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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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۱۳ Abstract

١٤ Pomegranate is popular fruits consumed because of their pleasant taste and high 10 nutritional value having some health benefits to human health. In addition, ١٦ pomegranate (rumman in Arabic) is one of stated fruit in Ouran. Ouranic ۱۷ Hermeneutic with a scientific approach has been a new model used by modern ۱۸ commentators to explore various kinds of sciences presented in the Quranic ۱۹ verses. Qur'an mentions a pomegranate three times. Classic commentators ۲. generally interpreted the pomegranate verses as a special fruit and served for the ۲۱ occupants of heaven. In contrast, modern scientific commentators stated that the ۲۲ fruit contains scientific miracles that are very beneficial for human's health since ۲۳ this fruit had some phytochemicals reported to have some biological activities ۲٤ including antioxidant and antibacterial activity.

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

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٤ Introduction

٥ Pomegranate fruits with scientific name of Punica granatum L. (belong to ٦ family of Punicaceae) are excellent sources of bioactive compounds mainly ۷ polyphenols. This plant is native to central Asia, but currently it is highly adaptable to a ٨ wide range of climatic and soil conditions, and is now grown in many different ٩ geographical regions including the Mediterranean basin, Asia, and California in the ۱. USA. Pomegranate fruit has been used extensively in the folk medicines of many ۱۱ cultures since ancient times including Greek, Ayurvedic, Unani and Egyptian (Reddy, ۱۲ 2018). This fruit is regarded as a 'super fruit', which is rich in antioxidant ۱۳ phytochemicals and is recognized for a myriad of health benefits. Pomegranate fruit is ١٤ gaining popularity worldwide for its uniqueness, exclusive colour and taste, and ۱٥ associated health benefits (Hegazi et al., 2021).

١٦ Pomegranate is a type of tree from the family of Myrtaceae. Pomegranate ۱۷ (rumman) in a scientific term is called Punica granatum (Talbah, 2011). Since ۱۸ thousands of years ago, human beings have enjoyed it both as food and medicine. The ۱۹ fruit is estimated to originate from West Asia and spread to the surrounding areas. ۲. Hebron, which is now a part of Israel territories, is well-known for pomegranate which ۲۱ has been planted since the time of the Prophet Moses. Egypt, Ancient Greece, and ۲۲ Rome are the civilizations known for harvesting this fruit. Several archaeological ۲۳ findings found the residues of pomegranate plants, such as its seeds and barks around ۲٤ Cyprus, Israel, Iraq, Jordan, Lebanon, Palestine, Syria, and Turkey. It is estimated to ۲0 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).

٨ Pomegranates are becoming more popular with consumers because of their ٩ pleasant taste and high nutritional value. Pomegranate fruit is constituted by peel, arils, ۱. and seeds in an approximate 50:40:10 ratio, respectively. As in the majority of fruits, ۱۱ the chemical composition of the pomegranate differs according to the climatic ۱۲ conditions, ripening degree of the fruit at the time of harvest (Guo et al., 2021). The ۱۳ edible part of pomegranate is about 57%-85% of the whole fruit, among which fruit ١٤ juice accounts for 36%–63%. The taste of pomegranate is moderately sour and sweet 10 throughout the flavouring improvement by modern cultivation technology. Pomegranate ١٦ juice is considered as functional food due to some bioactive contents which are ١٧ beneficial to human health. Pomegranate fruit contain 17 kinds of amino acids and ۱۸ minerals, vitamin C, calcium, iron, phosphorus, retinol, riboflavin, ferulic acid, and ۱۹ other phenolic compounds. Pomegranate seed oil is also valuable source of bioactive ۲. compounds with health-beneficial effects, but it is sensitive to oxidation due to high ۲١ content of PUFA. Therefore, the oil was added with pomegranate peel extract or ۲۲ synthetic antioxidants to improve its stability toward oxidation (Drinić et al., 2020). ۲۳ This fruit is suitable for both young and old consumers; for example, pomegranate juice ۲٤ drinks are popular in daily life, and pomegranate extracts also serve as food additives, ۲0 supplements, and for taste correction (Ge et al., 2021). Pomegranate extract and its

١ polyphenols can be considered as cosmeceuticals because both revealed skin protective ۲ effects by ameliorating methylglyoxal (MGO)-induced DNA damage through restoring ٣ cell adhesion, migration, and wound healing capacity (Guo et al., 2021). The regular ٤ consumption of this fruit has been associated with the prevention of gastric damage, ٥ cardiovascular disease, type 2 diabetes mellitus, and specific types of cancers, renal ٦ illnesses, liver complications, and osteoarthritis (Villa-Ruano et al., 2020). In this ۷ review, pomegranate from Quranic and scientific perspectives are described. In ٨ scientific perspective, the antibacterial and antioxidant activities and polyphenols ٩ responsible for these activities are highlighted.

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Methods

۱۲ This descriptive-analytical paper used a thematic method based on literature ۱۳ review, referring to scientific articles from Tafseer books, reputed journals, book ١٤ literature, and conference papers. During this study, some databases of Scopus, 10 American Chemical Society, Science Direct, Springer, and Google Scholar covering ١٦ abstract and full texts are downloaded and evaluated to be used as references during this ۱۷ review. Scientific studies on Pomegranate published in journals were also used as main ۱۸ references. In addition, other sources came from books related to scientific miracles of ۱۹ the Ouran compiled by experts in their fields.

۲.

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, 19 cm in length, 0.5-2.5 cm in width, and green-coloured (Ahmad, 2003).

٥ Pomegranate is a berry fruit with a rounded shape and 5-12 cm in diameter, with ٦ various bark colours, such as purplish-green, white, reddish-brown, or blackish purple. ۷ The fruit is unique with its red-glazing seeds like crystals. The flower is called *Jullanar*. ٨ It is an antique fruit that has been known since ancient times. Many people gain some ٩ virtues and benefits found in it (Tayyāra, 2009). The pomegranate tree is a small posture ۱. with thin foliage and flatly shaped, having large and beautiful flowers, with a reddish ۱۱ colour, a fleshy shell of which contents are red-coloured cobs. The white flowers which ۱۲ lie in several separate places, one by one serve as a transparent lid. The Persians named ۱۳ this pomegranate Jalnaz, meaning the red fruit with seeds on it (Olivia, 2015).

١٤ In Indonesia, pomegranate is well-known by several names, depending on the 10 regions it grows, such as delima (Malay), glima (Acehnese), Glineu Mekah (Gayonese), ١٦ dhalima (Maduranese), gangsalan (Javanese), dalima (Sundanese), teliman ۱۷ (Sasaknese), lele kase and rumu (Timor). There are three types of pomegranate ۱۸ scattered over Indonesia, classified by its colours; they are white pomegranate, red ۱۹ pomegranate, and black pomegranate. Of these three types, the most famous is the red ۲. one. Pomegranate fruit is a symbol of prosperity and fertility, which is held in the form ۲۱ of a ceremony of seven months of a pregnancy ritual, conducted by Javanese people and ۲۲ other tribes in Indonesia (Olivia, 2015). Meanwhile, for Chinese people, it is one of the ۲۳ compulsory fruits in welcoming the Lunar New Year. They believe that many of the ۲٤ seeds are a symbol of abundant fortunes.

١ In general, pomegranate is various in types, in terms of shape, colour, sweetness ۲ level, acidity, or its seed's shape and colour. The best is the very red one with thin bark ٣ and abundant water content (Talbah, 2011). It has three flavours, that is, sweet, sour, ٤ 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 ٥ ٦ 0.3% of fat. Moreover, sweet pomegranate also contains fiber as much as 2% as well as ۷ some tannin, inulin, and citric acid as much as 1%. It also contains minerals, mainly ٨ iron, phosphorus, sulfur, potassium, lime, manganese, and vitamin C (Lansky and ٩ Newman 2007). Pomegranate with sour taste comprises less sugar, with 2% of citric ۱. acids. This acid content is even higher than that on oranges. Meanwhile, its seeds cover ۱۱ 9% of proteins and fat as much as 7%. Its outer bark contains tannic acids; the material ۱۲ that can restrain bleeding. Therefore, its outer bark powder which has been dried can be ۱۳ used as a remedy to ward off diarrhea and dysentery. It can also be used to restrain ١٤ blood discharge in the digestive tract (Al-Qabbani, 2009).

10 Today, Quran has not only become the main focus of merely studying objects ١٦ and classical interpretations, but also the attention of various scientific studies, ۱۷ including scientific and medical fields. An effort to comprehend the Quran with a ۱۸ scientific and medical approach by experts is called scientific hermeneutic. This style of ۱۹ hermeneutic is an attempt to understand the verses of the Ouran containing scientific ۲. cues from the perspectives of modern science. Scientific hermeneutic is also an ۲١ interpreter's striving effort to uncover the relationship between the verses of kauniyah ۲۲ in the Quran and scientific discoveries aimed at revealing its scientific miracles ۲۳ (Rahman, 1986).

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Yo Pomegranate in Quranic perspective

١ According to Al-Zahabi, this scientific hermeneutic seeks to explore the ۲ scientific dimension and uncover the secrets of its miracles related to scientific ٣ information that may not have been known to humankind during the descent, so it ٤ becomes evidence of the truth that the Quran is not a human work, but a revelation of ٥ the Creator instead (Zahabi, 2009). Dealing with this, many scientists have focused their ٦ studies on the Quran by attempting to put the verses of the Quran into logic and ۷ correlating them with treatments and medicines. Scientists have tried to combine the ٨ studies of plants mentioned in the Quran with medicines. The Quran does not mention ٩ all types of plants in general, just like modern botanical science does, but all types of ۱. plants mentioned by the Quran are certainly the top organisms of their respective ۱۱ species. For example, the fig tree (the fruits of heaven) is the top of the species of ۱۲ "Ficus" of "Moraceae" types according to botanists, its species reaches about 700 ۱۳ scattered around the world. Likewise, pomegranate, herbs of 1001 benefits, cure various ١٤ diseases, internal and external ones (Ahmad, 2003).

10 Nowadays, there have been families who have started the 'no vegetables and ١٦ fruits' campaign in their family menu. Fruits constitute a major part of the nutrients ١٧ needed by a human. Besides being consumed as nutrients and vitamins, certain fruits ۱۸ have medicinal properties for certain diseases. This is based on knowledge in religious ۱۹ teachings. This fruit is pomegranate which is also mentioned several times in the Qur'an ۲. and contains many health benefits. Almost all parts of pomegranate plants are useful for ۲۱ medical treatments, starting from the pulp, seeds, flowers, leaves, fruit skins, bark, to ۲۲ 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).

۱۲ The Qur'an as the greatest miracle for Muslims comprises verses showing ۱۳ various scientific signs from modern science perspectives. The hermeneutic of verses ١٤ that talk about science is known as Tafsir Ilmi (Scientific Interpretation) (Al-Qaradawi, 10 1999). According to Husain al-Zahabi, scientific hermeneutic discusses scientific terms ١٦ in narrating verses of the Qur'an, seeks to explore its scientific dimensions, and ۱۷ uncovers the secrets of miracles related to scientific information that may not have been ۱۸ known to humans at the time the Qur'an was revealed (Al-Żahabī, 1995). Hence, in ۱۹ modern times, this becomes another evidence that the Qur'an is not a human creation, ۲. 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-Shirbaşī, 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.

٤ This scientific hermeneutic employed a set of contemporary sciences, such as 0 astronomy, geology, chemistry, biology, medical science, and other scientific tools (Al-٦ Qaradāwī, 1999). Such interpretation with scientific approaches is not intended to ۷ justify the truth of scientific findings by the verses of the Qur'an, nor is it to compel the ٨ interpretation of the verses of the Qur'an to seemingly conform to the scientific findings. ٩ However, this scientific hermeneutic study initially arises from the awareness that the ۱. Qur'an is absolute, whilst its interpretation, both from commentary and scientific 11 perspectives, is relative and tentative in nature (Hanafi, 2015).

۱۲ Scientific hermeneutic has existed since the Abbasid dynasty. At that time, there ۱۳ were attempts made by some scholars to compromise Islamic teachings with translated ١٤ foreign cultures, as well as pure sciences found among the Muslims (Abderrahman, ١٥ 1986). Al-Ghazali was one of the figures who was persistent in supporting these ١٦ interpretive ideas. In his monumental masterpiece, Ihya 'Ulumiddin, he put forward his ۱۷ argumentations to prove his stance (Al-Ghazālī, 2000). He said that all kinds of ۱۸ sciences, both preceding and subsequent ones, whether known or not, come from the ۱٩ Our'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. AshShu'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.

٣ Besides al-Ghazali, Fakhruddin al-Razi was an expert commentator who tends to ٤ comply with scientific hermeneutic (Al-Rāzī, 2012). His monumental work, Mafatih al-Gaib, is filled with scientific discussions related to philosophy, natural sciences, 0 ٦ theology, medicine, astronomy, and so on. Because of presenting the above discussions, ۷ this interpretation is known as a philosophical hermeneutic (Shihab, 1994). The same ٨ perspective is also carried out by Jauhari Tantawi, in his work, Tafsir al-Jawahir. His ٩ interpretation uncovers scientific theories and scientific reinforcement in every verse he ۱. interprets (Goldziher, 1955).

