals were also used as main references. In addition, other sources came from books related to scientific miracles of the Quran compiled by experts in their fields.

3. Pomegranate fruit

Pomegranate (*Punica granatum* L.), Figure 1, is a fruit plant that can grow up to 5-8 meters in sub-tropical areas to tropical ones, from lowland to below 1000 meters above sea level. It is a shrub or a small tree with 2-5 meters in height (Lansky and Newman, 2007). Its stem is woody with square twigs, a lot of branches, spikes on its axilla, weak in nature, brown-coloured when unripe, and turns into dirty green post ripe. The pomegranate tree has a single leaf with short stems, located in groups. The leaf sheet takes oval to lancet in shape, taper base, blunt tip, pinnate bones, shiny surface, 1-9 cm in length, 0.5-2.5 cm in width, and green-coloured (Ahmad, 2003).

Pomegranate is a berry fruit with a rounded shape and 5-12 cm in diameter, with various bark colours, such as purplish-green, white, reddish-brown, or blackish purple. The fruit is unique with its red-glazing seeds like crystals. The flower is called *Jullanar*. It is an antique fruit that has been known since ancient times. Many people gain some virtues and benefits found in it (Ṭayyāra, 2009). The pomegranate tree is a small posture with thin foliage and flatly shaped, having large and beautiful flowers, with a reddish colour, a fleshy shell of which contents are red-coloured cobs. The white flowers which lie in several separate places, one by one serve as a transparent lid. The Persians named this pomegranate *Jalnaz*, meaning the red fruit with seeds on it (Olivia, 2015).

In Indonesia, pomegranate is well-known by several names, depending on the regions it grows, such as *delima* (Malay), *glima* (Acehnese), *Glineu Mekah* (Gayonese), *dhalima* (Maduranese), *gangsalan* (Javanese), *dalima* (Sundanese), *teliman* (Sasaknese), *lele kase* and *rumu* (Timor). There are three types of pomegranate scattered over Indonesia, classified by its colours; they are white pomegranate, red pomegranate, and black pomegranate. Of these three types, the most famous is the red one. Pomegranate fruit is a symbol of prosperity and fertility, which is held in the form of a ceremony of seven months of a pregnancy ritual, conducted by Javanese people and other tribes in Indonesia (Olivia, 2015). Meanwhile, for Chinese people, it is one of the compulsory fruits in welcoming the Lunar New Year. They believe that many of the seeds are a symbol of abundant fortunes.

In general, pomegranate is various in types, in terms of shape, colour, sweetness level, acidity, or its seed’s shape and colour. The best is the very red one with thin bark and abundant water content (Ṭalbah, 2011). It has three flavours, that is, sweet, sour, and blends between sweet and sour. Each flavour has a diverse uniqueness. The fruit with a sweet taste has a 7-10% content of sugar, 81% of water, 0.6% of proteins, and

0.3% of fat. Moreover, sweet pomegranate also contains fiber as much as 2% as well as some tannin, inulin, and citric acid as much as 1%. It also contains minerals, mainly iron, phosphorus, sulfur, potassium, lime, manganese, and vitamin C (Lansky and Newman 2007). Pomegranate with sour taste comprises less sugar, with 2% of citric acids. This acid content is even higher than that on oranges. Meanwhile, its seeds cover 9% of proteins and fat as much as 7%. Its outer bark contains tannic acids; the material that can restrain bleeding. Therefore, its outer bark powder which has been dried can be used as a remedy to ward off diarrhea and dysentery. It can also be used to restrain blood discharge in the digestive tract (Al-Qabbani, 2009).

Today, Quran has not only become the main focus of merely studying objects and classical interpretations, but also the attention of various scientific studies, including scientific and medical fields. An effort to comprehend the Quran with a scientific and medical approach by experts is called scientific hermeneutic. This style of hermeneutic is an attempt to understand the verses of the Quran containing scientific cues from the perspectives of modern science. Scientific hermeneutic is also an interpreter's striving effort to uncover the relationship between the verses of *kauniyah* in the Quran and scientific discoveries aimed at revealing its scientific miracles (Rahman, 1986).

4. Pomegranate in Quranic perspective

According to Al-Zahabi, this scientific hermeneutic seeks to explore the scientific dimension and uncover the secrets of its miracles related to scientific information that may not have been known to humankind during the descent, so it becomes evidence of the truth that the Quran is not a human work, but a revelation of the Creator instead (Zahabi, 2009). Dealing with this, many scientists have focused their studies on the Quran by attempting to put the verses of the Quran into logic and

correlating them with treatments and medicines. Scientists have tried to combine the studies of plants mentioned in the Quran with medicines. The Quran does not mention all types of plants in general, just like modern botanical science does, but all types of plants mentioned by the Quran are certainly the top organisms of their respective species. For example, the fig tree (the fruits of heaven) is the top of the species of "*Ficus*" of "Moraceae" types according to botanists, its species reaches about 700 scattered around the world. Likewise, pomegranate, herbs of 1001 benefits, cure various diseases, internal and external ones (Ahmad, 2003).

Nowadays, there have been families who have started the 'no vegetables and fruits' campaign in their family menu. Fruits constitute a major part of the nutrients needed by a human. Besides being consumed as nutrients and vitamins, certain fruits have medicinal properties for certain diseases. This is based on knowledge in religious teachings. This fruit is pomegranate which is also mentioned several times in the Qur'an and contains many health benefits. Almost all parts of pomegranate plants are useful for medical treatments, starting from the pulp, seeds, flowers, leaves, fruit skins, bark, to the roots that can be formulated into medicine (Al-Najjar, 2006).

The Quran does not mention a type of plant unless it serves as the top organism of each species. Likewise, pomegranate, with the Latin name *Punica granatum*, is a type of fruit that belongs to the berry species. Pomegranate is a plant species that has been well-known since ancient Egyptian time, that is, the beginning era of Egyptian civilization. Ancient people recognized it as 'Arhamanie' derived from the Qibti name called 'Armen' or 'Rumen' which is derived from the Hebrew name called 'Rumon'. Then, it is translated into the Arabic word 'Rumman' (Shehab, 2011).

Pomegranate (*rumman*) is an ancient plant known to produce many benefits and to provide various virtues. The Pharaoh Kings of ancient Egyptian had used

pomegranates as medicine (Ahmad, 2003). In Islamic literary treasures, pomegranate is classified into the fruit used as medicine for the Prophet. Ibn Qayyim wrote some of its virtues; the one with sweet taste is beneficial to the stomach, throat, chest, and lungs. It can also smoothen urine, reduce yellow substances in the liver, overcome diarrhea, and strengthen organs (Al-Jauziyah, 2012).

The Qur'an as the greatest miracle for Muslims comprises verses showing various scientific signs from modern science perspectives. The hermeneutic of verses that talk about science is known as *Tafsir Ilmi* (Scientific Interpretation) (Al-Qaraḍāwī, 1999). According to Husain al-Zahabi, scientific hermeneutic discusses scientific terms in narrating verses of the Qur'an, seeks to explore its scientific dimensions, and uncovers the secrets of miracles related to scientific information that may not have been known to humans at the time the Qur'an was revealed (Al-Żahabī, 1995). Hence, in modern times, this becomes another evidence that the Qur’an is not a human creation, rather a revelation of God, The Creator.

Muslim scientists have tried to uncover the contents of the Qur'an which leads to scientific discoveries or to keep some of the natural sciences which are not widely known by humans. They scientifically describe those contents in depth. Despite the Qur’an’s *zahir* (visible) characteristics, of which texts briefly talk about this issue, the scientists’ commentary can almost be proven by modern sciences (Al-Shirbaṣī, 1962). This argument is based on the fact that all sciences obtained from the Qur'an, after being analyzed accurately, will lead people to think at a certain point that everything said in the Qur'an is all true.

This scientific hermeneutic employed a set of contemporary sciences, such as astronomy, geology, chemistry, biology, medical science, and other scientific tools (Al-Qaraḍāwī, 1999). Such interpretation with scientific approaches is not intended to

justify the truth of scientific findings by the verses of the Qur'an, nor is it to compel the interpretation of the verses of the Qur'an to seemingly conform to the scientific findings. However, this scientific hermeneutic study initially arises from the awareness that the Qur'an is absolute, whilst its interpretation, both from commentary and scientific perspectives, is relative and tentative in nature (Hanafi, 2015).

Scientific hermeneutic has existed since the Abbasid dynasty. At that time, there were attempts made by some scholars to compromise Islamic teachings with translated foreign cultures, as well as pure sciences found among the Muslims (Abderrahman, 1986). Al-Ghazali was one of the figures who was persistent in supporting these interpretive ideas. In his monumental masterpiece, *Ihya 'Ulumiddin*, he put forward his argumentations to prove his stance (Al-Ghazālī, 2000). He said that all kinds of sciences, both preceding and subsequent ones, whether known or not, come from the Qur'an (Musbikin, 2014).

In another work, *Jawahir al-Qur'an*, Al-Ghazali also discussed his support for scientific hermeneutic. He stated that all sciences are gathered in one among several oceans of Allah's knowledge which has no end. Furthermore, he strengthened his arguments by saying that among Allah's deeds are to provide healing and pain, as He told about Prophet Abraham: " *And He ˹alone˺ heals me when I am sick.*" QC. Ash-Shu’ara: 80). Al-Gazali explained that medicine and diseases cannot be discovered except by those who are involved in the medical field (Al-Ghazālī, 2003). Thus, the verse is a signal dealing with medical science.

Besides al-Ghazali, Fakhruddin al-Razi was an expert commentator who tends to comply with scientific hermeneutic (Al-Rāzī, 2012). His monumental work, *Mafatih al-Gaib*, is filled with scientific discussions related to philosophy, natural sciences, theology, medicine, astronomy, and so on. Because of presenting the above discussions,

this interpretation is known as a philosophical hermeneutic (Shihab, 1994). The same perspective is also carried out by Jauhari Tantawi, in his work, *Tafsir al-Jawahir*. His interpretation uncovers scientific theories and scientific reinforcement in every verse he interprets (Goldziher, 1955).

In this modern era, scientific hermeneutic is increasingly popular and used as a reference to study the sciences presented in the Quran. The development of scientific interpretation in the modern era was at least due to the influence of western technology and science (Europe and the United States) on the Arab world and Muslim regions, especially in the second half of the 19th century when most of the Islamic worlds were under the control of European countries (Jansen, 1980). This western hegemony has gradually led to resistance on one hand and on the other hand, advances in modern Arab scholars' thoughts in terms of religious and social sciences.

The development of scientific hermeneutic is also an implication of the change in the modern Muslims’ perspectives on the verses of the Qur'an, especially with the exposure of modern scientific discoveries in the 20th century. For example, the word '*lamusi'un'*, in the QC *al-Zariyat*: 47, "*We built the universe with ˹great˺ might, and We are certainly expanding ˹it˺*". Along with new scientific discoveries, astronomers concluded a scientific theory, stating that nebulae which lie outside the galaxy we live in continues to move away at different speeds, even celestial bodies in one galaxy are moving away from one another (Hanafi, 2015). This shows that the discoveries of modern science can provide new scientific meanings of the verses of the Qur'an.

An expert on scientific miracles, Nadya Tayyara, explained that he finally found out new information from several passages of the Qur'an verses that talk about fruits. This understanding is also a response to the exposure of biological diseases and their treatment mechanisms, and an understanding of the correlation between chronic

diseases and immune disorders that can be cured by these fruits (Ṭayyāra, 2009). This statement was strengthened by Ibn Qayyim al-Jauziyah, claiming that the fruits mentioned in the Qur'an have efficacies that other fruits don't. All of these fruits can be used to cure certain diseases (Al-Jauziyah, 2012). By this context, the paper shows the scientific evidence that causes the pomegranate to be a special fruit as mentioned in the Koran. The disclosure of scientific facts means that the quranic hermeneutic is open to modern science. In interpreting the pomegranate verses must be based on botanical science data.