۱۱ In this modern era, scientific hermeneutic is increasingly popular and used as a ۱۲ reference to study the sciences presented in the Quran. The development of scientific ۱۳ interpretation in the modern era was at least due to the influence of western technology ١٤ 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 10 ١٦ under the control of European countries (Jansen, 1980). This western hegemony has ١٧ gradually led to resistance on one hand and on the other hand, advances in modern Arab ۱۸ 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.

- ٣ An expert on scientific miracles, Nadya Tayyara, explained that he finally found ٤ out new information from several passages of the Our'an verses that talk about fruits. ٥ This understanding is also a response to the exposure of biological diseases and their ٦ treatment mechanisms, and an understanding of the correlation between chronic ۷ diseases and immune disorders that can be cured by these fruits (Tayyāra, 2009). This ٨ statement was strengthened by Ibn Qayyim al-Jauziyah, claiming that the fruits ٩ mentioned in the Qur'an have efficacies that other fruits don't. All of these fruits can be ۱. used to cure certain diseases (Al-Jauziyah, 2012). By this context, the paper shows the ۱۱ scientific evidence that causes the pomegranate to be a special fruit as mentioned in the ۱۲ Koran. The disclosure of scientific facts means that the guranic hermeneutic is open to ۱۳ modern science. In interpreting the pomegranate verses must be based on botanical ١٤ science data.
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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).

۷ In the Quran chapter Al-Rahman (55) verses 68-69, God said: "In both of them ٨ will be [all kinds of] fruit, and date-palms and pomegranates. Then which of your ٩ Lord's favors will you both deny?". In this verse, God particularly mentions that there ۱. are kinds of fruits, dates, and pomegranates in heaven. Ibn al-Jauzi mentioned the word ۱۱ 'dates' (nakhl) and 'pomegranates' (rumman) after the word 'fakihah' meaning fruits ۱۲ both are classified as fruits. This is to explain the virtue of both fruits (Al-Jauzi, 2002). ۱۳ Al-Tabari also stated that in the verse, there is a conjunction indicating a particular thing ١٤ to the general one, mentioning the word 'fruits' followed by the word 'dates' (nakhl) and 10 pomegranates (rumman) (Al-Tabari, 1998). However, the mention of the two words ١٦ specifically shows the virtue of the two fruits over the others.

١٧ Al-Maragi stated that the series in Al-Rahman verses 62 to 77 describe that there ۱۸ is a tree of fruit grown with leafy green in heaven. Inside of it, there is a clear water ۱۹ spring that sparkles. Meanwhile, the dwellers and angels are leaning back on green ۲. pillows and beautiful carpets. The angels who happen to be the dwellers' servants have ۲١ never been touched by any human beings nor genies. They can easily pick the fruit up ۲۲ close as the trees are short. Among the various fruits, the only special ones are dates and ۲۳ pomegranates which have been mentioned (Al-Maragi, 1996). Then which of your ۲٤ Lord's favors will you deny?

١ According to Al-Qurtubi, in this verse, dates, and pomegranates are mentioned ۲ after the other fruits as in line with the Arabs customs, dates and pomegranates are like ٣ wheat. For the Arabs, dates are the main course, while pomegranates are the dessert. ٤ Both fruits are mostly planted since the Arabs take benefits from them (Al-Ourtubī, 2014). Whereas, according to Al-Rāzī, God mentions the two fruits, pomegranates and ٥ ٦ dates, because they are opposite each other; one tastes sweet and the other does not. In ۷ addition, one is hot and the other is cold; one is as a source of nutrients and the other is ٨ not; one grows in hot land and the other is in cold land; one with high trunk and the ٩ other with opposite trunk (Al-Rāzī, 2012). Whereas, a medieval commentator, ۱. Muhammad al-Shawkani, presented several opinions from the interpretation of surah al-۱۱ 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 ۱۲ ۱۳ classified into fruits, but particularly mentioned because of their abundant benefits ١٤ compared to other fruits. Both are also plants existing on the land of Arabs. Another 10 opinion stated that pomegranate is a type of fruit that can be used for medication with ١٦ extraordinary efficacies (Al-Shawkānī, 2014).

١٧ A modern Indonesian commentator, M. Quraish Shibab, tends to interpret the ۱۸ verses about pomegranate based on its efficacies which have empirically been ۱۹ examined. In his commentary book, *al-Misbah*, he explained that its juice contains very ۲. high levels of citric acid compared to other types of fruits, and when roasted, it is very ۲١ helpful in reducing the acidity of urine and blood which in turn can prevent gout on the ۲۲ body. The citric acid contained in pomegranate can also help form some kidney stones. ۲۳ This juice also contains sufficient sugar levels, around 11%, to ease the roasting and ۲٤ produce energy (Shihab, 2002).

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Polyphenols in pomegranate fruit

۲ Some extraction techniques have been introduced to get high recovery of ٣ polyphenols. Rajha et al. (2019) have compared 5 extraction techniques namely ٤ conventional extraction (CE) based on liquid-solid extraction using water bath, ٥ extraction assisted by infrared irradiation (IR), ultrasound- assisted extraction (UAE), ٦ extraction using pulsed electric fields (PEF), and extraction using high-voltage electrical ۷ discharges (HVED). HVED assisted extraction offered the enhanced the recovery of ٨ polyphenols by approximately of 3 and 1.3 times as compared to US and PEF assisted ٩ extractions, respectively. The high recovery of polyphenols during extraction of HVED ۱. was caused by the ability of HVED technique to damage the microstructure of ۱۱ pomegranate skins strongly, as indicated from scanning electron microscopy (SEM) ۱۲ study.

۱۳ With the advance of experimental design applied in extraction of ١٤ phytochemicals, response surface methodology (RSM) was used to evaluate the effect 10 of three factors namely (1) condition liquid/solid ratio, (2) extraction time and (3) ١٦ ethanol percentage on ultrasonic assisted extraction (UAE) in obtaining the maximum ۱۷ of total polyphenols (TP), total flavonoids (TF) and condensed tannins (CD) from ۱۸ pomegranate peels. The optimum condition was obtained using liquid/solid ratio of 20, ۱۹ extraction time of 30.94 min and 59.26% of ethanol offered the highest contents of TP. ۲. TF and CT simultaneously. The results obtained during experimental design were in ۲۱ 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 ١ ۲ pomegranate peel and arils during storage for 50 days at temperature of 5°C was ٣ undertaken. The change patterns of pomegranate peel and aril were different among ٤ different phenolic compounds. The concentrations of the major phenolic compounds ٥ detected in arils and peels decreased during storage, except for syringic acid, catechin ٦ acid, p-coumaric acid, chlorogenic acid, caffeic acid, epicatechin, and dihydroquercetin ۷ (in arils). In addition, some phenolics compounds were decreased in pomegranate peel ٨ except syringic acid, catechin acid, p-coumaric acid, dihydromyricetin during storage. ٩ These changes may relate to enzymatic activities. The information on changes in ۱. polyphenolic contents is useful for management during postharvest treatments to ۱۱ maintain the quality of pomegranate fruits (Liu et al., 2021).

۱۲ Polyphenolics can be divided into two types: extractable (soluble in ۱۳ aqueous-organic solvents) and non-extractable polyphenols (NEPPs, which are not ١٤ soluble in aqueous-organic solvents (Pérez-Ramírez et al., 2018). The main extractable 10 phenolic compounds were anthocyanins, gallotannins and gallagyl derivatives, while the ١٦ main non-extractable phenolic compounds include vanillic acid and dihydroxybenzoic ۱۷ acid. Six compounds were then isolated from the EtOAc extracts whose structures were ۱۸ identified as β -sitosterol-3-O-glycoside (1), β -sitosterol (2), ursolic acid (3), corosolic ۱۹ acid (4), asiatic acid (5) and arjunolic acid (6). Using supercritical extraction CO₂: ۲. EtOH, punicalagin α -anomer, punicalagin β -anome and ellagic acid were isolated ۲۱ (Harscoat-Schiavo et al., 2021).

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The identified polyphenolic compounds in pomegranate fruit are grouped into ۲۳ (1) ellagitannins (hydrolyzable tannins) such as corilagin, granatin A and B, ۲٤ tellimagrandin, pedunculagin, punicalagin (an unique compound to pomegranate which ۲0 is found in the seeds, peel, leaves and juice) with the chemical structure in Figure 2; (2)

١ anthocyanins and their derivatives (sugar derivatives of delphinidin, cyanidin and ۲ pelargonidin such as delphinidin-3-glucoside, delphinidin-3,5-diglucoside, cyanidin-3-٣ gluco side, cyanidin-3,5-diglucoside, pelargonidin-3-glucoside and pelargonidin -3,5-٤ diglucoside, and punicalin with chemical structures in Figure 3; (3) derivatives of ٥ ellagic acid; (4) flavanols such as kaempferol, quercetin and myricetin, flavones; (4) ٦ flavan-3-ols such as catechin, epicatechin and epigallactocatechin 3-gallate; (5) ۷ hydroxybenzoic acids and their derivatives; (6) hydroxycinnamic acids and their ٨ derivatives, as compiled in Table 2 (Topalović et al., 2021; Wong et al., 2021).

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b 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).

۱۸ Pomegranate is a very special fruit with a lot of efficacies and benefits. It is ۱۹ closely related to the fact that the Quran particularly mentions pomegranate in the QC. ۲. Al-Rahman verses 68-69, "In both of them will be [all kinds of] fruit, and date-palms ۲١ and pomegranates. Then which of your Lord's favors will you both deny?". The Quran ۲۲ does not mention a type of vegetation unless it is the top organism of its species. ۲۳ Therefore, modern scientific commentators of the Quran state that pomegranate ۲٤ conceives scientific miracles, which is very beneficial for human life. These benefits did ۲0 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).

۱. In modern alternative medical treatment, all elements of the pomegranate fruit ۱۱ tree are efficacious for treatment, starting from its flesh of fruit, seeds, flowers, leaves, ۱۲ rinds, barks, to its root, which can serve as medicine. Pomegranate fruit produces ۱۳ anthocyanin, sugar, ascorbic acid, ellagic acid, gallic acid, caffeic acid; catechin, ١٤ epigallocatechin gallate, and many minerals, especially iron, and amino acid (Jurenka, 10 2008). Fakhruddin al-Razi in his exegesis stated that sweet pomegranate serves to strain ١٦ the shaft of male genitals; meanwhile, the sour one can eliminate sexual stimulus. The ۱۷ sweet pomegranate causes thirst, while the sour one relieves jaundice and discontinues ۱۸ 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 wellpreserved 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 Indonesiaare 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).

٤ Pomegranate's root and bark comprise ellagitannins, including punicalin and punicalagin; piperidine alkaloids (Jurenka, 2008). Its root bark can be used to eradicate ٥ ٦ worms because it contains a lot of pelletierene alkaloids. To make such content in high ۷ doses is by boiling its root bark in 50 grams for every 1 L of water with a quarter-hour ٨ time. This stew is then consumed as many as approximately one glass each morning ٩ (Al-Husaini, 2015). This potion can sometimes result in indications of virulence, ۱. headache, nausea, and vomiting. To avoid the occurrence of these poisoning symptoms, ۱۱ this root bark should be mixed with other ingredients which can restrain bleeding, such ۱۲ as tannins. Thus, absorption of the solvent materials becomes slower. The root bark also ۱۳ comprises various materials which can restrain bleeding in high doses (Ahmad, 2003).

١٤ Meanwhile, pomegranate bark contains phenolic punicalagin, gallic acid, fatty 10 acid; catechin, epigallocatechin gallate (EGCG), quercetin, rutin, flavonol, flavone, ١٦ flavanone, anthocyanidin. Besides, its outer bark contains tannic acid, the materials which can restrain bleeding. Therefore, the dried pomegranate bark powder can serve as ١٧ ۱۸ a remedy to ward off diarrhea and dysentery (Al-Futuh, 2006). It can also be used to ۱۹ withstand blood discharge in the digestive tract. Meanwhile, the boiled one also ۲. provides the same benefits and can be used to ward off caterpillars or worms, ۲۱ particularly tapeworms. This is because, on its bark, there are pelletierene alkaloid ۲۲ materials. The bark can also benefit people as anti-aging materials, so they make use of ۲۳ it to colour their skins along with the tree (Tayyāra, 2009).

Y: Pomegranate is very beneficial for elderly women. Based on a study by Hidaka
Yo *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.

٦ Pomegranate is a fruit that refreshes the body and strengthens the heart and ۷ nerves. It is beneficial to cure people with weak nerves as well as to smoothen the ٨ digestive tract. Its juice which is dripped down the nose, either mixed with honey or not, ٩ can avoid the occurrence of polyps because it restrains blood vessels (Al-Bagdadi, ۱. 1994). The juice is a potion that is nutritious and refreshing, because it contains high ۱۱ enough carbohydrates, salt, and rich in vitamins, especially vitamin C. The juice can ۱۲ also exterminate germs with a comparison of 1:60 bacteria (Al-Audat, 1994). The bark, ۱۳ stem, and root of the pomegranate tree comprise no less than 20% of tannins. ١٤ Pomegranate fruit is an easily hydrolyzed tannin, in the form of punicalagin. 10 Punicalagin is an ellagitannin found only in pomegranate fruit. Punicalagin has isomer ١٦ structures, that is, 2.3-(S)-Hexahydroxydiphenoyl-4.6-(S, S)-galagil-D-glucose (Kumari ۱۷ and Khatkar, 2016). Its bark, stem, and root contain no less than 20% of tannins. Of the ۱۸ existing tannins are four separate alkaloids; first, pelletierine alkaloid called also ۱۹ punicine; second, isopelletierine alkaloid; third, ethyl pelletierine alkaloid; and fourth, ۲. the pseudo-pelletierine alkaloid also called Methylgrantanine (Talbah, 2011). ۲۱ Pomegranate also contains other polyphenol compounds, that is, catechin, and ۲۲ gallocatechin, as well as anthocyanin compounds such as prodelphinidin, delphinidin, ۲۳ cyanidin, and pelargonidin (Mertens-Talcott et al., 2006).

Y: In Western countries, pomegranate usually appears in the fall. Now, food
 Yo 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

٨ Antibacterial activities have been described in several studies using in vitro ٩ methods such as agar disc diffusion assays and/or minimum inhibitory concentration ۱. (MIC). Some extracts of Pomegranate peels extracted by conventional extraction (CE) ۱۱ based on liquid-solid extraction using water bath, extraction assisted by infrared ۱۲ irradiation (IR), ultrasound- assisted extraction (UAE), extraction using pulsed electric ۱۳ fields (PEF), and extraction using high-voltage electrical discharges (HVED) are ١٤ evaluated for antibacterial activities using gram negative bacteria of Escherichia coli 10 and gram positive bacteria of Staphylococcus aureus. The inhibition of polyphenol rich ١٦ extracts are assessed using ELISA technique. Based on HPLC studies, all extract ۱۷ contains high levels of ellagic and gallic acids (polyphenols). All extracts exhibited ۱۸ antibacterial activities with the inhibition efficiency toward S. aureus up to ۱۹ approximately of 80% as compared to E. coli (up to approximately 33%) (Rajha et al., ۲. 2019). Phloretin and coumaric acid present in pomegranate fruit exhibited potent ۲۱ antimicrobial activity against Staphylococcus epidermidis, while punigratane revealed ۲۲ the most substantial antimicrobial effect on Micrococcus kristinae (Nazeam et al., ۲۳ 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 ١ enterica, Escherichia coli, Shigella sonnei, Enterococcus faecalis, Staphylococcus ۲ ٣ aureus and Bacillus subtilis. These antimicrobial activities are primarily attributed to ٤ the polyphenolic compounds, including high tannin content especially punicalagin. The ٥ other polyphenolic compounds identified are gallic acid, punicalagin- α , punicalagin- β , ٦ catechin, chlorogenic acid, epicatechin, and ellagic acid. However, it is believed that the ۷ antimicrobial activities not only depend on a single or an individual component but also ٨ due to a various metabolite.

٩ The antibacterial activity of water extract of black peel pomegranate and silver ۱. nanoparticles synthesized by water extract toward strains of gram-positive and gram-۱۱ negative. Both extract and silver nanoparticles exhibited potent the antibacterial ۱۲ activities toward *Pseudomonas aeruginosa* (gram negative) and *Staphylococcus aureus* ۱۳ (gram-positive), although P. aeruginosa was less sensitive to both samples. The ١٤ nanoparticles made from water extracts were more effective as bacteriostatic than water 10 extracts with minimum bacteriostatic concentration of nanoparticles of 40-65 µg/mL. ١٦ From this result, silver nanoparticles synthesized by water extract of black peel ۱۷ pomegranate can be considered as a high potential agent to combat infectious diseases ۱۸ due to its significant bacteriostatic activity (Khorrami et al., 2020).

19 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).

^A The antioxidant activities of 70% ethanolic extract of pomegranate peel and its ^q fractions (petroleum ether, ethyl acetate, butanol and water) obtained using liquid-liquid ¹ extractions have been evaluated by *in vitro* methods. Butanol and ethyl acetate were the ¹ most active fractions as radical scavenger toward DPPH ABTS radicals. In addition, ¹ water fraction showed the strongest activity in FRAP and β-carotene bleaching tests ¹ (Šavikin *et al.*, 2018).

١٤ Some clinical studies have been conducted related to the health benefits of 10 pomegranate juices and extracts. Giménez-Bastida et al. (2021) informed that the most ١٦ promising effects in clinical studies are related to improvement of the blood pressure. In ۱۷ addition, the activities related to inflammation, cancer, cognitive function, physical ۱۸ activity are less evidence. The evidence on human during clinical studies remains ۱۹ inconsistent, making it difficult to support most claimed health effects. The difference ۲. on clinical study results might be attributable to design limitations, including ۲۱ insufficient product characterization and inter individual variability which influence the ۲۲ efficiency of pomegranate polyphenols.

۲۳

۲٤ Conclusion

١ Pomegranate is mentioned three times in the Qur'an. Classic commentators have ۲ different ways of interpreting it from modern ones who relate it to scientific ٣ hermeneutics. The former generally interpreted the verses on pomegranate as a special ٤ fruit which is mentioned by the Our'an besides dates. Meanwhile, the latter stated that pomegranate contains scientific miracles, which are very beneficial for humans' life ٥ ٦ since its tree components have medical efficacies, starting from its pulp, seeds, flowers, ۷ leaves, rind, bark, to roots which can be formulated into cosmetic and herbal ٨ medication. From scientific perspective, pomegranate fruit and its part contained ٩ bioactive compounds, especially polyphenols, having some biological activities which ۱. are beneficial to human health.

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- ٣٤

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Pomegranate Juice and Fruit

Pomegranate Tree

- ۲ Figure 1. Pomegranate fruit, pomegranate juice and pomegranate tree.
- ٣



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



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

Pomegranate	Commentators	Quranic Hermeneutic
Shura al-An'am verses 99 and 141.	Al-Alusi There is a similarity between the 3 fruits olive, and pomegranate. But have a d 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 <i>fakihah</i> (fruits) means that both of them have virtues.
	Al-Tabari	The word <i>fakihah</i> (fruits) relies on the words <i>nakhl</i> (palm) and <i>rumman</i> (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

1 Table 1. The Quranic Hermeneutics of pomegranate verses

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

Anthocyanins and their derivative	Ellagitannins and derivatives of ellagic acid
• Cvanidin-3.5-caffeovl hexoside	• Brevifolin carboxylic acid
• Cvanidin-3.5-diglucoside	Casuarinin
• Cvanidin-3.5-pentoside hexoside	• Ellagic acid
 Cvanidin-3-galactoside 	• Ellagic acid (p-coumaroyl) hexoside
Cvanidin-3-glucoside	Ellagic acid derivative
 Delphinidin-3 5-pentoside hexoside 	Ellagic acid dihexoside
 Delphinidin-3-glucoside 	 Fllagic acid gallovl hexoside
 Delphinidin-caffeoyl 	 Ellagic acid bevoside
 Delphinidin-dihevoside 	 Ellagic acid pentoside 1
 Delphinidin-tribevoside 	Ellagic acid pentoside 1
 Epiafzelechin cyanidin dihavoside 	Ellagic acid pentoside 2
 Epiatzelechin-cyandin-dinexoside Epiafzelechin evenidin hevoside 	Ellagic acid mannoside Ellagitannin 1
 Epiatzelechin-cyalitatii-nexoside Epiafzelechin delphinidin hexoside 	Ellagitannin 1 Ellagitannin 10
 Epiarzelectini-delphiliduli-flexoside Epiarzelectini-delphiliduli-flexoside 	• Ellagitannin 10
• Epicatechin-cyanidii-5,5-dillexoside	• Ellagitamin 11
• Epicatecnin-delphimdin-3,5-	• Ellagitannin 2
uniexoside	• Ellagitannin 3
• Epicatechin-delphindin-nexoside	• Ellagitannin 4
• Epicatechin-pelargonidin-nexoside	• Ellagitannin 5
• Epigallocatechin-cyanidin-3,5-	• Ellagitannin 6
	• Ellagitannin 7
• Epigallocatechin-cyanidin-hexoside	• Ellagitannin 8
• Epigallocatechin-delphinidin-3,5-	• Ellagitannin 9
	Granatin A
• Epigallocatechin-delphinidin-hexoside	Lagerstannin A
• Pelargonidin-3,5-diglucoside	• Lagerstannin C
• Pelargonidin-3,5-pentoside hexoside	Pedunculagin 1
	• Pedunculagin 2
	• Pedunculagin 3
	Pedunculagin 4
	Pedunculagin derivative
	• Punicalin derivative 1
	• Punicalin derivative 2
	Punigluconin 1
	Punigluconin 2
Flavonol glycosides	Flavanols
Kaempferol hexoside	Catechin
Dihydrokaempferol hexoside	Epicatechin
• Syringetin hexoside 1	Procyanidin dimer 1
• Syringetin hexoside 2	Procyanidin dimer 2
Flavones	• Procyanidin dimer 3
• Apigenin rhamnoside	Procyanidin dimer 4
	Procyanidin dimer 5
	• Procyanidin trimer 1
	• Procyanidin trimer 2
	• Procvanidin trimer 3
Hydroxybenzoic acids and their derivatives	Hydroxycinnamic acids and their
Gallic acid	derivatives

Vanillic acid hexoside	• p-coumaric acid hexoside
Monogalloyl hexoside	• 4-p-coumaroylquinic acid
Hexahydroxydiphenic acid hexoside	• Caffeic acid hexoside 1
• Digalloyl-hexoside 1	• Caffeic acid hexoside 2
• Digalloyl hexoside 2	• 3-caffeoylquinic acid
Vanillic acid dihexoside	• 5-caffeoylquinic acid 1
Gallagic acid	• 5-caffeoylquinic acid 2
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	

MANUSCRIPT EVALUATION FORM

Date	:	10 th July 2021	
Manuscript ID	:	FR-2021-504	
Please return by	:	10 th August 2021	
Title of Manuscript	cript: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.

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Evaluation Criteria	A (Excellent)	В	С	D	E (Worst)
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2. Originality of Topic		\checkmark			
3. Manuscript Format		\checkmark			
4. Research Methodology			\checkmark		
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6. Relevance to the Journal		\checkmark			

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1.	Title It should reflect the article	Thank you			
	Ok				
2.	Abstract Background, Aim, Methodology and Conclusion	We have added "This review highlighted the Quranic hermeneutics and scientific perspective of Pomegranate for human health.			
	It is worth mentioning the purpose and method used in writing this manuscript	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				
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4.	Introduction Concise with sufficient background	-			
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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:

- 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



Prof. Abdul Rohman, PhD

Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Gadjah Mada University 55281. Yogyakarta, Indonesia. Email: <u>abdulkimfar@gmail.com</u> or <u>abdul_kimfar@ugm.ac.id</u>



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Manuscript Type	Original Article	Review
(Please Bold)	Short Communication	Technical Notes
Authors	Atabik, A., Muqtada, M.R., Su	ıhadi, Irnawati and Rohman, A.
Corresponding Author	Abdul Rohman	
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Corresponding Author		

SUGGESTED REVIEWERS		
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Area of Expertise	Halal product science	
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muhammad rikza muqtada <mrmuqtada@iainkudus.ac.id>

Fwd: Submission

1 pesan

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

------ 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

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: <u>awalmadewa@gmail.com</u>

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

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> Kepada: mrmuqtada@iainkudus.ac.id 12 April 2023 pukul 14.48

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Pak, Berikut Bukti penerimaan artikel

Salam

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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,

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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".

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Sincerely,

Son Radu, Ph.D.