5. Pomegranate in commentators' perspectives: a Quranic Hermeneutic

Pomegranate is a fruit mentioned in the Quran. Al-Shafii noted that pomegranate (*rumman*) is mentioned three times in the Quran; two of which are in the QC Al-An'am (6): verse 99 and 141, and another in the QC Al-Rahman (55): verse 68 (Al-Shāfī'ī, 2000). Hermeneutical interpretations of these verses were compiled in Table 1.

Al-Alusi mentions the hermeneutic of the shura al-An'am verses; 99 and 141, there is a similar redaction as referring to olive and pomegranate. In both verses, God speaks of the signs of His power for the believers. Among of which on earth is that He created a variety of trees, such as palm trees, olive trees, and pomegranate trees which take similar shapes and colours, despite the difference in taste (Al-Alusi, 1997). Commenting on those verses above, Qatadah stated that the creation of this pomegranate fruit is similar in its shape, partly to some of the others, but different in the fruit it produces, either in terms of its colour, taste, or content. The power of God's creation on the pomegranate can be seen from the origin of its creation. At the initial phase, it is grain, then grows into a tree, and produces the same fruit colour but different taste and smell (Kathīr, 2000).

In the Quran chapter Al-Rahman (55) verses 68-69, God said: "*In both of them will be [all kinds of] fruit, and date-palms and pomegranates*. *Then which of your Lord’s favors will you both deny?”.* In this verse, God particularly mentions that there are kinds of fruits, dates, and pomegranates in heaven. Ibn al-Jauzi mentioned the word '*dates*’(*nakhl*) and ‘*pomegranates*’ (*rumman*) after the word ‘*fakihah*’ meaning fruits both are classified as fruits. This is to explain the virtue of both fruits (Al-Jauzi, 2002). Al-Tabari also stated that in the verse, there is a conjunction indicating a particular thing to the general one, mentioning the word 'fruits' followed by the word 'dates' (*nakhl*) and pomegranates (*rumman*) (Al-Tabari, 1998). However, the mention of the two words specifically shows the virtue of the two fruits over the others.

Al-Maragi stated that the series in *Al-Rahman* verses 62 to 77 describe that there is a tree of fruit grown with leafy green in heaven. Inside of it, there is a clear water spring that sparkles. Meanwhile, the dwellers and angels are leaning back on green pillows and beautiful carpets. The angels who happen to be the dwellers' servants have never been touched by any human beings nor genies. They can easily pick the fruit up close as the trees are short. Among the various fruits, the only special ones are dates and pomegranates which have been mentioned (Al-Maragi, 1996). *Then which of your Lord’s favors will you deny?*

According to Al-Qurtubi, in this verse, dates, and pomegranates are mentioned after the other fruits as in line with the Arabs customs, dates and pomegranates are like wheat. For the Arabs, dates are the main course, while pomegranates are the dessert. Both fruits are mostly planted since the Arabs take benefits from them (Al-Qurṭubī, 2014). Whereas, according to Al-Rāzī, God mentions the two fruits, pomegranates and dates, because they are opposite each other; one tastes sweet and the other does not. In addition, one is hot and the other is cold; one is as a source of nutrients and the other is

not; one grows in hot land and the other is in cold land; one with high trunk and the other with opposite trunk (Al-Rāzī, 2012). Whereas, a medieval commentator, Muhammad al-Shawkani, presented several opinions from the interpretation of *surah* al-Rahman: 68, pomegranate and dates mentioned in the verse belong to the heaven's second characteristics mentioned in the QC. al-Rahman: 62. Even though both are classified into fruits, but particularly mentioned because of their abundant benefits compared to other fruits. Both are also plants existing on the land of Arabs. Another opinion stated that pomegranate is a type of fruit that can be used for medication with extraordinary efficacies (Al-Shawkānī, 2014).

A modern Indonesian commentator, M. Quraish Shibab, tends to interpret the verses about pomegranate based on its efficacies which have empirically been examined. In his commentary book, *al-Misbah*, he explained that its juice contains very high levels of citric acid compared to other types of fruits, and when roasted, it is very helpful in reducing the acidity of urine and blood which in turn can prevent gout on the body. The citric acid contained in pomegranate can also help form some kidney stones. This juice also contains sufficient sugar levels, around 11%, to ease the roasting and produce energy (Shihab, 2002).

6. Polyphenols in pomegranate fruit

Some extraction techniques have been introduced to get high recovery of polyphenols. Rajha *et al.* (2019) have compared 5 extraction techniques namely conventional extraction (CE) based on liquid-solid extraction using water bath, extraction assisted by infrared irradiation (IR), ultrasound- assisted extraction (UAE), extraction using pulsed electric fields (PEF), and extraction using high-voltage electrical discharges (HVED). HVED assisted extraction offered the enhanced the recovery of polyphenols by approximately of 3 and 1.3 times as compared to US and PEF assisted

extractions, respectively. The high recovery of polyphenols during extraction of HVED was caused by the ability of HVED technique to damage the microstructure of pomegranate skins strongly, as indicated from scanning electron microscopy (SEM) study.

With the advance of experimental design applied in extraction of phytochemicals, response surface methodology (RSM) was used to evaluate the effect of three factors namely (1) condition liquid/solid ratio, (2) extraction time and (3) ethanol percentage on ultrasonic assisted extraction (UAE) in obtaining the maximum of total polyphenols (TP), total flavonoids (TF) and condensed tannins (CD) from pomegranate peels. The optimum condition was obtained using liquid/solid ratio of 20, extraction time of 30.94 min and 59.26% of ethanol offered the highest contents of TP, TF and CT simultaneously. The results obtained during experimental design were in agreement in those with the predicted values (Hayder *et al.*, 2021).

Pomegranate fruit is rich in polyphenol compounds that may potentially revealed some biological activities such as antioxidant, antibacterial and antifungal activities. The main phenolic compounds in pomegranate peel were anthocyanins, phenolic acids, and flavonoids. During storage, some changes in polyphenolic contents may occur. The study on the content changes of polyphenolic compounds of pomegranate peel and arils during storage for 50 days at temperature of 5^{o}C was undertaken. The change patterns of pomegranate peel and aril were different among different phenolic compounds. The concentrations of the major phenolic compounds detected in arils and peels decreased during storage, except for syringic acid, catechin acid, p-coumaric acid, chlorogenic acid, caffeic acid, epicatechin, and dihydroquercetin (in arils). In addition, some phenolics compounds were decreased in pomegranate peel except syringic acid, catechin acid, p-coumaric acid, dihydromyricetin during storage.

These changes may relate to enzymatic activities. The information on changes in polyphenolic contents is useful for management during postharvest treatments to maintain the quality of pomegranate fruits (Liu *et al.*, 2021).

Polyphenolics can be divided into two types: extractable (soluble in aqueous‒organic solvents) and non-extractable polyphenols (NEPPs, which are not soluble in aqueous‒organic solvents (Pérez-Ramírez *et al.*, 2018). The main extractable phenolic compounds were anthocyanins, gallotannins and gallagyl derivatives, while the main non-extractable phenolic compounds include vanillic acid and dihydroxybenzoic acid. Six compounds were then isolated from the EtOAc extracts whose structures were identified as β-sitosterol-3-O-glycoside (1), β-sitosterol (2), ursolic acid (3), corosolic acid (4), asiatic acid (5) and arjunolic acid (6). Using supercritical extraction CO_2: EtOH, punicalagin α-anomer, punicalagin β–anome and ellagic acid were isolated (Harscoat-Schiavo *et al.*, 2021).

The identified polyphenolic compounds in pomegranate fruit are grouped into (1) ellagitannins (hydrolyzable tannins) such as corilagin, granatin A and B, tellimagrandin, pedunculagin, punicalagin (an unique compound to pomegranate which is found in the seeds, peel, leaves and juice) with the chemical structure in Figure 2; (2) anthocyanins and their derivatives (sugar derivatives of delphinidin, cyanidin and pelargonidin such as delphinidin-3-glucoside, delphinidin-3,5-diglucoside, cyanidin-3-gluco side, cyanidin-3,5-diglucoside, pelargonidin-3-glucoside and pelargonidin -3,5-diglucoside, and punicalin with chemical structures in Figure 3; (3) derivatives of ellagic acid; (4) flavanols such as kaempferol, quercetin and myricetin, flavones; (4) flavan-3-ols such as catechin, epicatechin and epigallactocatechin 3-gallate; (5) hydroxybenzoic acids and their derivatives; (6) hydroxycinnamic acids and their derivatives, as compiled in Table 2 (Topalović *et al.*, 2021; Wong *et al.*, 2021).

7. Biological activities of pomegranate polyphenols

Some biological activities on pomegranate polyphenols have been reported including antibacterial and antioxidants (Govindappa *et al*., 2021). The antibacterial activities and antioxidant activities of pomegranate peel extracts extracted using high pressure and enzymatic assisted extraction have been evaluated. The chemometrics of principal component analyses exhibited that antioxidant activity and phenolic compounds content were strongly related with antimicrobial activity (Alexandre *et al*., 2019).

Pomegranate is a very special fruit with a lot of efficacies and benefits. It is closely related to the fact that the Quran particularly mentions pomegranate in the QC. Al-Rahman verses 68-69, "*In both of them will be [all kinds of] fruit, and date-palms and pomegranates*. *Then which of your Lord's favors will you both deny?”*. The Quran does not mention a type of vegetation unless it is the top organism of its species. Therefore, modern scientific commentators of the Quran state that pomegranate conceives scientific miracles, which is very beneficial for human life. These benefits did not only appear in the days when this verse was revealed but also had existed in ancient times. Pomegranate has been utilized for treatment in the times of the Pharaoh Kings to treat their people who were infected by certain diseases (Al-Muslih, 2009).

In the Islamic period, some scholars referred to some benefits that pomegranate has. Ibn al-Qayyim reported a hadith of treatment narrated by Ali R.A who heard the prophet P.B.U.H saying: "*Eat pomegranate with its fat because it can heal stomach*” (Hanbal, 2010). Ibn Qayyim said that pomegranate is very good to strengthen the stomach because it can soften it. It is also beneficial for the esophagus, chest, and lungs as well as efficacious for treating coughs. Its water can make the stomach feel relieved, facilitate nutrient supplies in the body, and strengthen memory (Al-Jauziyah, 2012).

In modern alternative medical treatment, all elements of the pomegranate fruit tree are efficacious for treatment, starting from its flesh of fruit, seeds, flowers, leaves, rinds, barks, to its root, which can serve as medicine. Pomegranate fruit produces anthocyanin, sugar, ascorbic acid, ellagic acid, gallic acid, caffeic acid; catechin, epigallocatechin gallate, and many minerals, especially iron, and amino acid (Jurenka, 2008). Fakhruddin al-Razi in his exegesis stated that sweet pomegranate serves to strain the shaft of male genitals; meanwhile, the sour one can eliminate sexual stimulus. The sweet pomegranate causes thirst, while the sour one relieves jaundice and discontinues vomiting (Al-Rāzī, 2012).

Besides, pomegranate can also cleanse and open the respiratory tract for people suffering from flu. Its juice may also serve as sweet thick syrup which is the most well-preserved acidity. This syrup can be added to any food and medically used to treat various diseases on the mouth and gums (Al-Najjar, 2006). Its antioxidant content is also higher than that in green tea, cranberry juice, and orange juice. The benefits of the fruit which grows a lot in Iran, northern India, and Southeast Asia-including Indonesia-are no longer just a myth nor advertising campaign. Even more, both red and white pomegranates are equally efficacious. They can serve as herbs to prevent cancer, antidiarrhea, increase or decrease weight, delay skin-aging, protect the heart and decrease cholesterol level (Menezes *et al*., 2006).

Pomegranate's root and bark comprise ellagitannins, including punicalin and punicalagin; piperidine alkaloids (Jurenka, 2008). Its root bark can be used to eradicate worms because it contains a lot of pelletierene alkaloids. To make such content in high doses is by boiling its root bark in 50 grams for every 1 L of water with a quarter-hour time. This stew is then consumed as many as approximately one glass each morning (Al-Husaini, 2015). This potion can sometimes result in indications of virulence,

headache, nausea, and vomiting. To avoid the occurrence of these poisoning symptoms, this root bark should be mixed with other ingredients which can restrain bleeding, such as tannins. Thus, absorption of the solvent materials becomes slower. The root bark also comprises various materials which can restrain bleeding in high doses (Ahmad, 2003).

Meanwhile, pomegranate bark contains phenolic punicalagin, gallic acid, fatty acid; catechin, epigallocatechin gallate (EGCG), quercetin, rutin, flavonol, flavone, flavanone, anthocyanidin. Besides, its outer bark contains tannic acid, the materials which can restrain bleeding. Therefore, the dried pomegranate bark powder can serve as a remedy to ward off diarrhea and dysentery (Al-Futuh, 2006). It can also be used to withstand blood discharge in the digestive tract. Meanwhile, the boiled one also provides the same benefits and can be used to ward off caterpillars or worms, particularly tapeworms. This is because, on its bark, there are pelletierene alkaloid materials. The bark can also benefit people as anti-aging materials, so they make use of it to colour their skins along with the tree (Ṭayyāra, 2009).

Pomegranate is very beneficial for elderly women. Based on a study by Hidaka *et al*. (2005) it has an estrogenic effect, which is to ward off menopausal disorders and prevent reproductive organ cancer. By drinking a glass of pomegranate juice every day, people approaching menopause will get 100 mL of polyphenol antioxidant compounds. These compounds can paralyze cancer cells and restore artery wall hardening. The phytoestrogens content in pomegranate can reduce menopausal symptoms and strengthen bones.

Pomegranate is a fruit that refreshes the body and strengthens the heart and nerves. It is beneficial to cure people with weak nerves as well as to smoothen the digestive tract. Its juice which is dripped down the nose, either mixed with honey or not, can avoid the occurrence of polyps because it restrains blood vessels (Al-Bagdadi,

1994). The juice is a potion that is nutritious and refreshing, because it contains high enough carbohydrates, salt, and rich in vitamins, especially vitamin C. The juice can also exterminate germs with a comparison of 1:60 bacteria (Al-Audat, 1994). The bark, stem, and root of the pomegranate tree comprise no less than 20% of tannins. Pomegranate fruit is an easily hydrolyzed tannin, in the form of punicalagin. Punicalagin is an ellagitannin found only in pomegranate fruit. Punicalagin has isomer structures, that is, 2.3-(S)-Hexahydroxydiphenoyl-4.6-(S, S)-galagil-D-glucose (Kumari and Khatkar, 2016). Its bark, stem, and root contain no less than 20% of tannins. Of the existing tannins are four separate alkaloids; first, pelletierine alkaloid called also punicine; second, isopelletierine alkaloid; third, ethyl pelletierine alkaloid; and fourth, the pseudo-pelletierine alkaloid also called Methylgrantanine (Ṭalbah, 2011). Pomegranate also contains other polyphenol compounds, that is, catechin, and gallocatechin, as well as anthocyanin compounds such as prodelphinidin, delphinidin, cyanidin, and pelargonidin (Mertens-Talcott *et al*., 2006).

In Western countries, pomegranate usually appears in the fall. Now, food manufacturers add this fruit to chocolate, chewing gum, or made into juice. In 2005, 215 new foods and beverages were recorded containing pomegranate in the United States. Pomegranate is a versatile plant. Besides consumption, it is also made as juice for medication. This fruit contains many benefits. in addition to a great number of antioxidants, it helps prevent heart disease and stroke, and the seeds in each pomegranate grain contain fiber which is very beneficial for the body's immunity (Olivia, 2015).

7.1. Antibacterial activities

Antibacterial activities have been described in several studies using *in vitro* methods such as agar disc diffusion assays and/or minimum inhibitory concentration

(MIC). Some extracts of Pomegranate peels extracted by conventional extraction (CE) based on liquid-solid extraction using water bath, extraction assisted by infrared irradiation (IR), ultrasound- assisted extraction (UAE), extraction using pulsed electric fields (PEF), and extraction using high-voltage electrical discharges (HVED) are evaluated for antibacterial activities using gram negative bacteria of *Escherichia coli* and gram positive bacteria of *Staphylococcus aureus*. The inhibition of polyphenol rich extracts are assessed using ELISA technique. Based on HPLC studies, all extract contains high levels of ellagic and gallic acids (polyphenols). All extracts exhibited antibacterial activities with the inhibition efficiency toward *S. aureus* up to approximately of 80% as compared to *E. coli* (up to approximately 33%) (Rajha *et al*., 2019). Phloretin and coumaric acid present in pomegranate fruit exhibited potent antimicrobial activity against *Staphylococcus epidermidis*, while punigratane revealed the most substantial antimicrobial effect on *Micrococcus kristinae* (Nazeam *et al*., 2020).

Giménez-Bastida *et al*. (2021) have compared the antibacterial activities of different parts of pomegranate fruit. The pomegranate peel revealed strong antibacterial activities, compared the other parts (flower, leaf, and stem), against *Salmonella enterica, Escherichia coli, Shigella sonnei, Enterococcus faecalis, Staphylococcus aureus* and *Bacillus subtilis*. These antimicrobial activities are primarily attributed to the polyphenolic compounds, including high tannin content especially punicalagin. The other polyphenolic compounds identified are gallic acid, punicalagin-α, punicalagin-β, catechin, chlorogenic acid, epicatechin, and ellagic acid. However, it is believed that the antimicrobial activities not only depend on a single or an individual component but also due to a various metabolite.

The antibacterial activity of water extract of black peel pomegranate and silver nanoparticles synthesized by water extract toward strains of gram-positive and gram-negative. Both extract and silver nanoparticles exhibited potent the antibacterial activities toward *Pseudomonas aeruginosa* (gram negative) and *Staphylococcus aureus* (gram-positive), although *P. aeruginosa* was less sensitive to both samples. The nanoparticles made from water extracts were more effective as bacteriostatic than water extracts with minimum bacteriostatic concentration of nanoparticles of 40–65 μg/mL. From this result, silver nanoparticles synthesized by water extract of black peel pomegranate can be considered as a high potential agent to combat infectious diseases due to its significant bacteriostatic activity (Khorrami *et al*., 2020).

7.2. Antioxidant activities

Antioxidant activities of pomegranate fruits and its parts either *in vitro* or *in vivo* in animal models have been reported (Akuru *et al*., 2020). In vitro, the antioxidant activities of pomegranate were evaluated by radical scavenging of DPPH (2,2’-diphenyl-1-picrylhydrazyl), ABTS (2,2’-azino-*bis* (3-ethylbenzothiazoline-6-sulphonic acid), FRAP (ferric-reducing antioxidant), metal chelating activity, reducing power assay, β-carotene bleaching assay, ORAC (oxygen radical absorbance capacity assay, NBT (nitroblue tetrazolium chloride) assay, TOSC (total oxyradical scavenging capacity) assay, ferrous ion chelating, superoxide radical scavenging activity and lipid peroxidation inhibitory activity (Smaoui *et al*., 2019). Polyphenols extracted from pomegranate peel using ultrasound-assisted extraction (UAE) revealed high antioxidant activities using radical scavenging activity of DPPH of 94.91%, due to high content of punicalagin (143.64 mg/g dry matter) as determined by HPLC analysis (Kaderides *et al*., 2019).

The antioxidant activities of 70% ethanolic extract of pomegranate peel and its fractions (petroleum ether, ethyl acetate, butanol and water) obtained using liquid-liquid extractions have been evaluated by *in vitro* methods. Butanol and ethyl acetate were the most active fractions as radical scavenger toward DPPH ABTS radicals. In addition, water fraction showed the strongest activity in FRAP and β-carotene bleaching tests (Šavikin *et al*., 2018).

Some clinical studies have been conducted related to the health benefits of pomegranate juices and extracts. Giménez-Bastida *et al.* (2021) informed that the most promising effects in clinical studies are related to improvement of the blood pressure. In addition, the activities related to inflammation, cancer, cognitive function, physical activity are less evidence. The evidence on human during clinical studies remains inconsistent, making it difficult to support most claimed health effects. The difference on clinical study results might be attributable to design limitations, including insufficient product characterization and inter individual variability which influence the efficiency of pomegranate polyphenols.

8. Conclusion

Pomegranate is mentioned three times in the Qur'an. Classic commentators have different ways of interpreting it from modern ones who relate it to scientific hermeneutics. The former generally interpreted the verses on pomegranate as a special fruit which is mentioned by the Qur’an besides dates. Meanwhile, the latter stated that pomegranate contains scientific miracles, which are very beneficial for humans’ life since its tree components have medical efficacies, starting from its pulp, seeds, flowers, leaves, rind, bark, to roots which can be formulated into cosmetic and herbal medication. From scientific perspective, pomegranate fruit and its part contained

bioactive compounds, especially polyphenols, having some biological activities which are beneficial to human health.

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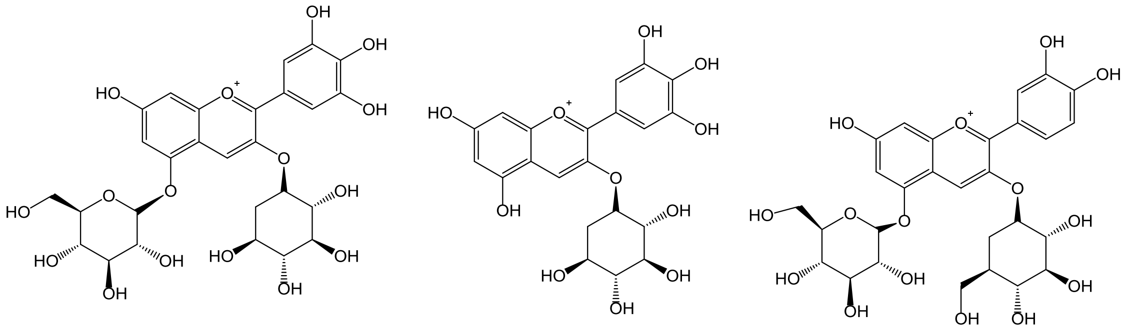
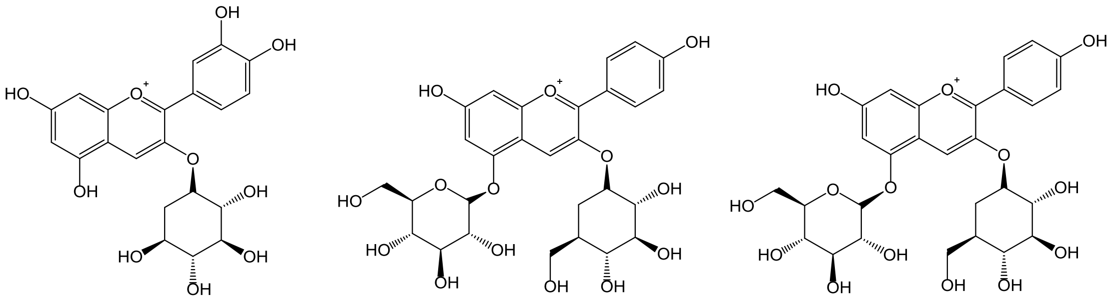
Pomegranate Juice and Fruit

Pomegranate Tree

Figure 1. Pomegranate fruit, pomegranate juice and pomegranate tree.