YVdlR0tCWjdJT0M5UVdacXQ2Y1FZQlVEdEZaMDA5ZkVpZ2l0ST0iLDg4OiJz aGEyNTYtejdqNkRBcnRHc0UzT0IMK2JXVUNhcjVkaWNhcVRaSIN3QzRnS2qv NIV6OD0iLDq5OiJzaGEyNTYtVEpjY21ZZmdHM0Q5K3RXbmNmVXR6Q0xuYUpU SzloTXh4YW5Jd2pORktMUT0iLDkwOiJzaGEyNTYtNEpKV0dadXhjblhzWTZF WWUxVEJ0ZVZ0bXBzVGJwQk10cU5yRDV3NnFFWT0iLDkxOiJzaGEyNTYtSUI4 MDFIajBzZ1IvWIFuN2p1MIFGRysrZzlkMTN5bFRvdDFJN0tOLzdLUT0iLDkv OiJzaGEyNTYtaEtSdHNybVhjdU0rR2taQU4yM0JmeUg2d3JkR1FDTERuZW9X TXN2RW5xMD0iLDkzOiJzaGEyNTYtWEFhbDdoOFRZczRaV1BvYzFwekhIdzFj YnBpYk9PUU9EYW8wNXQyV0xzcz0iLDk0OiJzaGEyNTYtZGFOdIZ3ZIJWWEho aE1YWk9Seks3UVRjeTRFeVh6UHVZMk1YdzdkZ2x0bz0iLDk1OiJzaGEyNTYt SkJIWmF5emdsbjJFUzdPWHBLZnNZQXIzbFpqaERjdHRBZzZtdG1IZFVMOD0i LDk2OiJzaGEyNTYtNFdJNDEzbEJjRnY3TzQ0TW1QdEhnSUhBSDhMU3pyMysw bXl2Nk14a3Mxbz0iLDk3OiJzaGEyNTYtN3o3dkRQUDBweVRDb3c5MCtMSXV2 RW1ackgzNHVia0NjQ2NYbVU4d2l1ST0iLDk4OiJzaGEyNTYtYkJgREhhd000 UnpoZzQ2OW5PL05sOXIVY2pFQjhORDNFanhHNklQbGpiYz0iLDk5OiJzaGEy NTYtckc1YitlQ2JuT2xPOXZJT0Nvb2lUaXBlWGx2b3dOVm5uOXq4ZWNWNi9E TT0iLDEwMDoic2hhMjU2LUcxNDIEK2dTdlJuQnl0YXJ6ZndFV3hGbEx3SFRx WHdpcnJ1RTNhQkkzejA9IiwxMDE6InNoYTI1Ni0vWitoY2RwUS9xQlRHWWM1 c3J2V0dQNFprNFV0QkFMaU9WbS9pbHFJMGhNPSIsMTAyOiJzaGEyNTYtRS9U Zmt6SINzYWIJc081aityQWRKRkc2VGJaK1VuMGhJYUI2Vm

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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,

Professor Dr. Son Radu Chief Editor Food Research



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

۳ Abstract

٤ This review highlighted the Quranic hermeneutics and scientific perspective of 0 Pomegranate for human health. To accomplish this review article, numerous ٦ reputable databases such as Scopus, American Chemical Society, Science Direct, ٧ Springer, and Google Scholar related with this review were downloaded and ٨ evaluated. Pomegranate is popular fruits consumed because of their pleasant taste ٩ and high nutritional value having some health benefits to human health. In ۱. addition, pomegranate (rumman in Arabic) is one of stated fruit in Quran. Quranic ۱۱ Hermeneutic with a scientific approach has been a new model used by modern ۱۲ commentators to explore various kinds of sciences presented in the Quranic ۱۳ verses. Qur'an mentions a pomegranate three times. Classic commentators ١٤ generally interpreted the pomegranate verses as a special fruit and served for the 10 occupants of heaven. In contrast, modern scientific commentators stated that the ١٦ fruit contains scientific miracles that are very beneficial for human's health since ١٧ this fruit had some phytochemicals reported to have some biological activities ۱۸ including antioxidant and antibacterial activity.

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

١

1. Introduction

۲ Pomegranate fruits with scientific name of Punica granatum L. (belong to ٣ family of Punicaceae) are excellent sources of bioactive compounds mainly ٤ 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 ٥ ٦ geographical regions including the Mediterranean basin, Asia, and California in the ٧ USA. Pomegranate fruit has been used extensively in the folk medicines of many ٨ cultures since ancient times including Greek, Ayurvedic, Unani and Egyptian (Reddy, ٩ 2018). This fruit is regarded as a 'super fruit', which is rich in antioxidant ۱. phytochemicals and is recognized for a myriad of health benefits. Pomegranate fruit is ۱۱ gaining popularity worldwide for its uniqueness, exclusive colour and taste, and ۱۲ associated health benefits (Hegazi et al., 2021).

۱۳ Pomegranate is a type of tree from the family of Myrtaceae. Pomegranate ١٤ (rumman) in a scientific term is called Punica granatum (Talbah, 2011). Since 10 thousands of years ago, human beings have enjoyed it both as food and medicine. The ١٦ fruit is estimated to originate from West Asia and spread to the surrounding areas. ۱۷ Hebron, which is now a part of Israel territories, is well-known for pomegranate which ۱۸ has been planted since the time of the Prophet Moses. Egypt, Ancient Greece, and ۱۹ Rome are the civilizations known for harvesting this fruit. Several archaeological ۲. findings found the residues of pomegranate plants, such as its seeds and barks around ۲۱ Cyprus, Israel, Iraq, Jordan, Lebanon, Palestine, Syria, and Turkey. It is estimated to ۲۲ 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).

0 Pomegranates are becoming more popular with consumers because of their ٦ pleasant taste and high nutritional value. Pomegranate fruit is constituted by peel, arils, ۷ and seeds in an approximate 50:40:10 ratio, respectively. As in the majority of fruits, ٨ the chemical composition of the pomegranate differs according to the climatic ٩ conditions, ripening degree of the fruit at the time of harvest (Guo et al., 2021). The ۱. edible part of pomegranate is about 57%-85% of the whole fruit, among which fruit ۱۱ juice accounts for 36%–63%. The taste of pomegranate is moderately sour and sweet ۱۲ throughout the flavouring improvement by modern cultivation technology. Pomegranate ۱۳ juice is considered as functional food due to some bioactive contents which are ١٤ beneficial to human health. Pomegranate fruit contain 17 kinds of amino acids and 10 minerals, vitamin C, calcium, iron, phosphorus, retinol, riboflavin, ferulic acid, and ١٦ other phenolic compounds. Pomegranate seed oil is also valuable source of bioactive ١٧ compounds with health-beneficial effects, but it is sensitive to oxidation due to high ۱۸ content of PUFA. Therefore, the oil was added with pomegranate peel extract or ۱۹ synthetic antioxidants to improve its stability toward oxidation (Drinić et al., 2020). ۲. This fruit is suitable for both young and old consumers; for example, pomegranate juice ۲۱ drinks are popular in daily life, and pomegranate extracts also serve as food additives, ۲۲ supplements, and for taste correction (Ge et al., 2021). Pomegranate extract and its ۲۳ polyphenols can be considered as cosmeceuticals because both revealed skin protective ۲٤ effects by ameliorating methylglyoxal (MGO)-induced DNA damage through restoring ۲0 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.

٧

2. Methods

٨ This descriptive-analytical paper used a thematic method based on literature ٩ review, referring to scientific articles from *Tafseer* books, reputed journals, book ۱. literature, and conference papers. During this study, some databases of Scopus, ۱۱ American Chemical Society, Science Direct, Springer, and Google Scholar covering ۱۲ abstract and full texts are downloaded and evaluated to be used as references during this ۱۳ review. Scientific studies on Pomegranate published in journals were also used as main ١٤ references. In addition, other sources came from books related to scientific miracles of 10 the Quran compiled by experts in their fields.

١٦

3. Pomegranate fruit

١٧ Pomegranate (Punica granatum L.), Figure 1, is a fruit plant that can grow up to ۱۸ 5-8 meters in sub-tropical areas to tropical ones, from lowland to below 1000 meters ۱۹ above sea level. It is a shrub or a small tree with 2-5 meters in height (Lansky and ۲. Newman, 2007). Its stem is woody with square twigs, a lot of branches, spikes on its ۲۱ axilla, weak in nature, brown-coloured when unripe, and turns into dirty green post ripe. ۲۲ The pomegranate tree has a single leaf with short stems, located in groups. The leaf ۲۳ sheet takes oval to lancet in shape, taper base, blunt tip, pinnate bones, shiny surface, 1-۲٤ 9 cm in length, 0.5-2.5 cm in width, and green-coloured (Ahmad, 2003).

١ Pomegranate is a berry fruit with a rounded shape and 5-12 cm in diameter, with ۲ various bark colours, such as purplish-green, white, reddish-brown, or blackish purple. ٣ The fruit is unique with its red-glazing seeds like crystals. The flower is called Jullanar. ٤ It is an antique fruit that has been known since ancient times. Many people gain some ٥ virtues and benefits found in it (Tayyāra, 2009). The pomegranate tree is a small posture ٦ with thin foliage and flatly shaped, having large and beautiful flowers, with a reddish ٧ colour, a fleshy shell of which contents are red-coloured cobs. The white flowers which ٨ lie in several separate places, one by one serve as a transparent lid. The Persians named ٩ this pomegranate Jalnaz, meaning the red fruit with seeds on it (Olivia, 2015).

۱. In Indonesia, pomegranate is well-known by several names, depending on the ۱۱ regions it grows, such as delima (Malay), glima (Acehnese), Glineu Mekah (Gayonese), ۱۲ (Maduranese), gangsalan (Javanese), dalima (Sundanese), dhalima teliman ۱۳ (Sasaknese), lele kase and rumu (Timor). There are three types of pomegranate ١٤ scattered over Indonesia, classified by its colours; they are white pomegranate, red 10 pomegranate, and black pomegranate. Of these three types, the most famous is the red ١٦ one. Pomegranate fruit is a symbol of prosperity and fertility, which is held in the form ۱۷ of a ceremony of seven months of a pregnancy ritual, conducted by Javanese people and ۱۸ other tribes in Indonesia (Olivia, 2015). Meanwhile, for Chinese people, it is one of the ۱۹ compulsory fruits in welcoming the Lunar New Year. They believe that many of the ۲. 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 (Talbah, 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

١ 0.3% of fat. Moreover, sweet pomegranate also contains fiber as much as 2% as well as ۲ some tannin, inulin, and citric acid as much as 1%. It also contains minerals, mainly ٣ iron, phosphorus, sulfur, potassium, lime, manganese, and vitamin C (Lansky and ٤ Newman 2007). Pomegranate with sour taste comprises less sugar, with 2% of citric ٥ acids. This acid content is even higher than that on oranges. Meanwhile, its seeds cover ٦ 9% of proteins and fat as much as 7%. Its outer bark contains tannic acids; the material ۷ that can restrain bleeding. Therefore, its outer bark powder which has been dried can be ٨ used as a remedy to ward off diarrhea and dysentery. It can also be used to restrain ٩ blood discharge in the digestive tract (Al-Qabbani, 2009).

۱. Today, Quran has not only become the main focus of merely studying objects ۱۱ and classical interpretations, but also the attention of various scientific studies, ۱۲ including scientific and medical fields. An effort to comprehend the Quran with a ۱۳ scientific and medical approach by experts is called scientific hermeneutic. This style of ١٤ hermeneutic is an attempt to understand the verses of the Quran containing scientific 10 cues from the perspectives of modern science. Scientific hermeneutic is also an ١٦ interpreter's striving effort to uncover the relationship between the verses of kauniyah ۱۷ in the Quran and scientific discoveries aimed at revealing its scientific miracles ۱۸ (Rahman, 1986).

۱۹

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

١ correlating them with treatments and medicines. Scientists have tried to combine the ۲ studies of plants mentioned in the Quran with medicines. The Quran does not mention ٣ all types of plants in general, just like modern botanical science does, but all types of ٤ plants mentioned by the Quran are certainly the top organisms of their respective ٥ 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 ٦ ۷ scattered around the world. Likewise, pomegranate, herbs of 1001 benefits, cure various ٨ diseases, internal and external ones (Ahmad, 2003).

٩ Nowadays, there have been families who have started the 'no vegetables and ۱. fruits' campaign in their family menu. Fruits constitute a major part of the nutrients ۱۱ needed by a human. Besides being consumed as nutrients and vitamins, certain fruits ۱۲ have medicinal properties for certain diseases. This is based on knowledge in religious ۱۳ teachings. This fruit is pomegranate which is also mentioned several times in the Qur'an ١٤ and contains many health benefits. Almost all parts of pomegranate plants are useful for 10 medical treatments, starting from the pulp, seeds, flowers, leaves, fruit skins, bark, to ١٦ 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).

٦ The Qur'an as the greatest miracle for Muslims comprises verses showing ۷ various scientific signs from modern science perspectives. The hermeneutic of verses ٨ that talk about science is known as Tafsir Ilmi (Scientific Interpretation) (Al-Qaradawi, ٩ 1999). According to Husain al-Zahabi, scientific hermeneutic discusses scientific terms ۱. in narrating verses of the Qur'an, seeks to explore its scientific dimensions, and ۱۱ uncovers the secrets of miracles related to scientific information that may not have been ۱۲ known to humans at the time the Qur'an was revealed (Al-Żahabī, 1995). Hence, in ۱۳ modern times, this becomes another evidence that the Qur'an is not a human creation, ١٤ rather a revelation of God, The Creator.

10 Muslim scientists have tried to uncover the contents of the Qur'an which leads to ١٦ scientific discoveries or to keep some of the natural sciences which are not widely ۱۷ known by humans. They scientifically describe those contents in depth. Despite the ۱۸ Qur'an's zahir (visible) characteristics, of which texts briefly talk about this issue, the ۱۹ scientists' commentary can almost be proven by modern sciences (Al-Shirbasī, 1962). ۲. This argument is based on the fact that all sciences obtained from the Qur'an, after being ۲۱ analyzed accurately, will lead people to think at a certain point that everything said in ۲۲ the Our'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 Qaradāwī, 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).

٦ Scientific hermeneutic has existed since the Abbasid dynasty. At that time, there ۷ were attempts made by some scholars to compromise Islamic teachings with translated ٨ foreign cultures, as well as pure sciences found among the Muslims (Abderrahman, ٩ 1986). Al-Ghazali was one of the figures who was persistent in supporting these ۱. interpretive ideas. In his monumental masterpiece, *Ihya 'Ulumiddin*, he put forward his ۱۱ argumentations to prove his stance (Al-Ghazālī, 2000). He said that all kinds of ۱۲ sciences, both preceding and subsequent ones, whether known or not, come from the ۱۳ Qur'an (Musbikin, 2014).

١٤ In another work, Jawahir al-Qur'an, Al-Ghazali also discussed his support for ١٥ scientific hermeneutic. He stated that all sciences are gathered in one among several ١٦ oceans of Allah's knowledge which has no end. Furthermore, he strengthened his ۱۷ 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-۱۸ ۱٩ Shu'ara: 80). Al-Gazali explained that medicine and diseases cannot be discovered ۲. except by those who are involved in the medical field (Al-Ghazālī, 2003). Thus, the ۲١ 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).

٥ In this modern era, scientific hermeneutic is increasingly popular and used as a ٦ reference to study the sciences presented in the Quran. The development of scientific ۷ interpretation in the modern era was at least due to the influence of western technology ٨ 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 ٩ ۱. under the control of European countries (Jansen, 1980). This western hegemony has ۱۱ gradually led to resistance on one hand and on the other hand, advances in modern Arab ۱۲ scholars' thoughts in terms of religious and social sciences.

۱۳ The development of scientific hermeneutic is also an implication of the change ١٤ 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 10 ١٦ 'lamusi'un', in the QC al-Zariyat: 47, "We built the universe with 'great' might, and We ۱۷ are certainly expanding *it*". Along with new scientific discoveries, astronomers ۱۸ concluded a scientific theory, stating that nebulae which lie outside the galaxy we live ۱۹ in continues to move away at different speeds, even celestial bodies in one galaxy are ۲. moving away from one another (Hanafi, 2015). This shows that the discoveries of ۲۱ 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

١ diseases and immune disorders that can be cured by these fruits (Tayyāra, 2009). This ۲ statement was strengthened by Ibn Qayyim al-Jauziyah, claiming that the fruits ٣ mentioned in the Qur'an have efficacies that other fruits don't. All of these fruits can be ٤ 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 ٥ ٦ Koran. The disclosure of scientific facts means that the guranic hermeneutic is open to ۷ modern science. In interpreting the pomegranate verses must be based on botanical ٨ science data.

٩

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-Shāfi'ī,
 2000). Hermeneutical interpretations of these verses were compiled in Table 1.

١٤ 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 10 ١٦ speaks of the signs of His power for the believers. Among of which on earth is that He ۱۷ created a variety of trees, such as palm trees, olive trees, and pomegranate trees which ۱۸ take similar shapes and colours, despite the difference in taste (Al-Alusi, 1997). ۱۹ Commenting on those verses above, Qatadah stated that the creation of this ۲. pomegranate fruit is similar in its shape, partly to some of the others, but different in the ۲۱ fruit it produces, either in terms of its colour, taste, or content. The power of God's ۲۲ creation on the pomegranate can be seen from the origin of its creation. At the initial ۲۳ phase, it is grain, then grows into a tree, and produces the same fruit colour but different ۲٤ taste and smell (Kathīr, 2000).

١ 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 ۲ ٣ Lord's favors will you both deny?". In this verse, God particularly mentions that there ٤ 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 ٥ ٦ both are classified as fruits. This is to explain the virtue of both fruits (Al-Jauzi, 2002). ۷ Al-Tabari also stated that in the verse, there is a conjunction indicating a particular thing ٨ to the general one, mentioning the word 'fruits' followed by the word 'dates' (nakhl) and ٩ pomegranates (rumman) (Al-Tabari, 1998). However, the mention of the two words ۱. specifically shows the virtue of the two fruits over the others.

۱۱ Al-Maragi stated that the series in Al-Rahman verses 62 to 77 describe that there ۱۲ is a tree of fruit grown with leafy green in heaven. Inside of it, there is a clear water ۱۳ spring that sparkles. Meanwhile, the dwellers and angels are leaning back on green ١٤ pillows and beautiful carpets. The angels who happen to be the dwellers' servants have 10 never been touched by any human beings nor genies. They can easily pick the fruit up ١٦ close as the trees are short. Among the various fruits, the only special ones are dates and ۱۷ pomegranates which have been mentioned (Al-Maragi, 1996). Then which of your ۱۸ 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-Qurtubī, 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

١ not; one grows in hot land and the other is in cold land; one with high trunk and the ۲ other with opposite trunk (Al-Rāzī, 2012). Whereas, a medieval commentator, ٣ Muhammad al-Shawkani, presented several opinions from the interpretation of surah al-٤ 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 ٥ ٦ classified into fruits, but particularly mentioned because of their abundant benefits ۷ compared to other fruits. Both are also plants existing on the land of Arabs. Another ٨ opinion stated that pomegranate is a type of fruit that can be used for medication with ٩ extraordinary efficacies (Al-Shawkānī, 2014).

۱. A modern Indonesian commentator, M. Quraish Shibab, tends to interpret the ۱۱ verses about pomegranate based on its efficacies which have empirically been ۱۲ examined. In his commentary book, *al-Misbah*, he explained that its juice contains very ۱۳ high levels of citric acid compared to other types of fruits, and when roasted, it is very ١٤ helpful in reducing the acidity of urine and blood which in turn can prevent gout on the 10 body. The citric acid contained in pomegranate can also help form some kidney stones. ١٦ This juice also contains sufficient sugar levels, around 11%, to ease the roasting and ۱۷ produce energy (Shihab, 2002).

۱۸

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.

٥ With the advance of experimental design applied in extraction of ٦ phytochemicals, response surface methodology (RSM) was used to evaluate the effect ۷ of three factors namely (1) condition liquid/solid ratio, (2) extraction time and (3) ٨ ethanol percentage on ultrasonic assisted extraction (UAE) in obtaining the maximum ٩ of total polyphenols (TP), total flavonoids (TF) and condensed tannins (CD) from ۱. pomegranate peels. The optimum condition was obtained using liquid/solid ratio of 20, ۱۱ extraction time of 30.94 min and 59.26% of ethanol offered the highest contents of TP, ۱۲ TF and CT simultaneously. The results obtained during experimental design were in ۱۳ agreement in those with the predicted values (Hayder et al., 2021).

١٤ Pomegranate fruit is rich in polyphenol compounds that may potentially 10 revealed some biological activities such as antioxidant, antibacterial and antifungal ١٦ activities. The main phenolic compounds in pomegranate peel were anthocyanins, ۱۷ phenolic acids, and flavonoids. During storage, some changes in polyphenolic contents ۱۸ may occur. The study on the content changes of polyphenolic compounds of ۱۹ pomegranate peel and arils during storage for 50 days at temperature of 5°C was ۲. undertaken. The change patterns of pomegranate peel and aril were different among ۲۱ different phenolic compounds. The concentrations of the major phenolic compounds ۲۲ detected in arils and peels decreased during storage, except for syringic acid, catechin ۲۳ acid, p-coumaric acid, chlorogenic acid, caffeic acid, epicatechin, and dihydroquercetin ۲٤ (in arils). In addition, some phenolics compounds were decreased in pomegranate peel ۲0 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).

٤ Polyphenolics can be divided into two types: extractable (soluble in aqueous-organic solvents) and non-extractable polyphenols (NEPPs, which are not ٥ ٦ soluble in aqueous–organic solvents (Pérez-Ramírez et al., 2018). The main extractable ۷ phenolic compounds were anthocyanins, gallotannins and gallagyl derivatives, while the ٨ main non-extractable phenolic compounds include vanillic acid and dihydroxybenzoic ٩ acid. Six compounds were then isolated from the EtOAc extracts whose structures were ۱. identified as β -sitosterol-3-O-glycoside (1), β -sitosterol (2), ursolic acid (3), corosolic ۱۱ acid (4), asiatic acid (5) and arjunolic acid (6). Using supercritical extraction CO_2 : ۱۲ EtOH, punicalagin α -anomer, punicalagin β -anome and ellagic acid were isolated ۱۳ (Harscoat-Schiavo et al., 2021).

١٤ The identified polyphenolic compounds in pomegranate fruit are grouped into 10 (1) ellagitannins (hydrolyzable tannins) such as corilagin, granatin A and B, ١٦ tellimagrandin, pedunculagin, punicalagin (an unique compound to pomegranate which ۱۷ is found in the seeds, peel, leaves and juice) with the chemical structure in Figure 2; (2) ۱۸ anthocyanins and their derivatives (sugar derivatives of delphinidin, cyanidin and ۱۹ pelargonidin such as delphinidin-3-glucoside, delphinidin-3,5-diglucoside, cyanidin-3-۲. gluco side, cyanidin-3,5-diglucoside, pelargonidin-3-glucoside and pelargonidin -3,5-۲۱ diglucoside, and punicalin with chemical structures in Figure 3; (3) derivatives of ۲۲ ellagic acid; (4) flavanols such as kaempferol, quercetin and myricetin, flavones; (4) ۲۳ flavan-3-ols such as catechin, epicatechin and epigallactocatechin 3-gallate; (5) ۲٤ hydroxybenzoic acids and their derivatives; (6) hydroxycinnamic acids and their ۲0 derivatives, as compiled in Table 2 (Topalović et al., 2021; Wong et al., 2021).

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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).

٩ Pomegranate is a very special fruit with a lot of efficacies and benefits. It is ۱. closely related to the fact that the Quran particularly mentions pomegranate in the QC. ۱۱ Al-Rahman verses 68-69, "In both of them will be [all kinds of] fruit, and date-palms ۱۲ and pomegranates. Then which of your Lord's favors will you both deny?". The Quran ۱۳ does not mention a type of vegetation unless it is the top organism of its species. ١٤ Therefore, modern scientific commentators of the Quran state that pomegranate 10 conceives scientific miracles, which is very beneficial for human life. These benefits did ١٦ not only appear in the days when this verse was revealed but also had existed in ancient ۱۷ times. Pomegranate has been utilized for treatment in the times of the Pharaoh Kings to ۱۸ 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).

١ In modern alternative medical treatment, all elements of the pomegranate fruit ۲ tree are efficacious for treatment, starting from its flesh of fruit, seeds, flowers, leaves, ٣ rinds, barks, to its root, which can serve as medicine. Pomegranate fruit produces ٤ anthocyanin, sugar, ascorbic acid, ellagic acid, gallic acid, caffeic acid; catechin, ٥ epigallocatechin gallate, and many minerals, especially iron, and amino acid (Jurenka, ٦ 2008). Fakhruddin al-Razi in his exegesis stated that sweet pomegranate serves to strain ۷ the shaft of male genitals; meanwhile, the sour one can eliminate sexual stimulus. The ٨ sweet pomegranate causes thirst, while the sour one relieves jaundice and discontinues ٩ vomiting (Al-Rāzī, 2012).

۱. Besides, pomegranate can also cleanse and open the respiratory tract for people ۱۱ suffering from flu. Its juice may also serve as sweet thick syrup which is the most well-۱۲ preserved acidity. This syrup can be added to any food and medically used to treat ۱۳ various diseases on the mouth and gums (Al-Najjar, 2006). Its antioxidant content is ١٤ also higher than that in green tea, cranberry juice, and orange juice. The benefits of the 10 fruit which grows a lot in Iran, northern India, and Southeast Asia-including Indonesia-١٦ are no longer just a myth nor advertising campaign. Even more, both red and white ۱۷ pomegranates are equally efficacious. They can serve as herbs to prevent cancer, ۱۸ antidiarrhea, increase or decrease weight, delay skin-aging, protect the heart and ۱۹ 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).