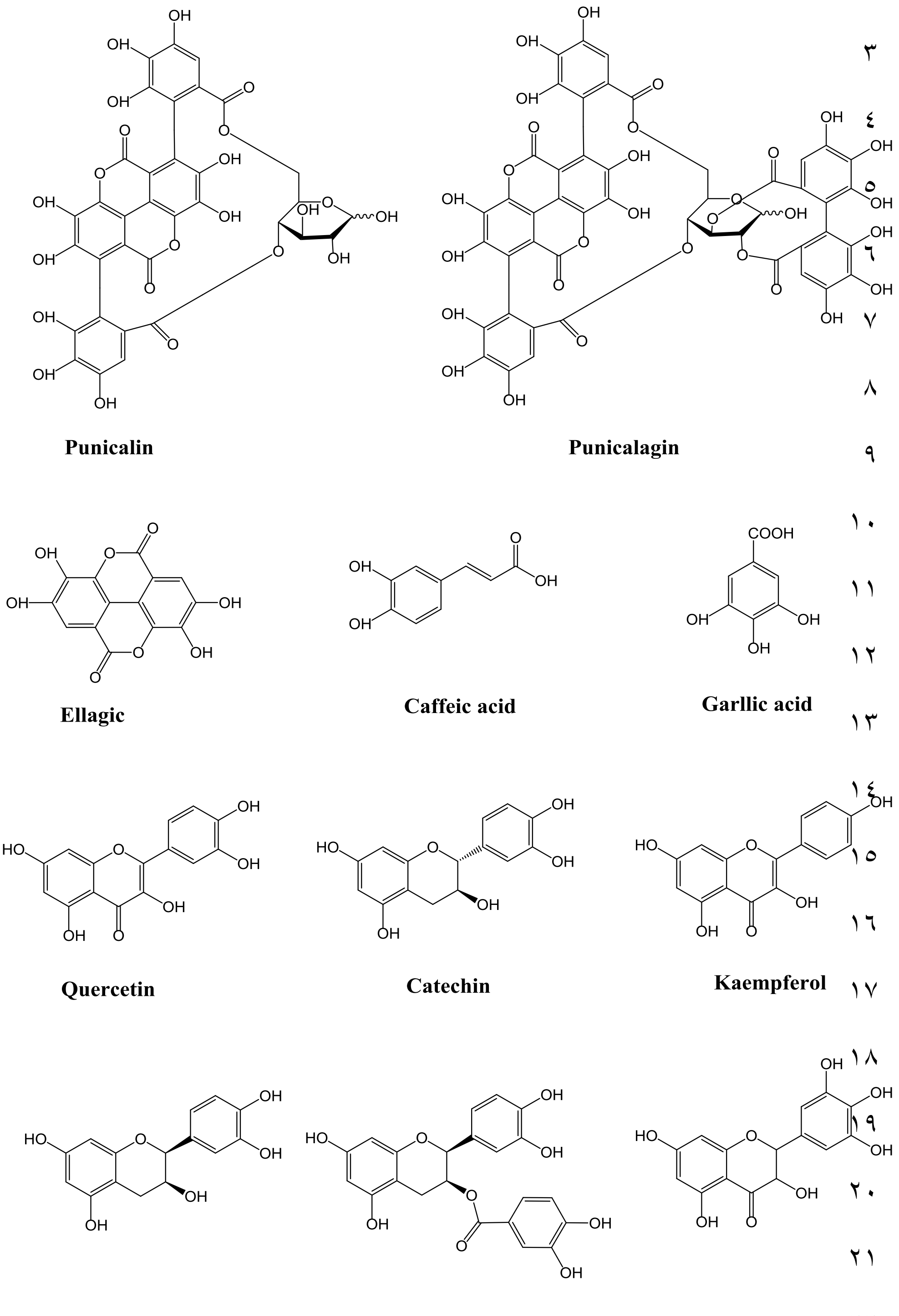


Delphinidin-3,5-diglucoside **Delphinidin-3-glucoside** **Cyanidin-3,5-diglucoside**



Cyanidin-3-glucoside **pelargonidin-3,5-diglucoside** **pelargonidin-3-diglucoside**

Figure 2. Anthocyanins present in pomegranate fruit (Wong *et al*., 2021).



Punicalin **Punicalagin**

Ellagic **Caffeic acid** **Garllic acid**

Quercetin **Catechin** **Kaempferol**

Epicatechin **Epicatechin gallate** **Myricetin**

Figure 3. The representative structures of phenolic compounds identified in pomegranate

Table 1. The Quranic Hermeneutics of pomegranate verses

Pomegranate verses	**Commentators**	**Quranic Hermeneutic**
Shura al-An’am verses 99 and 141.	Al-Alusi	There is a similarity between the 3 fruits; palm, olive, and pomegranate. But have a different taste.
	Ibnu Kathir	There is a process similarity between 3 fruits - palm, olive, and pomegranate- from their seed shapes, trees, and fruit colors. However, it has a different taste and smell.
Shura al-Rahman verses 68-69	Ibn al-Jauzi	palms and pomegranates are called after the word of *fakihah* (fruits) means that both of them have virtues.
	Al-Tabari	The word *fakihah* (fruits) relies on the words *nakhl* (palm) and *rumman* (pomegranate) giving the meaning that both have an advantage over other fruits.
	Al-Maragi	This verse is related to Qs. Al-Rahman: 62 to 77 series that describes the fruits in heaven which are green and fresh. The ones mentioned are palms and pomegranates.
	Al-Qurtubi	Palms are the staple food of Arabs and pomegranate is the fruit. Both are widely grown because the Arabs need benefits from them.
	Al-Razi	Allah mentioned the palms and pomegranates because they have opposing characteristics. One is sweet, the other is not. One grows in hot places, the other in cold places. One provides nutrition, the other does not.
	Al-Shawkani	Palms and pomegranates are heavenly fruits that have advantages, benefits, and efficacies for the body. Both of them can be found in the Arab region.
	M. Quraish Shihab	The efficacy of pomegranate has been tested empirically. It contains high citric acid that can help reduce the acidity of urine and blood, thereby preventing gout. Pomegranate also contains a sugar content of about 11% which is useful for easier burning and producing energy

Table 2. Some phenolics compounds identified in pomegranate fruits (Topalović *et al.*, 2021).

Anthocyanins and their derivative • Cyanidin-3,5-caffeoyl hexoside • Cyanidin-3,5-diglucoside • Cyanidin-3,5-pentoside hexoside • Cyanidin-3-galactoside • Cyanidin-3-glucoside • Delphinidin-3,5-pentoside hexoside • Delphinidin-3-glucoside • Delphinidin-caffeoyl • Delphinidin-dihexoside • Delphinidin-trihexoside • Epiafzelechin-cyanidin-dihexoside • Epiafzelechin-cyanidin-hexoside • Epiafzelechin-delphinidin-hexoside • Epicatechin-cyanidin-3,5-dihexoside • Epicatechin-delphinidin-3,5-dihexoside • Epicatechin-delphinidin-hexoside • Epicatechin-pelargonidin-hexoside • Epigallocatechin-cyanidin-3,5-dihexoside • Epigallocatechin-cyanidin-hexoside • Epigallocatechin-delphinidin-3,5-dihexoside • Epigallocatechin-delphinidin-hexoside • Pelargonidin-3,5-diglucoside • Pelargonidin-3,5-pentoside hexoside	Ellagitannins and derivatives of ellagic acid • Brevifolin carboxylic acid • Casuarinin • Ellagic acid • Ellagic acid (p-coumaroyl) hexoside • Ellagic acid derivative • Ellagic acid dihexoside • Ellagic acid galloyl hexoside • Ellagic acid hexoside • Ellagic acid pentoside 1 • Ellagic acid pentoside 2 • Ellagic acid rhamnoside • Ellagitannin 1 • Ellagitannin 10 • Ellagitannin 11 • Ellagitannin 2 • Ellagitannin 3 • Ellagitannin 4 • Ellagitannin 5 • Ellagitannin 6 • Ellagitannin 7 • Ellagitannin 8 • Ellagitannin 9 • Granatin A • Lagerstannin A • Lagerstannin C • Pedunculagin 1 • Pedunculagin 2 • Pedunculagin 3 • Pedunculagin 4 • Pedunculagin derivative • Punicalin derivative 1 • Punicalin derivative 2 • Punigluconin 1 • Punigluconin 2
Flavonol glycosides • Kaempferol hexoside • Dihydrokaempferol hexoside • Syringetin hexoside 1 • Syringetin hexoside 2 Flavones • Apigenin rhamnoside	Flavanols • Catechin • Epicatechin • Procyanidin dimer 1 • Procyanidin dimer 2 • Procyanidin dimer 3 • Procyanidin dimer 4 • Procyanidin dimer 5 • Procyanidin trimer 1 • Procyanidin trimer 2 • Procyanidin trimer 3
Hydroxybenzoic acids and their derivatives • Gallic acid	Hydroxycinnamic acids and their derivatives

• Vanillic acid hexoside • Monogalloyl hexoside • Hexahydroxydiphenic acid hexoside • Digalloyl-hexoside 1 • Digalloyl hexoside 2 • Vanillic acid dihexoside • Gallagic acid • Galloyl ester • Digalloyl hexahydroxydiphenic acid hexoside 1 • Digalloyl-hexahydroxydiphenic acid hexoside 2 • Gallotannin • Galloyl gallagyl hexoside Gallagyl ester 1 Gallagyl ester 2 • Tri-hexahydroxydiphenic acid hexoside 1 • Tri-hexahydroxydiphenic acid hexoside 2	• p-coumaric acid hexoside • 4-p-coumaroylquinic acid • Caffeic acid hexoside 1 • Caffeic acid hexoside 2 • 3-caffeoylquinic acid • 5-caffeoylquinic acid 1 • 5-caffeoylquinic acid 2

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REVIEW

Pomegranate (*Punica granatum* L.) fruits in the Quranic Hermeneutics and scientific perspectives

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Abstract

This review highlighted the Quranic hermeneutics and scientific perspective of pomegranate for human health. To accomplish this review article, numerous reputable databases such as Scopus, American Chemical Society, Science Direct, Springer, and Google Scholar related to this review were downloaded and evaluated. Pomegranate is a popular fruit consumed because of its pleasant taste and high nutritional value having some health benefits to human health. In addition, pomegranate (*rumman* in Arabic) is one of the stated fruits in the Quran. Quranic Hermeneutic with a scientific approach has been a new model used by modern commentators to explore various kinds of sciences presented in the Quranic verses. Qur'an mentions a pomegranate three times. Classic commentators generally interpreted the pomegranate verses as a special fruit and served for the occupants of heaven. In contrast, modern scientific commentators stated that the fruit contains scientific miracles that are very beneficial for human health since this fruit had some phytochemicals reported to have some biological activities including antioxidant and antibacterial activity.

1. Introduction

Pomegranate fruits with the scientific name of *Punica granatum* L. (belong to the family of Punicaceae) are excellent sources of bioactive compounds mainly polyphenols. This plant is native to central Asia, but currently, it is highly adaptable to a wide range of climatic and soil conditions and is now grown in many different geographical regions including the Mediterranean basin, Asia, and California in the USA. Pomegranate fruit has been used extensively in the folk medicines of many cultures since ancient times including Greek, Ayurvedic, Unani and Egyptian (Reddy, 2018). This fruit is regarded as a 'super fruit', which is rich in antioxidants and phytochemicals and is recognized for a myriad of health benefits. Pomegranate fruit is gaining popularity worldwide for its uniqueness, exclusive colour and taste, and associated health benefits (Hegazi *et al*., 2021).

Pomegranate is a type of tree from the family of Myrtaceae. Pomegranate (*rumman*) in a scientific term is called *Punica granatum* (Ṭalbah, 2011). Since thousands of years ago, human beings have enjoyed it both as food and medicine. The fruit is estimated to originate from West Asia and spread to the surrounding areas. Hebron, which is now a part of Israel territories, is well-known for pomegranate which has been planted since the time of the Prophet Moses. Egypt, Ancient Greece, and Rome are civilizations known for harvesting this fruit. Several archaeological findings found the residues of pomegranate plants, such as its seeds and barks around Cyprus, Israel, Iraq, Jordan, Lebanon, Palestine, Syria, and Turkey. It is estimated to have existed since 3,000 years before A.D. (Potts, 2012).

Experts argue that the pomegranate habitat is in Southwest Asia (Middle East) or Northwest Asia (India). However, it has already spread and is well-bred in the Mediterranean area. Then, it crosses over Iran, the Mediterranean Sea (Iraq and Syria), Egypt, Europe, and even flourishes in Southern China and Southeast Asia. This plant is easy to grow in areas with almost all climates and from low to high land. Despite its ignorance, pomegranate can flourish well on dry loose

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land (Mubashir and Mahran, 2010).

Pomegranates are becoming more popular with consumers because of their pleasant taste and high nutritional value. Pomegranate fruit is constituted by peel, arils, and seeds in an approximate 50:40:10 ratio, respectively. As in the majority of fruits, the chemical composition of the pomegranate differs according to the climatic conditions, and ripening degree of the fruit at the time of harvest (Guo *et al*., 2021). The edible part of pomegranate is about 57–85% of the whole fruit, among which fruit juice accounts for 36–63%. The taste of pomegranate is moderately sour and sweet throughout the flavouring improvement by modern cultivation technology. Pomegranate juice is considered a functional food due to some bioactive contents which are beneficial to human health. Pomegranate fruit contains 17 kinds of amino acids and minerals, vitamin C, calcium, iron, phosphorus, retinol, riboflavin, ferulic acid, and other phenolic compounds. Pomegranate seed oil is also a valuable source of bioactive compounds with health-beneficial effects, but it is sensitive to oxidation due to the high content of PUFA. Therefore, the oil was added with pomegranate peel extract or synthetic antioxidants to improve its stability toward oxidation (Drinić *et al*., 2020). This fruit is suitable for both young and old consumers; for example, pomegranate juice drinks are popular in daily life, and pomegranate extracts also serve as food additives, supplements, and taste corrections (Ge *et al*., 2021). Pomegranate extract and its polyphenols can be considered cosmeceuticals because both revealed skin protective effects by ameliorating methylglyoxal (MGO)-induced DNA damage through restoring cell adhesion, migration, and wound healing capacity (Guo *et al*., 2021). The regular consumption of this fruit has been associated with the prevention of gastric damage, cardiovascular disease, type 2 diabetes mellitus, and specific types of cancers, renal illnesses, liver complications, and osteoarthritis (Villa-Ruano *et al*., 2020). In this review, pomegranate from Quranic and scientific perspectives are described. From a scientific perspective, the antibacterial and antioxidant activities and polyphenols responsible for these activities are highlighted.

2. Methods

This descriptive-analytical paper used a thematic method based on literature review, referring to scientific articles from *Tafseer* books, reputed journals, book literature, and conference papers. During this study, some databases of Scopus, American Chemical Society, Science Direct, Springer, and Google Scholar covering abstract and full texts are downloaded and evaluated to be used as references during this review. Scientific studies on Pomegranate published in journals were also used as main references. In addition, other sources came from books related to scientific miracles of the Quran compiled by experts in their fields.

3. Pomegranate fruit

Pomegranate (*Punica granatum* L.), Figure 1, is a fruit plant that can grow up to 5-8 meters in sub-tropical areas to tropical ones, from lowland to below 1000 meters above sea level. It is a shrub or a small tree of 2-5 meters in height (Lansky *et al*., 2007). Its stem is woody with square twigs, a lot of branches, spikes on its axilla, weak in nature, brown-coloured when unripe, and turns into dirty green post ripe. The pomegranate tree has a single leaf with short stems, located in groups. The leaf sheet takes oval to lancet in shape, taper base, blunt tip, pinnate bones, shiny surface, 1-9 cm in length, 0.5-2.5 cm in width, and green-coloured (Ahmad, 2003).

Pomegranate Juice and Fruit

Pomegranate Tree

Figure 1. Pomegranate fruit, pomegranate juice and pomegranate tree.

Pomegranate is a berry fruit with a rounded shape and 5-12 cm in diameter, with various bark colours, such as purplish-green, white, reddish-brown, or blackish purple. The fruit is unique with its red-glazing seeds like crystals. The flower is called *Jullanar.* It is an antique fruit that has been known since ancient times. Many people gain some virtues and benefits found in it (Ṭayyāra, 2009). The pomegranate tree is a small posture with thin foliage and flatly shaped, having large and beautiful flowers, with a reddish colour, a fleshy shell of which contents are red-coloured cobs. The white flowers which lie in several separate places, one by one serve as a transparent lid. The Persians named this pomegranate *Jalnaz*, meaning the red fruit with seeds on it (Olivia, 2015).

In Indonesia, pomegranate is well-known by several names, depending on the regions it grows, such as *delima* (Malay), *glima* (Acehnese), *Glineu Mekah* (Gayonese), *dhalima* (Maduranese), *gangsalan* (Javanese), *dalima* (Sundanese), *teliman* (Sasaknese), *lele kase* and *rumu* (Timor). There are three types of pomegranate scattered over Indonesia, classified by their colours; they are white pomegranate, red pomegranate, and black pomegranate. Of these three types, the most famous is the red one. Pomegranate fruit is a symbol of prosperity and fertility, which is held in the form of a ceremony of seven months of pregnancy ritual, conducted by Javanese people and other tribes in Indonesia (Olivia, 2015). Meanwhile, for Chinese people, it is one of the compulsory fruits of welcoming the Lunar New Year. They believe that many of the seeds are a symbol of abundant fortunes.

In general, pomegranate is of various types, in terms of shape, colour, sweetness level, acidity, or its seed's shape and colour. The best is the deep red coloured with thin bark and abundant water content (Ṭalbah, 2011). It has three flavours, that is, sweet, sour, and blends between sweet and sour. Each flavour has a diverse uniqueness. The fruit with a sweet taste has a 7-10% content of sugar, 81% of water, 0.6% of proteins, and 0.3% of fat. Moreover, sweet pomegranate also contains fibre of as much as 2% as well as some tannin, inulin, and citric acid of as much as 1%. It also contains minerals, mainly iron, phosphorus, sulphur, potassium, lime, manganese, and vitamin C (Lansky *et al*., 2007). Pomegranate with a sour taste comprises less sugar, with 2% of citric acids. This acid content is even higher than that of oranges. Meanwhile, its seeds cover 9% of proteins and fat as much as 7%. Its outer bark contains tannic acids; the material that can restrain bleeding. Therefore, its outer bark powder which has been dried can be used as a remedy to ward off diarrhoea and dysentery. It can also be used to restrain blood discharge in the digestive tract (Al-Qabbani, 2009).

Today, Quran has not only become the main focus of merely studying objects and classical interpretations, but also the attention of various scientific studies, including scientific and medical fields. An effort to comprehend the Quran with a scientific and medical approach by experts is called scientific hermeneutic. This style of hermeneutic is an attempt to understand the verses of the Quran containing scientific cues from the perspectives of modern science. Scientific hermeneutic is also an interpreter's striving effort to uncover the relationship between the verses of *kauniyah* in the Quran and scientific discoveries aimed at revealing its scientific miracles (Rahman, 1986).

4. Pomegranate in Quranic perspective

According to Al-Zahabi, this scientific hermeneutic seeks to explore the scientific dimension and uncover the secrets of its miracles related to scientific information that may not have been known to humankind during the descent, it becomes evidence of the truth that the Quran is not a human work, but a revelation of the Creator instead (Zahabi, 2009). Dealing with this, many scientists have focused their studies on the Quran by attempting to put the verses of the Quran into logic and correlating them with treatments and medicines. Scientists have tried to combine the studies of plants mentioned in the Quran with medicines. The Quran does not mention all types of plants in general, just like modern botanical science does, but all types of plants mentioned by the Quran are certainly the top organisms of their respective species. For example, the fig tree (the fruits of heaven) is the top of the species of "*Ficus*" of "Moraceae" types according to botanists, its species reaches about 700 scattered around the world. Likewise, pomegranate, herbs of 1001 benefit, cure various diseases, internal and external ones (Ahmad, 2003).

Nowadays, there have been families who have started the 'no vegetables and fruits' campaign on their family menu. Fruits constitute a major part of the nutrients needed by a human. Besides being consumed as nutrients and vitamins, certain fruits have medicinal properties for certain diseases. This is based on knowledge of religious teachings. This fruit is pomegranate which is also mentioned several times in the Qur'an and contains many health benefits. Almost all parts of pomegranate plants are useful for medical treatments, starting from the pulp, seeds, flowers, leaves, fruit skins, and bark, to the roots that can be formulated into medicine (Al-Najjar, 2006).

The Quran does not mention a type of plant unless it serves as the top organism of each species. Likewise, pomegranate, with the Latin name *Punica granatum*, is a type of fruit that belongs to the berry species. Pomegranate is a plant species that has been well-known since ancient Egyptian time, that is, the beginning era of Egyptian civilization. Ancient people recognized it as 'Arhamanie' derived from the Qibti name called 'Armen' or 'Rumen' which is derived from the Hebrew name called 'Rumon'. Then, it is translated into the Arabic word 'Rumman' (Shehab, 2011).

Pomegranate (*rumman*) is an ancient plant known to produce many benefits and to provide various virtues. The Pharaoh Kings of ancient Egyptian used pomegranates as medicine (Ahmad, 2003). In Islamic literary treasures, the pomegranate is classified as the fruit used as medicine for the Prophet. Ibn Qayyim wrote some of its virtues; the one with a sweet taste is beneficial to the stomach, throat, chest, and lungs. It can also smoothen urine, reduce yellow substances in the liver, overcome diarrhoea, and strengthen organs (Al-Jauziyah, 2012).

The Qur'an as the greatest miracle for Muslims comprises verses showing various scientific signs from modern science perspectives. The hermeneutic of verses that talk about science is known as *Tafsir Ilmi* (Scientific Interpretation) (Al-Qaraḍāwī, 1999). According to

Husain al-Zahabi, scientific hermeneutic discusses scientific terms in narrating verses of the Qur'an, seeks to explore its scientific dimensions, and uncovers the secrets of miracles related to scientific information that may not have been known to humans at the time the Qur'an was revealed (Al-Żahabī, 1995). Hence, in modern times, this becomes another piece of evidence that the Qur'an is not a human creation, but rather a revelation of God, The Creator.