٥ Meanwhile, pomegranate bark contains phenolic punicalagin, gallic acid, fatty ٦ acid; catechin, epigallocatechin gallate (EGCG), quercetin, rutin, flavonol, flavone, ۷ flavanone, anthocyanidin. Besides, its outer bark contains tannic acid, the materials ٨ which can restrain bleeding. Therefore, the dried pomegranate bark powder can serve as ٩ a remedy to ward off diarrhea and dysentery (Al-Futuh, 2006). It can also be used to ۱. withstand blood discharge in the digestive tract. Meanwhile, the boiled one also ۱۱ provides the same benefits and can be used to ward off caterpillars or worms, ۱۲ particularly tapeworms. This is because, on its bark, there are pelletierene alkaloid ۱۳ materials. The bark can also benefit people as anti-aging materials, so they make use of ١٤ it to colour their skins along with the tree (Tayyāra, 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,

١ 1994). The juice is a potion that is nutritious and refreshing, because it contains high ۲ enough carbohydrates, salt, and rich in vitamins, especially vitamin C. The juice can ٣ also exterminate germs with a comparison of 1:60 bacteria (Al-Audat, 1994). The bark, ٤ 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. ٥ ٦ Punicalagin is an ellagitannin found only in pomegranate fruit. Punicalagin has isomer ۷ structures, that is, 2.3-(S)-Hexahydroxydiphenoyl-4.6-(S, S)-galagil-D-glucose (Kumari ٨ and Khatkar, 2016). Its bark, stem, and root contain no less than 20% of tannins. Of the ٩ existing tannins are four separate alkaloids; first, pelletierine alkaloid called also ۱. punicine; second, isopelletierine alkaloid; third, ethyl pelletierine alkaloid; and fourth, ۱۱ the pseudo-pelletierine alkaloid also called Methylgrantanine (Talbah, 2011). ۱۲ Pomegranate also contains other polyphenol compounds, that is, catechin, and ۱۳ gallocatechin, as well as anthocyanin compounds such as prodelphinidin, delphinidin, ١٤ cyanidin, and pelargonidin (Mertens-Talcott et al., 2006).

10 In Western countries, pomegranate usually appears in the fall. Now, food ١٦ manufacturers add this fruit to chocolate, chewing gum, or made into juice. In 2005, ۱۷ 215 new foods and beverages were recorded containing pomegranate in the United ۱۸ States. Pomegranate is a versatile plant. Besides consumption, it is also made as juice ۱۹ for medication. This fruit contains many benefits. in addition to a great number of ۲. antioxidants, it helps prevent heart disease and stroke, and the seeds in each ۲۱ pomegranate grain contain fiber which is very beneficial for the body's immunity ۲۲ (Olivia, 2015).

۲۳ 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

١ (MIC). Some extracts of Pomegranate peels extracted by conventional extraction (CE) ۲ based on liquid-solid extraction using water bath, extraction assisted by infrared ٣ irradiation (IR), ultrasound- assisted extraction (UAE), extraction using pulsed electric ٤ fields (PEF), and extraction using high-voltage electrical discharges (HVED) are evaluated for antibacterial activities using gram negative bacteria of Escherichia coli ٥ ٦ and gram positive bacteria of *Staphylococcus aureus*. The inhibition of polyphenol rich ۷ extracts are assessed using ELISA technique. Based on HPLC studies, all extract ٨ contains high levels of ellagic and gallic acids (polyphenols). All extracts exhibited ٩ antibacterial activities with the inhibition efficiency toward S. aureus up to ۱. approximately of 80% as compared to E. coli (up to approximately 33%) (Rajha et al., ۱۱ 2019). Phloretin and coumaric acid present in pomegranate fruit exhibited potent ۱۲ antimicrobial activity against *Staphylococcus epidermidis*, while punigratane revealed ۱۳ the most substantial antimicrobial effect on Micrococcus kristinae (Nazeam et al., ١٤ 2020).

10 Giménez-Bastida et al. (2021) have compared the antibacterial activities of ١٦ different parts of pomegranate fruit. The pomegranate peel revealed strong antibacterial ۱۷ activities, compared the other parts (flower, leaf, and stem), against Salmonella ۱۸ enterica, Escherichia coli, Shigella sonnei, Enterococcus faecalis, Staphylococcus ۱۹ aureus and Bacillus subtilis. These antimicrobial activities are primarily attributed to ۲. the polyphenolic compounds, including high tannin content especially punicalagin. The ۲۱ other polyphenolic compounds identified are gallic acid, punicalagin- α , punicalagin- β , ۲۲ catechin, chlorogenic acid, epicatechin, and ellagic acid. However, it is believed that the ۲۳ antimicrobial activities not only depend on a single or an individual component but also ۲٤ due to a various metabolite.

١ The antibacterial activity of water extract of black peel pomegranate and silver ۲ nanoparticles synthesized by water extract toward strains of gram-positive and gram-٣ negative. Both extract and silver nanoparticles exhibited potent the antibacterial ٤ activities toward *Pseudomonas aeruginosa* (gram negative) and *Staphylococcus aureus* ٥ (gram-positive), although P. aeruginosa was less sensitive to both samples. The ٦ nanoparticles made from water extracts were more effective as bacteriostatic than water extracts with minimum bacteriostatic concentration of nanoparticles of 40-65 µg/mL. ۷ ٨ From this result, silver nanoparticles synthesized by water extract of black peel ٩ pomegranate can be considered as a high potential agent to combat infectious diseases ۱. due to its significant bacteriostatic activity (Khorrami et al., 2020).

11 7.2. Antioxidant activities

۱۲ Antioxidant activities of pomegranate fruits and its parts either in vitro or in vivo ۱۳ in animal models have been reported (Akuru et al., 2020). In vitro, the antioxidant ١٤ activities of pomegranate were evaluated by radical scavenging of DPPH (2,2'-10 diphenyl-1-picrylhydrazyl), ABTS (2,2'-azino-bis (3-ethylbenzothiazoline-6-sulphonic ١٦ acid), FRAP (ferric-reducing antioxidant), metal chelating activity, reducing power ۱۷ assay, β-carotene bleaching assay, ORAC (oxygen radical absorbance capacity assay, ۱۸ NBT (nitroblue tetrazolium chloride) assay, TOSC (total oxyradical scavenging ۱۹ capacity) assay, ferrous ion chelating, superoxide radical scavenging activity and lipid ۲. peroxidation inhibitory activity (Smaoui et al., 2019). Polyphenols extracted from ۲١ pomegranate peel using ultrasound-assisted extraction (UAE) revealed high antioxidant ۲۲ activities using radical scavenging activity of DPPH of 94.91%, due to high content of ۲۳ punicalagin (143.64 mg/g dry matter) as determined by HPLC analysis (Kaderides et ۲٤ 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).

٧ Some clinical studies have been conducted related to the health benefits of ٨ pomegranate juices and extracts. Giménez-Bastida et al. (2021) informed that the most ٩ promising effects in clinical studies are related to improvement of the blood pressure. In ۱. addition, the activities related to inflammation, cancer, cognitive function, physical ۱۱ activity are less evidence. The evidence on human during clinical studies remains ۱۲ inconsistent, making it difficult to support most claimed health effects. The difference ۱۳ on clinical study results might be attributable to design limitations, including ١٤ insufficient product characterization and inter individual variability which influence the 10 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

- ۲ Figure 1. Pomegranate fruit, pomegranate juice and pomegranate tree.
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Figure 2. Anthocyanins present in pomegranate fruit (Wong et al., 2021).



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

Pomegranate	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 <i>fakihah</i> (fruits) means that both of them have virtues.
	Al-Tabari	The word <i>fakihah</i> (fruits) relies on the words <i>nakhl</i> (palm) and <i>rumman</i> (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

1 Table 1. The Quranic Hermeneutics of pomegranate verses

- Table 2. Some phenolics compounds identified in pomegranate fruits (Topalović et al.,
- 1 7 7 2021).

Anthocyanins and their derivative	Ellagitannins and derivatives of ellagic acid
• Cvanidin-3.5-caffeoyl hexoside	Brevifolin carboxylic acid
• Cyanidin-3,5-diglucoside	• Casuarinin
• Cyanidin-3,5-pentoside hexoside	• Ellagic acid
• Cvanidin-3-galactoside	• Ellagic acid (p-coumarovl) hexoside
Cvanidin-3-glucoside	• Ellagic acid derivative
• Delphinidin-3.5-pentoside hexoside	Ellagic acid dihexoside
 Delphinidin-3-glucoside 	• Ellagic acid gallovl hexoside
Delphinidin-caffeoyl	Ellagic acid hexoside
 Delphinidin-dihexoside 	Ellagic acid pentoside 1
Delphinidin-tribexoside	 Ellagic acid pentoside ?
 Enjafzelechin-cyanidin-dihexoside 	 Filagic acid rhamnoside
 Epiatzelechin-cyanidin-bevoside 	Fllagitannin 1
 Epiatzelechin-delphinidin-hexoside 	• Fllagitannin 10
 Epiarzetechin-cyanidin-3 5-dihevoside 	Fllagitannin 11
 Epicatechin delphinidin 3.5 	Filagitannin 2
dibevoside	Ellagitannin 2
 Enicatechin delphinidin hevoside 	Ellagitannin 3
 Epicatechin-belargonidin-bevoside 	Ellagitannin 4 Ellagitannin 5
Epicatechin-perargonium-nexoside Epicatechin cyanidin 3.5	Ellagitannin 5 Ellagitannin 6
dibevoside	Ellagitannin 0 Ellositannin 7
 Enigallocatechin cyanidin havosida 	• Ellagitannin /
 Epigallocatechin-cyalildin-fiexoside Epigallocatechin delphinidin 2.5 	• Ellagitannin 8
• Epiganocatechni-derpinnidin-5,5-	• Ellagitannin 9
 Enigallocatachin delphinidin havosida 	• Granatin A
 Delargonidin 3.5 diglucosido 	• Lagerstannin A
 Pelargonidin 3.5 pantosida havosida 	• Lagerstannin C
• Penargonium-5,5-pentoside nexoside	Pedunculagin I
	• Pedunculagin 2
	• Pedunculagin 3
	• Pedunculagin 4
	Pedunculagin derivative
	• Punicalin derivative 1
	• Punicalin derivative 2
	Punigluconin 1
	Punigluconin 2
Flavonol glycosides	Flavanols
Kaempferol hexoside	Catechin
 Dihydrokaempferol hexoside 	Epicatechin
• Syringetin hexoside 1	Procyanidin dimer 1
• Syringetin hexoside 2	Procyanidin dimer 2
Flavones	• Procyanidin dimer 3
Apigenin rhamnoside	• Procyanidin dimer 4
	Procyanidin dimer 5
	Procyanidin trimer 1
	• Procyanidin trimer 2
	Procyanidin trimer 3
Hydroxybenzoic acids and their derivatives	Hydroxycinnamic acids and their
• Gallic acid	derivatives

Vanillic acid hexoside	• p-coumaric acid hexoside
Monogalloyl hexoside	• 4-p-coumaroylquinic acid
Hexahydroxydiphenic acid hexoside	Caffeic acid hexoside 1
• Digalloyl-hexoside 1	• Caffeic acid hexoside 2
• Digalloyl hexoside 2	• 3-caffeoylquinic acid
Vanillic acid dihexoside	• 5-caffeoylquinic acid 1
Gallagic acid	• 5-caffeoylquinic acid 2
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	

١	Pomegranate (Punica granatum L.) fruits in the Quranic Hermeneutics and
۲	scientific perspectives
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Abstract

۲ This review highlighted the Quranic hermeneutics and scientific perspective of ٣ Pomegranate for human health. To accomplish this review article, numerous ٤ reputable databases such as Scopus, American Chemical Society, Science Direct, ٥ Springer, and Google Scholar related with this review were downloaded and ٦ evaluated. Pomegranate is popular fruits consumed because of their pleasant taste ۷ and high nutritional value having some health benefits to human health. In ٨ addition, pomegranate (rumman in Arabic) is one of stated fruit in Quran. Quranic ٩ Hermeneutic with a scientific approach has been a new model used by modern ۱. commentators to explore various kinds of sciences presented in the Quranic ۱۱ verses. Qur'an mentions a pomegranate three times. Classic commentators ۱۲ generally interpreted the pomegranate verses as a special fruit and served for the ۱۳ occupants of heaven. In contrast, modern scientific commentators stated that the ١٤ fruit contains scientific miracles that are very beneficial for human's health since 10 this fruit had some phytochemicals reported to have some biological activities ١٦ including antioxidant and antibacterial activity.

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

1. Introduction

۲ Pomegranate fruits with scientific name of Punica granatum L. (belong to ٣ family of Punicaceae) are excellent sources of bioactive compounds mainly ٤ 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 ٥ ٦ geographical regions including the Mediterranean basin, Asia, and California in the ٧ USA. Pomegranate fruit has been used extensively in the folk medicines of many ٨ cultures since ancient times including Greek, Ayurvedic, Unani and Egyptian (Reddy, ٩ 2018). This fruit is regarded as a 'super fruit', which is rich in antioxidant ۱. phytochemicals and is recognized for a myriad of health benefits. Pomegranate fruit is ۱۱ gaining popularity worldwide for its uniqueness, exclusive colour and taste, and ۱۲ associated health benefits (Hegazi et al., 2021).

۱۳ Pomegranate is a type of tree from the family of Myrtaceae. Pomegranate ١٤ (rumman) in a scientific term is called Punica granatum (Talbah, 2011). Since 10 thousands of years ago, human beings have enjoyed it both as food and medicine. The ١٦ fruit is estimated to originate from West Asia and spread to the surrounding areas. ۱۷ Hebron, which is now a part of Israel territories, is well-known for pomegranate which ۱۸ has been planted since the time of the Prophet Moses. Egypt, Ancient Greece, and ۱۹ Rome are the civilizations known for harvesting this fruit. Several archaeological ۲. findings found the residues of pomegranate plants, such as its seeds and barks around ۲۱ Cyprus, Israel, Iraq, Jordan, Lebanon, Palestine, Syria, and Turkey. It is estimated to ۲۲ 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).

0 Pomegranates are becoming more popular with consumers because of their ٦ pleasant taste and high nutritional value. Pomegranate fruit is constituted by peel, arils, ۷ and seeds in an approximate 50:40:10 ratio, respectively. As in the majority of fruits, ٨ the chemical composition of the pomegranate differs according to the climatic ٩ conditions, ripening degree of the fruit at the time of harvest (Guo et al., 2021). The ۱. edible part of pomegranate is about 57%-85% of the whole fruit, among which fruit ۱۱ juice accounts for 36%–63%. The taste of pomegranate is moderately sour and sweet ۱۲ throughout the flavouring improvement by modern cultivation technology. Pomegranate ۱۳ juice is considered as functional food due to some bioactive contents which are ١٤ beneficial to human health. Pomegranate fruit contain 17 kinds of amino acids and 10 minerals, vitamin C, calcium, iron, phosphorus, retinol, riboflavin, ferulic acid, and ١٦ other phenolic compounds. Pomegranate seed oil is also valuable source of bioactive ١٧ compounds with health-beneficial effects, but it is sensitive to oxidation due to high ۱۸ content of PUFA. Therefore, the oil was added with pomegranate peel extract or ۱۹ synthetic antioxidants to improve its stability toward oxidation (Drinić et al., 2020). ۲. This fruit is suitable for both young and old consumers; for example, pomegranate juice ۲۱ drinks are popular in daily life, and pomegranate extracts also serve as food additives, ۲۲ supplements, and for taste correction (Ge et al., 2021). Pomegranate extract and its ۲۳ polyphenols can be considered as cosmeceuticals because both revealed skin protective ۲٤ effects by ameliorating methylglyoxal (MGO)-induced DNA damage through restoring ۲0 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.

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2. Methods

٨ This descriptive-analytical paper used a thematic method based on literature ٩ review, referring to scientific articles from *Tafseer* books, reputed journals, book ۱. literature, and conference papers. During this study, some databases of Scopus, ۱۱ American Chemical Society, Science Direct, Springer, and Google Scholar covering ۱۲ abstract and full texts are downloaded and evaluated to be used as references during this ۱۳ review. Scientific studies on Pomegranate published in journals were also used as main ١٤ references. In addition, other sources came from books related to scientific miracles of 10 the Quran compiled by experts in their fields.

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3. Pomegranate fruit

١٧ Pomegranate (Punica granatum L.), Figure 1, is a fruit plant that can grow up to ۱۸ 5-8 meters in sub-tropical areas to tropical ones, from lowland to below 1000 meters ۱۹ above sea level. It is a shrub or a small tree with 2-5 meters in height (Lansky and ۲. Newman, 2007). Its stem is woody with square twigs, a lot of branches, spikes on its ۲۱ axilla, weak in nature, brown-coloured when unripe, and turns into dirty green post ripe. ۲۲ The pomegranate tree has a single leaf with short stems, located in groups. The leaf ۲۳ sheet takes oval to lancet in shape, taper base, blunt tip, pinnate bones, shiny surface, 1-۲٤ 9 cm in length, 0.5-2.5 cm in width, and green-coloured (Ahmad, 2003).

١ Pomegranate is a berry fruit with a rounded shape and 5-12 cm in diameter, with ۲ various bark colours, such as purplish-green, white, reddish-brown, or blackish purple. ٣ The fruit is unique with its red-glazing seeds like crystals. The flower is called Jullanar. ٤ It is an antique fruit that has been known since ancient times. Many people gain some ٥ virtues and benefits found in it (Tayyāra, 2009). The pomegranate tree is a small posture ٦ with thin foliage and flatly shaped, having large and beautiful flowers, with a reddish ۷ colour, a fleshy shell of which contents are red-coloured cobs. The white flowers which ٨ lie in several separate places, one by one serve as a transparent lid. The Persians named ٩ this pomegranate Jalnaz, meaning the red fruit with seeds on it (Olivia, 2015).

۱. In Indonesia, pomegranate is well-known by several names, depending on the ۱۱ regions it grows, such as delima (Malay), glima (Acehnese), Glineu Mekah (Gayonese), ۱۲ (Maduranese), gangsalan (Javanese), dalima (Sundanese), dhalima teliman ۱۳ (Sasaknese), lele kase and rumu (Timor). There are three types of pomegranate ١٤ scattered over Indonesia, classified by its colours; they are white pomegranate, red 10 pomegranate, and black pomegranate. Of these three types, the most famous is the red ١٦ one. Pomegranate fruit is a symbol of prosperity and fertility, which is held in the form ۱۷ of a ceremony of seven months of a pregnancy ritual, conducted by Javanese people and ۱۸ other tribes in Indonesia (Olivia, 2015). Meanwhile, for Chinese people, it is one of the ۱۹ compulsory fruits in welcoming the Lunar New Year. They believe that many of the ۲. 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 (Talbah, 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

١ 0.3% of fat. Moreover, sweet pomegranate also contains fiber as much as 2% as well as ۲ some tannin, inulin, and citric acid as much as 1%. It also contains minerals, mainly ٣ iron, phosphorus, sulphur, potassium, lime, manganese, and vitamin C (Lansky and ٤ Newman 2007). Pomegranate with sour taste comprises less sugar, with 2% of citric ٥ acids. This acid content is even higher than that on oranges. Meanwhile, its seeds cover ٦ 9% of proteins and fat as much as 7%. Its outer bark contains tannic acids; the material ۷ that can restrain bleeding. Therefore, its outer bark powder which has been dried can be ٨ used as a remedy to ward off diarrhoea and dysentery. It can also be used to restrain ٩ blood discharge in the digestive tract (Al-Qabbani, 2009).

۱. Today, Quran has not only become the main focus of merely studying objects ۱۱ and classical interpretations, but also the attention of various scientific studies, ۱۲ including scientific and medical fields. An effort to comprehend the Quran with a ۱۳ scientific and medical approach by experts is called scientific hermeneutic. This style of ١٤ hermeneutic is an attempt to understand the verses of the Quran containing scientific 10 cues from the perspectives of modern science. Scientific hermeneutic is also an ١٦ interpreter's striving effort to uncover the relationship between the verses of kauniyah ۱۷ in the Quran and scientific discoveries aimed at revealing its scientific miracles ۱۸ (Rahman, 1986).

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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

١ correlating them with treatments and medicines. Scientists have tried to combine the ۲ studies of plants mentioned in the Quran with medicines. The Quran does not mention ٣ all types of plants in general, just like modern botanical science does, but all types of ٤ plants mentioned by the Quran are certainly the top organisms of their respective ٥ 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 ٦ ۷ scattered around the world. Likewise, pomegranate, herbs of 1001 benefits, cure various ٨ diseases, internal and external ones (Ahmad, 2003).

٩ Nowadays, there have been families who have started the 'no vegetables and ۱. fruits' campaign in their family menu. Fruits constitute a major part of the nutrients ۱۱ needed by a human. Besides being consumed as nutrients and vitamins, certain fruits ۱۲ have medicinal properties for certain diseases. This is based on knowledge in religious ۱۳ teachings. This fruit is pomegranate which is also mentioned several times in the Qur'an ١٤ and contains many health benefits. Almost all parts of pomegranate plants are useful for 10 medical treatments, starting from the pulp, seeds, flowers, leaves, fruit skins, bark, to ١٦ 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).

٦ The Qur'an as the greatest miracle for Muslims comprises verses showing ۷ various scientific signs from modern science perspectives. The hermeneutic of verses ٨ that talk about science is known as Tafsir Ilmi (Scientific Interpretation) (Al-Qaradawi, ٩ 1999). According to Husain al-Zahabi, scientific hermeneutic discusses scientific terms ۱. in narrating verses of the Qur'an, seeks to explore its scientific dimensions, and ۱۱ uncovers the secrets of miracles related to scientific information that may not have been ۱۲ known to humans at the time the Qur'an was revealed (Al-Żahabī, 1995). Hence, in ۱۳ modern times, this becomes another evidence that the Qur'an is not a human creation, ١٤ rather a revelation of God, The Creator.

10 Muslim scientists have tried to uncover the contents of the Qur'an which leads to ١٦ scientific discoveries or to keep some of the natural sciences which are not widely ۱۷ known by humans. They scientifically describe those contents in depth. Despite the ۱۸ Qur'an's zahir (visible) characteristics, of which texts briefly talk about this issue, the ۱۹ scientists' commentary can almost be proven by modern sciences (Al-Shirbasī, 1962). ۲. This argument is based on the fact that all sciences obtained from the Qur'an, after being ۲١ analyzed accurately, will lead people to think at a certain point that everything said in ۲۲ the Our'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 Qaradāwī, 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).

٦ Scientific hermeneutic has existed since the Abbasid dynasty. At that time, there ۷ were attempts made by some scholars to compromise Islamic teachings with translated ٨ foreign cultures, as well as pure sciences found among the Muslims (Abderrahman, ٩ 1986). Al-Ghazali was one of the figures who was persistent in supporting these ۱. interpretive ideas. In his monumental masterpiece, *Ihya 'Ulumiddin*, he put forward his ۱۱ argumentations to prove his stance (Al-Ghazālī, 2000). He said that all kinds of ۱۲ sciences, both preceding and subsequent ones, whether known or not, come from the ۱۳ Qur'an (Musbikin, 2014).

١٤ In another work, Jawahir al-Qur'an, Al-Ghazali also discussed his support for ١٥ scientific hermeneutic. He stated that all sciences are gathered in one among several ١٦ oceans of Allah's knowledge which has no end. Furthermore, he strengthened his ۱۷ 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-۱۸ ۱٩ Shu'ara: 80). Al-Gazali explained that medicine and diseases cannot be discovered ۲. except by those who are involved in the medical field (Al-Ghazālī, 2003). Thus, the ۲١ 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).

٥ In this modern era, scientific hermeneutic is increasingly popular and used as a ٦ reference to study the sciences presented in the Quran. The development of scientific ۷ interpretation in the modern era was at least due to the influence of western technology ٨ 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 ٩ ۱. under the control of European countries (Jansen, 1980). This western hegemony has ۱۱ gradually led to resistance on one hand and on the other hand, advances in modern Arab ۱۲ scholars' thoughts in terms of religious and social sciences.

۱۳ The development of scientific hermeneutic is also an implication of the change ١٤ 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 10 ١٦ 'lamusi'un', in the QC al-Zariyat: 47, "We built the universe with 'great' might, and We ۱۷ are certainly expanding *it*". Along with new scientific discoveries, astronomers ۱۸ concluded a scientific theory, stating that nebulae which lie outside the galaxy we live ۱۹ in continues to move away at different speeds, even celestial bodies in one galaxy are ۲. moving away from one another (Hanafi, 2015). This shows that the discoveries of ۲۱ 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

١ diseases and immune disorders that can be cured by these fruits (Tayyāra, 2009). This ۲ statement was strengthened by Ibn Qayyim al-Jauziyah, claiming that the fruits ٣ mentioned in the Qur'an have efficacies that other fruits don't. All of these fruits can be ٤ 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 ٥ ٦ Koran. The disclosure of scientific facts means that the guranic hermeneutic is open to ۷ modern science. In interpreting the pomegranate verses must be based on botanical ٨ science data.

٩

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-Shāfi'ī,
 2000). Hermeneutical interpretations of these verses were compiled in Table 1.

١٤ 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 10 ١٦ speaks of the signs of His power for the believers. Among of which on earth is that He ۱۷ created a variety of trees, such as palm trees, olive trees, and pomegranate trees which ۱۸ take similar shapes and colours, despite the difference in taste (Al-Alusi, 1997). ۱۹ Commenting on those verses above, Qatadah stated that the creation of this ۲. pomegranate fruit is similar in its shape, partly to some of the others, but different in the ۲۱ fruit it produces, either in terms of its colour, taste, or content. The power of God's ۲۲ creation on the pomegranate can be seen from the origin of its creation. At the initial ۲۳ phase, it is grain, then grows into a tree, and produces the same fruit colour but different ۲٤ taste and smell (Kathīr, 2000).