Muslim scientists have tried to uncover the contents of the Qur'an which leads to scientific discoveries or to keep some of the natural sciences which are not widely known by humans. They scientifically describe those contents in depth. Despite the Qur'an's *zahir* (visible) characteristics, of which texts briefly talk about this issue, the scientists' commentary can almost be proven by modern sciences (Al-Shirbaṣī, 1962). This argument is based on the fact that all sciences obtained from the Qur'an, after being analyzed accurately, will lead people to think at a certain point that everything said in the Qur'an is all true.

This scientific hermeneutic employed a set of contemporary sciences, such as astronomy, geology, chemistry, biology, medical science, and other scientific tools (Al-Qaraḍāwī, 1999). Such interpretation with scientific approaches is not intended to justify the truth of scientific findings by the verses of the Qur'an, nor is it to compel the interpretation of the verses of the Qur'an to seemingly conform to the scientific findings. However, this scientific hermeneutic study initially arises from the awareness that the Qur'an is absolute, whilst its interpretation, both from commentary and scientific perspectives, is relative and tentative in nature (Hanafi, 2015).

Scientific hermeneutic have existed since the Abbasid dynasty. At that time, there were attempts made by some scholars to compromise Islamic teachings with translated foreign cultures, as well as pure sciences found among the Muslims (Abderrahman, 1986). Al-Ghazali was one of the figures who was persistent in supporting these interpretive ideas. In his monumental masterpiece, *Ihya 'Ulumiddin*, he put forward his arguments to prove his stance (Al-Ghazālī, 2000). He said that all kinds of sciences, both preceding and subsequent ones, whether known or not, come from the Qur'an (Musbikin, 2014).

In another work, *Jawahir al-Qur'an*, Al-Ghazali also discussed his support for scientific hermeneutic. He stated that all sciences are gathered in one among several oceans of Allah's knowledge which has no end. Furthermore, he strengthened his arguments by saying that Allah's deeds are to provide healing and pain, as He told about Prophet Abraham: " *And He ˹alone˺ heals me when I am sick.*" QC. Ash- Shu'ara: 80). Al-Gazali explained that medicine and diseases cannot be discovered except by those who are involved in the medical field (Al-Ghazālī, 2003). Thus, the verse is a signal dealing with medical science.

Besides al-Ghazali, Fakhruddin al-Razi was an expert commentator who tends to comply with scientific hermeneutic (Al-Rāzī, 2012). His monumental work, *Mafatih al-Gaib*, is filled with scientific discussions related to philosophy, natural sciences, theology, medicine, astronomy, and so on. Because of presenting the above discussions, this interpretation is known as a philosophical hermeneutic (Shihab, 1994). The same perspective is also carried out by Jauhari Tantawi, in his work, *Tafsir al-Jawahir*. His interpretation uncovers scientific theories and scientific reinforcement in every verse he interprets (Goldziher, 1955).

In this modern era, scientific hermeneutic is increasingly popular and used as a reference to study the sciences presented in the Quran. The development of scientific interpretation in the modern era was at least due to the influence of western technology and science (Europe and the United States) on the Arab world and Muslim regions, especially in the second half of the 19th century when most of the Islamic worlds were under the control of European countries (Jansen, 1980). This western hegemony has gradually led to resistance on one hand and on the other hand, advances in modern Arab scholars' thoughts in terms of religious and social sciences.

The development of scientific hermeneutic is also an implication of the change in the modern Muslims' perspectives on the verses of the Qur'an, especially with the exposure of modern scientific discoveries in the 20th century. For example, the word '*lamusi'un*', in the QC *al-Zariyat*: 47, "*We built the universe with ˹great˺ might, and We are certainly expanding ˹it˺*". Along with new scientific discoveries, astronomers concluded a scientific theory, stating that nebulae which lie outside the galaxy we live in continue to move away at different speeds, even celestial bodies in one galaxy are moving away from one another (Hanafi, 2015). This shows that the discoveries of modern science can provide new scientific meanings to the verses of the Qur'an.

An expert on scientific miracles, Nadya Tayyara, explained that he finally found out new information from several passages of the Qur'an verses that talk about fruits. This understanding is also a response to the exposure to biological diseases and their treatment mechanisms, and an understanding of the correlation between chronic diseases and immune disorders that can be cured by these fruits (Ṭayyāra, 2009). This statement was strengthened by Ibn Qayyim al-Jauziyah, claiming that the fruits mentioned in the Qur'an have efficacies that other fruits don't. All of these fruits can be used to cure certain diseases (Al-Jauziyah, 2012). In this context, the paper shows the scientific evidence that causes the pomegranate to be a special fruit as mentioned in the Koran. The disclosure of scientific facts means that the quranic hermeneutic is open to modern science. In interpreting the pomegranate verses must be based on botanical science data.

5. Pomegranate in commentators' perspectives: a Quranic Hermeneutic

Pomegranate is a fruit mentioned in the Quran. Al-Shafii noted that pomegranate (*rumman*) is mentioned three times in the Quran; two of which are in the QC Al-An'am (6): verses 99 and 141, and another in the QC Al-Rahman (55): verse 68 (Al-Shāfi'ī, 2000). Hermeneutical interpretations of these verses were compiled in Table 1.

Al-Alusi mentions the hermeneutic of the shura al-An'am verses; 99 and 141, there is a similar redaction as referring to olive and pomegranate. In both verses, God speaks of the signs of His power for the believers. Which earth is that He created a variety of trees, such as palm trees, olive trees, and pomegranate trees which take similar shapes and colours, despite the difference in taste (Al-Alusi, 1997). Commenting on those verses above, Qatadah stated that the creation of this pomegranate fruit is similar in its shape, partly to some of the others, but different in the fruit it produces, either in terms of its colour, taste, or content. The power of God's creation on the pomegranate can be seen from the origin of its creation. At the initial phase, it is grain, then grows into a tree, and produces the same fruit colour but different taste and smell (Kathīr, 2000).

In the Quran chapter Al-Rahman (55) verses 68-69, God said: "*In both of them will be [all kinds of] fruit, and date-palms and pomegranates. Then which of your Lord's favours will you both deny?".* In this verse, God particularly mentions that there are kinds of fruits, dates, and pomegranates in heaven. Ibn al-Jauzi mentioned the word '*dates*'(*nakhl*) and '*pomegranates*' (*rumman*) after the word '*fakihah*' meaning fruits both are classified as fruits. This is to explain the virtue of both fruits (Al-Jauzi, 2002). Al-Tabari also stated that in the verse, there is a conjunction indicating a particular thing to the general one, mentioning the word 'fruits' followed by the word 'dates' (*nakhl*) and pomegranates (*rumman*) (Al-Tabari, 1998). However, the mention of the two words specifically shows the virtue of the two fruits over the others.

Al-Maragi stated that the series in *Al-Rahman* verses 62 to 77 describe that there is a tree of fruit grown with leafy green in heaven. Inside it there is a clear water spring that sparkles. Meanwhile, the dwellers and angels are leaning back on green pillows and beautiful carpets. The angels who happen to be the dwellers' servants have never been touched by any human beings nor genies. They can easily pick the fruit up close as the trees are short. Among the various fruits, the only special ones are dates and pomegranates which have been mentioned (Al-Maragi, 1996). *Then which of your Lord's favours will*

Table 1. The Quranic Hermeneutics of pomegranate verses

Pomegranate verses	Commentators	Quranic Hermeneutic
Shura al-An'am verses 99 and 141	Al-Alusi	There is a similarity between the 3 fruits; palm, olive, and pomegranate. But have a different taste.
	Ibnu Kathir	There is a process similarity between 3 fruits -palm, olive, and pomegranate- from their seed shapes, trees, and fruit colors. However, it has a different taste and smell.
Shura al-Rahman verses 68-69	Ibn al-Jauzi	palms and pomegranates are called after the word *fakihah* (fruits) means that both of them have virtues.
	Al-Tabari	The word *fakihah* (fruits) relies on the words *nakhl* (palm) and *rumman* (pomegranate) giving the meaning that both have an advantage over other fruits.
	Al-Maragi	This verse is related to Qs. Al-Rahman: 62 to 77 series that describes the fruits in heaven which are green and fresh. The ones mentioned are palms and pomegranates.
	Al-Qurtubi	Palms are the staple food of Arabs and pomegranate is the fruit. Both are widely grown because the Arabs need benefits from them.
	Al-Razi	Allah mentioned the palms and pomegranates because they have opposing characteristics. One is sweet, the other is not. One grows in hot places, the other in cold places. One provides nutrition, the other does not.
	Al-Shawkani	Palms and pomegranates are heavenly fruits that have advantages, benefits, and efficacies for the body. Both of them can be found in the Arab region.
	M. Quraish Shihab	The efficacy of pomegranate has been tested empirically. It contains high citric acid that can help reduce the acidity of urine and blood, thereby preventing gout. Pomegranate also contains a sugar content of about 11% which is useful for easier burning and producing energy

you deny?

According to Al-Qurtubi, in this verse, dates, and pomegranates are mentioned after the other fruits as in line with Arabs customs, dates and pomegranates are like wheat. For the Arabs, dates are the main course, while pomegranates are the dessert. Both fruits are mostly planted since the Arabs take benefits from them (Al-Qurṭubī, 2014). Whereas, according to Al-Rāzī, God mentions the two fruits, pomegranates and dates, because they are opposite each other; one tastes sweet and the other does not. In addition, one is hot and the other is cold; one is as a source of nutrients and the other is not; one grows in hot land and the other is in cold land; one with high trunk and the other with opposite trunk (Al-Rāzī, 2012). Whereas, a medieval commentator, Muhammad al-Shawkani, presented several opinions from the interpretation of *surah* al-Rahman: 68, pomegranate and dates mentioned in the verse belong to heaven's second characteristics mentioned in the QC. al-Rahman: 62. Even though both are classified as fruits, but particularly mentioned because of their abundant benefits compared to other fruits. Both are also plants existing in the land of Arabs. Another opinion stated that pomegranate is a type of fruit that can be used for medication with extraordinary efficacies (Al-Shawkānī, 2014).

A modern Indonesian commentator, M. Quraish Shibab, tends to interpret the verses about pomegranate based on its efficacies which have empirically been examined. In his commentary book, *al-Misbah*, he explained that its juice contains very high levels of citric acid compared to other types of fruits, and when roasted, it is very helpful in reducing the acidity of urine and blood which in turn can prevent gout on the body. The citric acid contained in pomegranate can also help form some kidney stones. This juice also contains sufficient sugar levels, around 11%, to ease the roasting and produce energy (Shihab, 2002).

6. Polyphenols in pomegranate fruit

Some extraction techniques have been introduced to get a high recovery of polyphenols. Rajha *et al*. (2019) have compared 5 extraction techniques namely conventional extraction (CE) based on liquid-solid extraction using a water bath, extraction assisted by infrared irradiation (IR), ultrasound-assisted extraction (UAE), extraction using pulsed electric fields (PEF), and extraction using high-voltage electrical discharges (HVED). HVED assisted extraction offered enhanced the recovery of polyphenols by approximately 3 and 1.3 times as compared to the US and PEF-assisted extractions, respectively. The high recovery of polyphenols during extraction of HVED was caused by the ability of HVED technique to damage the microstructure of pomegranate skins strongly, as indicated by the scanning electron microscopy (SEM) study.

With the advance in experimental design applied in the extraction of phytochemicals, response surface methodology (RSM) was used to evaluate the effect of three factors namely (1) condition liquid/solid ratio, (2) extraction time and (3) ethanol percentage on ultrasonic-assisted extraction (UAE) in obtaining the maximum of total polyphenols (TP), total flavonoids (TF) and condensed tannins (CD) from pomegranate peels. The optimum condition was obtained using a liquid/solid ratio of 20, extraction time of 30.94 min and 59.26% of ethanol offered the highest contents of TP, TF and CT simultaneously. The results obtained during the experimental design were in agreement with those with the predicted values (Hayder *et al*., 2021).

Pomegranate fruit is rich in polyphenol compounds that may potentially reveal some biological activities such as antioxidant, antibacterial and antifungal activities. The main phenolic compounds in pomegranate peel were anthocyanins, phenolic acids, and flavonoids. During storage, some changes in polyphenolic contents may occur. The study on the content changes of polyphenolic compounds of pomegranate peel and arils during storage for 50 days at a temperature of 5^{o}C was undertaken. The change patterns of pomegranate peel and aril were different among different phenolic compounds. The concentrations of the major phenolic compounds detected in arils and peels decreased during storage, except for syringic acid, catechin acid, p-coumaric acid, chlorogenic acid, caffeic acid, epicatechin, and dihydroquercetin (in arils). In addition, some phenolic compounds were decreased in pomegranate peel except syringic acid, catechin acid, p-coumaric acid, and dihydromyricetin during storage. These changes may relate to enzymatic activities. The information on changes in polyphenolic contents is useful for management during postharvest treatments to maintain the quality of pomegranate fruits (Liu *et al*., 2021).

Polyphenolics can be divided into two types: extractable (soluble in aqueous−organic solvents) and non-extractable polyphenols (NEPPs, which are not soluble in aqueous−organic solvents (Pérez-Ramírez *et al*., 2018). The main extractable phenolic compounds were anthocyanins, gallotannins and gallagyl derivatives, while the main non-extractable phenolic compounds include vanillic acid and dihydroxybenzoic acid. Six compounds were then isolated from the EtOAc extracts whose structures were identified as β-sitosterol-3-O-glycoside (1), β-sitosterol (2), ursolic acid (3), corosolic acid (4), asiatic acid (5) and arjunolic acid (6). Using supercritical extraction CO_2: EtOH, punicalagin α-anomer, punicalagin β–anome and ellagic acid were isolated (Harscoat-Schiavo *et al*., 2021).

The identified polyphenolic compounds in pomegranate fruit are grouped into (1) ellagitannins (hydrolyzable tannins) such as corilagin, granatin A and B, tellimagrandin, pedunculagin, punicalagin (a unique compound to pomegranate which is found in the seeds, peel, leaves and juice) with the chemical structure in Figure 2; (2) anthocyanins and their derivatives (sugar derivatives of delphinidin, cyanidin and pelargonidin such as delphinidin-3-glucoside, delphinidin-3,5-diglucoside, cyanidin-3-glucoside, cyanidin-3,5-diglucoside, pelargonidin-3-glucoside and pelargonidin -3,5-diglucoside, and punicalin with chemical structures in Figure 3; (3) derivatives of ellagic acid; (4) flavanols such as kaempferol, quercetin and myricetin, flavones; (4) flavan-3-ols such as catechin, epicatechin and epigallactocatechin 3-gallate; (5) hydroxybenzoic acids and their derivatives; (6) hydroxycinnamic acids and their derivatives, as compiled in Table 2 (Topalović *et al*., 2021; Wong *et al*., 2021).

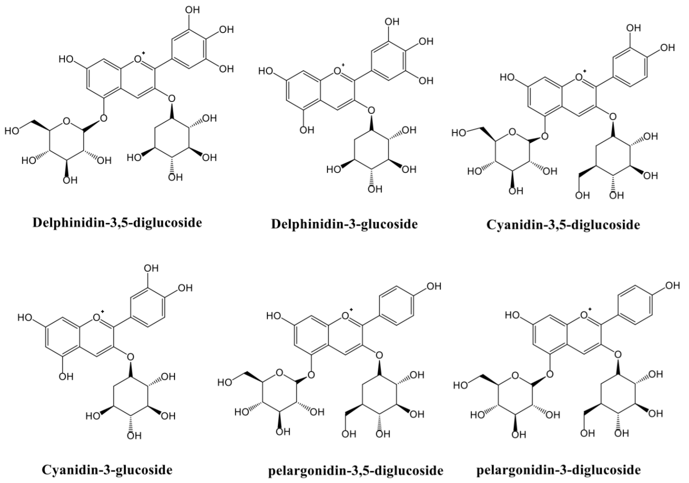
Delphinidin-3,5-diglucoside
Delphinidin-3-glucoside
Cyanidin-3,5-diglucoside
Cyanidin-3-glucoside
pelargonidin-3,5-diglucoside
pelargonidin-3-diglucoside

Figure 2. Anthocyanins present in pomegranate fruit (Wong *et al*., 2021).

7. Biological activities of pomegranate polyphenols

Some biological activities on pomegranate polyphenols have been reported including antibacterial and antioxidants (Govindappa *et al*., 2021). The antibacterial activities and antioxidant activities of pomegranate peel extracts extracted using high pressure and enzymatic assisted extraction have been evaluated. The chemometrics of principal component analyses exhibited that antioxidant activity and phenolic compound content were strongly related to the antimicrobial activity (Alexandre *et al*., 2019).

Pomegranate is a very special fruit with a lot of efficacies and benefits. It is closely related to the fact that the Quran particularly mentions pomegranate in the QC. Al-Rahman verses 68-69, "*In both of them will be [all kinds of] fruit, and date-palms and pomegranates. Then which of your Lord's favours will you both deny?"*. The Quran does not mention a type of vegetation unless it is the top organism of its species. Therefore, modern scientific commentators of the Quran state that the pomegranate conceives scientific miracles, which are very beneficial for human life. These benefits did not only appear in the days when this verse was revealed but also existed in ancient times. Pomegranate has been utilized for treatment in the times of the Pharaoh Kings to treat their people who were infected by certain diseases (Al-Muslih, 2009).

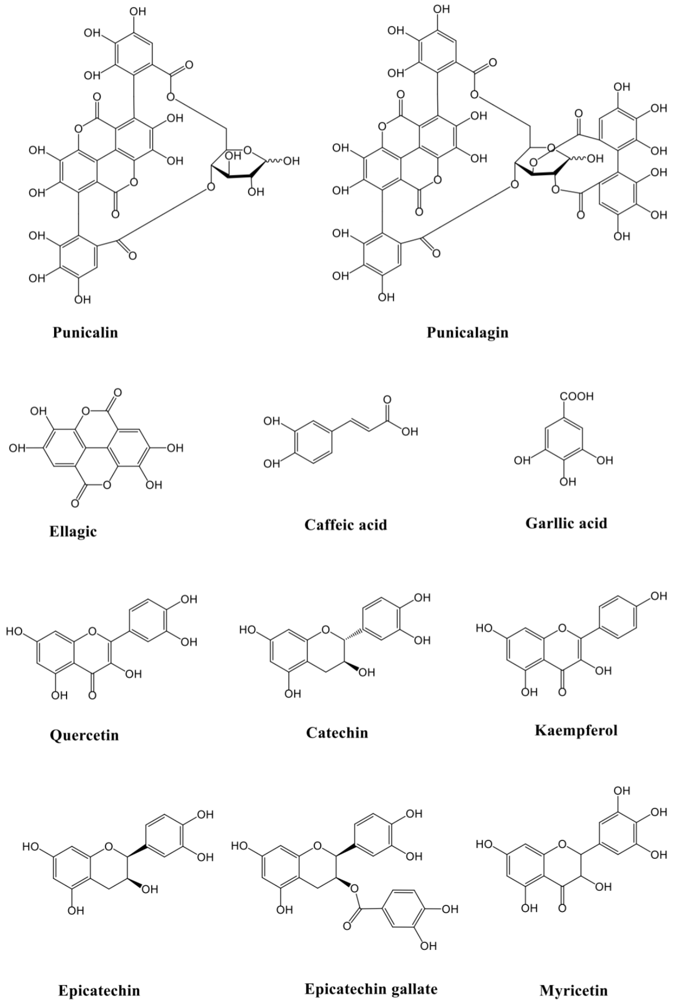
Punicalin
Punicalagin
Ellagic
Caffeic acid
Garllic acid
Quercetin
Catechin
Kaempferol
Epicatechin
Epicatechin gallate
Myricetin

Figure 3. The representative structures of phenolic compounds identified in pomegranate

In the Islamic period, some scholars referred to some benefits that pomegranate has. Ibn al-Qayyim reported a hadith of treatment narrated by Ali R.A who heard the prophet P.B.U.H saying: "*Eat pomegranate with its fat because it can heal stomach*" (Hanbal, 2010). Ibn Qayyim said that pomegranate is very good to strengthen the stomach because it can soften it. It is also beneficial for the oesophagus, chest, and lungs as well as efficacious for treating coughs. Its water can make the stomach feel relieved, facilitate nutrient supplies in the

Table 2. Some phenolic compounds identified in pomegranate fruits (Topalović *et al*., 2021).

Anthocyanins and their derivative • Cyanidin-3,5-caffeoyl hexoside • Cyanidin-3,5-diglucoside • Cyanidin-3,5-pentoside hexoside • Cyanidin-3-galactoside • Cyanidin-3-glucoside • Delphinidin-3,5-pentoside hexoside • Delphinidin-3-glucoside • Delphinidin-caffeoyl • Delphinidin-dihexoside • Delphinidin-trihexoside • Epiafzelechin-cyanidin-dihexoside • Epiafzelechin-cyanidin-hexoside • Epiafzelechin-delphinidin-hexoside • Epicatechin-cyanidin-3,5-dihexoside • Epicatechin-delphinidin-3,5-dihexoside • Epicatechin-delphinidin-hexoside • Epicatechin-pelargonidin-hexoside • Epigallocatechin-cyanidin-3,5-dihexoside • Epigallocatechin-cyanidin-hexoside • Epigallocatechin-delphinidin-3,5-dihexoside • Epigallocatechin-delphinidin-hexoside • Pelargonidin-3,5-diglucoside • Pelargonidin-3,5-pentoside hexoside	Ellagitannins and derivatives of ellagic acid • Brevifolin carboxylic acid • Casuarinin • Ellagic acid • Ellagic acid (p-coumaroyl) hexoside • Ellagic acid derivative • Ellagic acid dihexoside • Ellagic acid galloyl hexoside • Ellagic acid hexoside • Ellagic acid pentoside 1 • Ellagic acid pentoside 2 • Ellagic acid rhamnoside • Ellagitannin 1 • Ellagitannin 10 • Ellagitannin 11 • Ellagitannin 2 • Ellagitannin 3 • Ellagitannin 4 • Ellagitannin 5 • Ellagitannin 6 • Ellagitannin 7 • Ellagitannin 8 • Ellagitannin 9 • Granatin A • Lagerstannin A • Lagerstannin C • Pedunculagin 1 • Pedunculagin 2 • Pedunculagin 3 • Pedunculagin 4 • Pedunculagin derivative • Punicalin derivative 1 • Punicalin derivative 2 • Punigluconin 1 • Punigluconin 2
Flavonol glycosides • Kaempferol hexoside • Dihydrokaempferol hexoside • Syringetin hexoside 1 • Syringetin hexoside 2 Flavones • Apigenin rhamnoside	Flavanols • Catechin • Epicatechin • Procyanidin dimer 1 • Procyanidin dimer 2 • Procyanidin dimer 3 • Procyanidin dimer 4 • Procyanidin dimer 5 • Procyanidin trimer 1 • Procyanidin trimer 2 • Procyanidin trimer 3
Hydroxybenzoic acids and their derivatives • Gallic acid • Vanillic acid hexoside • Monogalloyl hexoside • Hexahydroxydiphenic acid hexoside • Digalloyl-hexoside 1 • Digalloyl hexoside 2 • Vanillic acid dihexoside • Gallagic acid • Galloyl ester • Digalloyl hexahydroxydiphenic acid hexoside 1 • Digalloyl-hexahydroxydiphenic acid hexoside 2 • Gallotannin • Galloyl gallagyl hexoside Gallagyl ester 1 Gallagyl ester 2 • Tri-hexahydroxydiphenic acid hexoside 1 • Tri-hexahydroxydiphenic acid hexoside 2	Hydroxycinnamic acids and their derivatives • p-coumaric acid hexoside • 4-p-coumaroylquinic acid • Caffeic acid hexoside 1 • Caffeic acid hexoside 2 • 3-caffeoylquinic acid • 5-caffeoylquinic acid 1 • 5-caffeoylquinic acid 2

body, and strengthen memory (Al-Jauziyah, 2012).

In modern alternative medical treatment, all elements of the pomegranate fruit tree are efficacious for treatment, starting from its flesh of fruit, seeds, flowers, leaves, rinds, and barks, to its root, which can serve as medicine. Pomegranate fruit produces anthocyanin, sugar, ascorbic acid, ellagic acid, gallic acid, caffeic acid; catechin, epigallocatechin gallate, and many minerals, especially iron, and amino acid (Jurenka, 2008). Fakhruddin al-Razi in his exegesis stated that sweet pomegranate serves to strain the shaft of male genitals; meanwhile, the sour one can eliminate sexual stimulus. The sweet pomegranate causes thirst, while the sour one relieves jaundice and discontinues vomiting (Al-Rāzī, 2012).

Besides, pomegranate can also cleanse and open the respiratory tract for people suffering from flu. Its juice may also serve as sweet thick syrup which is the most well-preserved acidity. This syrup can be added to any food and medically used to treat various diseases on the mouth and gums (Al-Najjar, 2006). Its antioxidant content is also higher than that in green tea, cranberry juice, and orange juice. The benefits of the fruit which grows a lot in Iran, northern India, and Southeast Asia- including Indonesia- are no longer just a myth nor an advertising campaign. Even more, both red and white pomegranates are equally efficacious. They can serve as herbs to prevent cancer, antidiarrhea, increase or decrease weight, delay skin-ageing, protect the heart and decrease cholesterol levels (Menezes *et al*., 2006).

Pomegranate's root and bark comprise ellagitannins, including punicalin and punicalagin; piperidine alkaloids (Jurenka, 2008). Its root bark can be used to eradicate worms because it contains a lot of pelletierene alkaloids. To make such content in high doses is by boiling its root bark in 50 g for every 1 L of water for a quarter-hour time. This stew is then consumed as many as approximately one glass each morning (Al-Husaini, 2015). This potion can sometimes result in indications of virulence, headache, nausea, and vomiting. To avoid the occurrence of these poisoning symptoms, this root bark should be mixed with other ingredients which can restrain bleeding, such as tannins. Thus, absorption of the solvent materials becomes slower. The root bark also comprises various materials which can restrain bleeding in high doses (Ahmad, 2003).

Meanwhile, pomegranate bark contains phenolic punicalagin, gallic acid, fatty acid; catechin, epigallocatechin gallate (EGCG), quercetin, rutin, flavonol, flavone, flavanone, anthocyanidin. Besides, its outer bark contains tannic acid, the material which can restrain bleeding. Therefore, the dried pomegranate bark powder can serve as a remedy to ward off diarrhoea and dysentery (Al-Futuh, 2006). It can also be used to withstand blood discharge in the digestive tract. Meanwhile, the boiled one also provides the same benefits and can be used to ward off caterpillars or worms, particularly tapeworms. This is because, on its bark, there are pelletierene alkaloid materials. The bark can also benefit people as anti-ageing material, they make use of it to colour their skins along with the tree (Ṭayyāra, 2009).

Pomegranate is very beneficial for elderly women. Based on a study by Hidaka *et al*. (2005) it has an estrogenic effect, which is to ward off menopausal disorders and prevent reproductive organ cancer. By drinking a glass of pomegranate juice every day, people approaching menopause will get 100 mL of polyphenol antioxidant compounds. These compounds can paralyze cancer cells and restore artery wall hardening. The phytoestrogens content in pomegranate can reduce menopausal symptoms and strengthen bones.

Pomegranate is a fruit that refreshes the body and strengthens the heart and nerves. It is beneficial to cure people with weak nerves as well as to smoothen the digestive tract. Its juice which is dripped down the nose, either mixed with honey or not, can avoid the occurrence of polyps because it restrains blood vessels (Al-Bagdadi, 1994). The juice is a potion that is nutritious and refreshing, because it contains high enough carbohydrates, and salt, and is rich in vitamins, especially vitamin C. The juice can also exterminate germs with a comparison of 1:60 bacteria (Al-Audat, 1994). The bark, stem, and root of the pomegranate tree comprise no less than 20% of tannins. Pomegranate fruit is an easily hydrolyzed tannin, in the form of punicalagin. Punicalagin is an ellagitannin found only in pomegranate fruit. Punicalagin has isomer structures, that is, 2,3-(S)-Hexahydroxydiphenoyl-4,6-(S, S)-galagil-D-glucose (Kumari *et al*., 2016). Its bark, stem, and root contain no less than 20% of tannins. Of the existing tannins are four separate alkaloids; first, pelletierine alkaloid called also punicine; second, isopelletierine alkaloid; third, ethyl pelletierine alkaloid; and fourth, the pseudo-pelletierine alkaloid also called Methylgrantanine (Ṭalbah, 2011). Pomegranate also contains other polyphenol compounds, that is, catechin, and gallocatechin, as well as anthocyanin compounds such as prodelphinidin, delphinidin, cyanidin, and pelargonidin (Mertens-Talcott *et al*., 2006).

In Western countries, pomegranate usually appears in the fall. Now, food manufacturers add this fruit to chocolate, chewing gum, or made into juice. In 2005, 215 new foods and beverages were recorded containing pomegranate in the United States. Pomegranate is a versatile plant. Besides consumption, it is also made as juice for medication. This fruit contains many benefits. in addition to a great number of antioxidants, it helps prevent heart disease and stroke, and the seeds in each pomegranate grain contain fibre which is very beneficial for the body's immunity (Olivia, 2015).

7.1 Antibacterial activities

Antibacterial activities have been described in several studies using *in vitro* methods such as agar disc diffusion assays and/or minimum inhibitory concentration (MIC). Some extracts of Pomegranate peels extracted by conventional extraction (CE) based on liquid-solid extraction using a water bath, extraction assisted by infrared irradiation (IR), ultrasound-assisted extraction (UAE), extraction using pulsed electric fields (PEF), and extraction using high-voltage electrical discharges (HVED) are evaluated for antibacterial activities using Gram-negative bacteria of *Escherichia coli* and Gram-positive bacteria of *Staphylococcus aureus*. The inhibition of polyphenol-rich extracts is assessed using the ELISA technique. Based on HPLC studies, all extract contains high levels of ellagic and gallic acids (polyphenols). All extracts exhibited antibacterial activities with the inhibition efficiency toward *S. aureus* up to approximately 80% as compared to *E. coli* (up to approximately 33%) (Rajha *et al*., 2019). Phloretin and coumaric acid present in pomegranate fruit exhibited potent antimicrobial activity against *Staphylococcus epidermidis*, while punigratane revealed the most substantial antimicrobial effect on *Micrococcus kristinae* (Nazeam *et al*., 2020).

Giménez-Bastida *et al*. (2021) have compared the antibacterial activities of different parts of the pomegranate fruit. The pomegranate peel revealed strong antibacterial activities, compared to the other parts (flower, leaf, and stem), against *Salmonella enterica, Escherichia coli, Shigella sonnei, Enterococcus faecalis, Staphylococcus aureus* and *Bacillus subtilis*. These antimicrobial activities are primarily attributed to the polyphenolic compounds, including high tannin content, especially punicalagin. The other polyphenolic compounds identified are gallic acid, punicalagin-α, punicalagin-β, catechin, chlorogenic acid, epicatechin, and ellagic acid. However, it is believed that antimicrobial activities not only depend on a single or an individual component but also due to various metabolites.

The antibacterial activity of water extract of black peel pomegranate and silver nanoparticles synthesized by water extract toward strains of gram-positive and gram-negative. Both extract and silver nanoparticles exhibited potent antibacterial activities toward *Pseudomonas aeruginosa* (Gram-negative) and *Staphylococcus aureus* (gram-positive), although *P. aeruginosa* was less sensitive to both samples. The nanoparticles made from water extracts were more effective as bacteriostatic than water extracts with a minimum bacteriostatic concentration of nanoparticles of 40–65 µg/mL. From this result, silver nanoparticles synthesized by water extract of black peel pomegranate can be considered as a high potential agent to combat infectious diseases due to its significant bacteriostatic activity (Khorrami *et al*., 2020).

7.2 Antioxidant activities

Antioxidant activities of pomegranate fruits and their parts either *in vitro* or *in vivo* in animal models have been reported (Akuru *et al*., 2020). In vitro, the antioxidant activities of pomegranate were evaluated by radical scavenging of DPPH (2,2'-diphenyl-1-picrylhydrazyl), ABTS (2,2'-azino-*bis* (3-ethylbenzothiazoline-6-sulphonic acid), FRAP (ferric-reducing antioxidant), metal chelating activity, reducing power assay, β-carotene bleaching assay, ORAC (oxygen radical absorbance capacity assay, NBT (nitroblue tetrazolium chloride) assay, TOSC (total oxyradical scavenging capacity) assay, ferrous ion chelating, superoxide radical scavenging activity and lipid peroxidation inhibitory activity (Smaoui *et al*., 2019). Polyphenols extracted from pomegranate peel using ultrasound-assisted extraction (UAE) revealed high antioxidant activities using radical scavenging activity of DPPH of 94.91%, due to high content of punicalagin (143.64 mg/g dry matter) as determined by HPLC analysis (Kaderides *et al*., 2019).

The antioxidant activities of 70% ethanolic extract of pomegranate peel and its fractions (petroleum ether, ethyl acetate, butanol and water) obtained using liquid-liquid extractions have been evaluated by *in vitro* methods. Butanol and ethyl acetate was the most active fractions as radical scavenger toward DPPH ABTS radicals. In addition, water fraction showed the strongest activity in FRAP and β-carotene bleaching tests (Šavikin *et al*., 2018).

Some clinical studies have been conducted related to the health benefits of pomegranate juices and extracts. Giménez-Bastida *et al*. (2021) informed that the most promising effects in clinical studies are related to the improvement of blood pressure. In addition, the activities related to inflammation, cancer, cognitive function, and physical activity are less evident. The evidence on humans during clinical studies remains inconsistent, making it difficult to support most claimed health effects. The difference in clinical study results might be attributable to design limitations, including insufficient product characterization and inter-individual variability which influence the efficiency of pomegranate polyphenols.

8. Conclusion

Pomegranate is mentioned three times in the Qur'an. Classic commentators have different ways of interpreting it from modern ones who relate it to scientific hermeneutics. The former generally interpreted the verses on pomegranate as a special fruit that is mentioned by the Qur’an besides dates. Meanwhile, the latter stated that pomegranate contains scientific miracles, which are very beneficial for humans’ life since its tree components have medical efficacies, starting from its pulp, seeds, flowers, leaves, rind, bark, to roots which can be formulated into cosmetic and herbal medication. From a scientific perspective, pomegranate fruit and its part contained bioactive compounds, especially polyphenols, having some biological activities which are beneficial to human health.

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