١ 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 ۲ ٣ Lord's favors will you both deny?". In this verse, God particularly mentions that there ٤ 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 ٥ ٦ both are classified as fruits. This is to explain the virtue of both fruits (Al-Jauzi, 2002). ۷ Al-Tabari also stated that in the verse, there is a conjunction indicating a particular thing ٨ to the general one, mentioning the word 'fruits' followed by the word 'dates' (nakhl) and ٩ pomegranates (rumman) (Al-Tabari, 1998). However, the mention of the two words ۱. specifically shows the virtue of the two fruits over the others.

۱۱ Al-Maragi stated that the series in Al-Rahman verses 62 to 77 describe that there ۱۲ is a tree of fruit grown with leafy green in heaven. Inside of it, there is a clear water ۱۳ spring that sparkles. Meanwhile, the dwellers and angels are leaning back on green ١٤ pillows and beautiful carpets. The angels who happen to be the dwellers' servants have 10 never been touched by any human beings nor genies. They can easily pick the fruit up ١٦ close as the trees are short. Among the various fruits, the only special ones are dates and ۱۷ pomegranates which have been mentioned (Al-Maragi, 1996). Then which of your ۱۸ 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-Qurtubī, 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

١ not; one grows in hot land and the other is in cold land; one with high trunk and the ۲ other with opposite trunk (Al-Rāzī, 2012). Whereas, a medieval commentator, ٣ Muhammad al-Shawkani, presented several opinions from the interpretation of surah al-٤ 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 ٥ ٦ classified into fruits, but particularly mentioned because of their abundant benefits ٧ compared to other fruits. Both are also plants existing on the land of Arabs. Another ٨ opinion stated that pomegranate is a type of fruit that can be used for medication with ٩ extraordinary efficacies (Al-Shawkānī, 2014).

۱. A modern Indonesian commentator, M. Quraish Shibab, tends to interpret the ۱۱ verses about pomegranate based on its efficacies which have empirically been ۱۲ examined. In his commentary book, *al-Misbah*, he explained that its juice contains very ۱۳ high levels of citric acid compared to other types of fruits, and when roasted, it is very ١٤ helpful in reducing the acidity of urine and blood which in turn can prevent gout on the 10 body. The citric acid contained in pomegranate can also help form some kidney stones. ١٦ This juice also contains sufficient sugar levels, around 11%, to ease the roasting and ۱۷ produce energy (Shihab, 2002).

۱۸

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.

٥ With the advance of experimental design applied in extraction of ٦ phytochemicals, response surface methodology (RSM) was used to evaluate the effect ۷ of three factors namely (1) condition liquid/solid ratio, (2) extraction time and (3) ٨ ethanol percentage on ultrasonic assisted extraction (UAE) in obtaining the maximum ٩ of total polyphenols (TP), total flavonoids (TF) and condensed tannins (CD) from ۱. pomegranate peels. The optimum condition was obtained using liquid/solid ratio of 20, ۱۱ extraction time of 30.94 min and 59.26% of ethanol offered the highest contents of TP, ۱۲ TF and CT simultaneously. The results obtained during experimental design were in ۱۳ agreement in those with the predicted values (Hayder et al., 2021).

١٤ Pomegranate fruit is rich in polyphenol compounds that may potentially 10 revealed some biological activities such as antioxidant, antibacterial and antifungal ١٦ activities. The main phenolic compounds in pomegranate peel were anthocyanins, ۱۷ phenolic acids, and flavonoids. During storage, some changes in polyphenolic contents ۱۸ may occur. The study on the content changes of polyphenolic compounds of ۱۹ pomegranate peel and arils during storage for 50 days at temperature of 5°C was ۲. undertaken. The change patterns of pomegranate peel and aril were different among ۲۱ different phenolic compounds. The concentrations of the major phenolic compounds ۲۲ detected in arils and peels decreased during storage, except for syringic acid, catechin ۲۳ acid, p-coumaric acid, chlorogenic acid, caffeic acid, epicatechin, and dihydroquercetin ۲٤ (in arils). In addition, some phenolics compounds were decreased in pomegranate peel ۲0 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).

٤ Polyphenolics can be divided into two types: extractable (soluble in aqueous-organic solvents) and non-extractable polyphenols (NEPPs, which are not ٥ ٦ soluble in aqueous–organic solvents (Pérez-Ramírez et al., 2018). The main extractable ۷ phenolic compounds were anthocyanins, gallotannins and gallagyl derivatives, while the ٨ main non-extractable phenolic compounds include vanillic acid and dihydroxybenzoic ٩ acid. Six compounds were then isolated from the EtOAc extracts whose structures were ۱. identified as β -sitosterol-3-O-glycoside (1), β -sitosterol (2), ursolic acid (3), corosolic ۱۱ acid (4), asiatic acid (5) and arjunolic acid (6). Using supercritical extraction CO_2 : ۱۲ EtOH, punicalagin α -anomer, punicalagin β -anome and ellagic acid were isolated ۱۳ (Harscoat-Schiavo et al., 2021).

١٤ The identified polyphenolic compounds in pomegranate fruit are grouped into 10 (1) ellagitannins (hydrolyzable tannins) such as corilagin, granatin A and B, ١٦ tellimagrandin, pedunculagin, punicalagin (an unique compound to pomegranate which ۱۷ is found in the seeds, peel, leaves and juice) with the chemical structure in Figure 2; (2) ۱۸ anthocyanins and their derivatives (sugar derivatives of delphinidin, cyanidin and ۱۹ pelargonidin such as delphinidin-3-glucoside, delphinidin-3,5-diglucoside, cyanidin-3-۲. gluco side, cyanidin-3,5-diglucoside, pelargonidin-3-glucoside and pelargonidin -3,5-۲۱ diglucoside, and punicalin with chemical structures in Figure 3; (3) derivatives of ۲۲ ellagic acid; (4) flavanols such as kaempferol, quercetin and myricetin, flavones; (4) ۲۳ flavan-3-ols such as catechin, epicatechin and epigallactocatechin 3-gallate; (5) ۲٤ hydroxybenzoic acids and their derivatives; (6) hydroxycinnamic acids and their ۲0 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).

٩ Pomegranate is a very special fruit with a lot of efficacies and benefits. It is ۱. closely related to the fact that the Quran particularly mentions pomegranate in the QC. ۱۱ Al-Rahman verses 68-69, "In both of them will be [all kinds of] fruit, and date-palms ۱۲ and pomegranates. Then which of your Lord's favors will you both deny?". The Quran ۱۳ does not mention a type of vegetation unless it is the top organism of its species. ١٤ Therefore, modern scientific commentators of the Quran state that pomegranate 10 conceives scientific miracles, which is very beneficial for human life. These benefits did ١٦ not only appear in the days when this verse was revealed but also had existed in ancient ۱۷ times. Pomegranate has been utilized for treatment in the times of the Pharaoh Kings to ۱۸ 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).

١ In modern alternative medical treatment, all elements of the pomegranate fruit ۲ tree are efficacious for treatment, starting from its flesh of fruit, seeds, flowers, leaves, ٣ rinds, barks, to its root, which can serve as medicine. Pomegranate fruit produces ٤ anthocyanin, sugar, ascorbic acid, ellagic acid, gallic acid, caffeic acid; catechin, ٥ epigallocatechin gallate, and many minerals, especially iron, and amino acid (Jurenka, ٦ 2008). Fakhruddin al-Razi in his exegesis stated that sweet pomegranate serves to strain ۷ the shaft of male genitals; meanwhile, the sour one can eliminate sexual stimulus. The ٨ sweet pomegranate causes thirst, while the sour one relieves jaundice and discontinues ٩ vomiting (Al-Rāzī, 2012).

۱. Besides, pomegranate can also cleanse and open the respiratory tract for people ۱۱ suffering from flu. Its juice may also serve as sweet thick syrup which is the most well-۱۲ preserved acidity. This syrup can be added to any food and medically used to treat ۱۳ various diseases on the mouth and gums (Al-Najjar, 2006). Its antioxidant content is ١٤ also higher than that in green tea, cranberry juice, and orange juice. The benefits of the 10 fruit which grows a lot in Iran, northern India, and Southeast Asia-including Indonesia-١٦ are no longer just a myth nor advertising campaign. Even more, both red and white ۱۷ pomegranates are equally efficacious. They can serve as herbs to prevent cancer, ۱۸ antidiarrhea, increase or decrease weight, delay skin-aging, protect the heart and ۱۹ 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).

٥ Meanwhile, pomegranate bark contains phenolic punicalagin, gallic acid, fatty ٦ acid; catechin, epigallocatechin gallate (EGCG), quercetin, rutin, flavonol, flavone, ۷ flavanone, anthocyanidin. Besides, its outer bark contains tannic acid, the materials ٨ which can restrain bleeding. Therefore, the dried pomegranate bark powder can serve as ٩ a remedy to ward off diarrhea and dysentery (Al-Futuh, 2006). It can also be used to ۱. withstand blood discharge in the digestive tract. Meanwhile, the boiled one also ۱۱ provides the same benefits and can be used to ward off caterpillars or worms, ۱۲ particularly tapeworms. This is because, on its bark, there are pelletierene alkaloid ۱۳ materials. The bark can also benefit people as anti-aging materials, so they make use of ١٤ it to colour their skins along with the tree (Tayyāra, 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,

١ 1994). The juice is a potion that is nutritious and refreshing, because it contains high ۲ enough carbohydrates, salt, and rich in vitamins, especially vitamin C. The juice can ٣ also exterminate germs with a comparison of 1:60 bacteria (Al-Audat, 1994). The bark, ٤ 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. ٥ ٦ Punicalagin is an ellagitannin found only in pomegranate fruit. Punicalagin has isomer ۷ structures, that is, 2.3-(S)-Hexahydroxydiphenoyl-4.6-(S, S)-galagil-D-glucose (Kumari ٨ and Khatkar, 2016). Its bark, stem, and root contain no less than 20% of tannins. Of the ٩ existing tannins are four separate alkaloids; first, pelletierine alkaloid called also ۱. punicine; second, isopelletierine alkaloid; third, ethyl pelletierine alkaloid; and fourth, ۱۱ the pseudo-pelletierine alkaloid also called Methylgrantanine (Talbah, 2011). ۱۲ Pomegranate also contains other polyphenol compounds, that is, catechin, and ۱۳ gallocatechin, as well as anthocyanin compounds such as prodelphinidin, delphinidin, ١٤ cyanidin, and pelargonidin (Mertens-Talcott et al., 2006).

10 In Western countries, pomegranate usually appears in the fall. Now, food ١٦ manufacturers add this fruit to chocolate, chewing gum, or made into juice. In 2005, ۱۷ 215 new foods and beverages were recorded containing pomegranate in the United ۱۸ States. Pomegranate is a versatile plant. Besides consumption, it is also made as juice ۱۹ for medication. This fruit contains many benefits. in addition to a great number of ۲. antioxidants, it helps prevent heart disease and stroke, and the seeds in each ۲۱ pomegranate grain contain fiber which is very beneficial for the body's immunity ۲۲ (Olivia, 2015).

۲۳ 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

١ (MIC). Some extracts of Pomegranate peels extracted by conventional extraction (CE) ۲ based on liquid-solid extraction using water bath, extraction assisted by infrared ٣ irradiation (IR), ultrasound- assisted extraction (UAE), extraction using pulsed electric ٤ fields (PEF), and extraction using high-voltage electrical discharges (HVED) are evaluated for antibacterial activities using gram negative bacteria of Escherichia coli ٥ ٦ and gram positive bacteria of *Staphylococcus aureus*. The inhibition of polyphenol rich ۷ extracts are assessed using ELISA technique. Based on HPLC studies, all extract ٨ contains high levels of ellagic and gallic acids (polyphenols). All extracts exhibited ٩ antibacterial activities with the inhibition efficiency toward S. aureus up to ۱. approximately of 80% as compared to E. coli (up to approximately 33%) (Rajha et al., ۱۱ 2019). Phloretin and coumaric acid present in pomegranate fruit exhibited potent ۱۲ antimicrobial activity against *Staphylococcus epidermidis*, while punigratane revealed ۱۳ the most substantial antimicrobial effect on Micrococcus kristinae (Nazeam et al., ١٤ 2020).

10 Giménez-Bastida et al. (2021) have compared the antibacterial activities of ١٦ different parts of pomegranate fruit. The pomegranate peel revealed strong antibacterial ۱۷ activities, compared the other parts (flower, leaf, and stem), against Salmonella ۱۸ enterica, Escherichia coli, Shigella sonnei, Enterococcus faecalis, Staphylococcus ۱۹ aureus and Bacillus subtilis. These antimicrobial activities are primarily attributed to ۲. the polyphenolic compounds, including high tannin content especially punicalagin. The ۲۱ other polyphenolic compounds identified are gallic acid, punicalagin- α , punicalagin- β , ۲۲ catechin, chlorogenic acid, epicatechin, and ellagic acid. However, it is believed that the ۲۳ antimicrobial activities not only depend on a single or an individual component but also ۲٤ due to a various metabolite.

١ The antibacterial activity of water extract of black peel pomegranate and silver ۲ nanoparticles synthesized by water extract toward strains of gram-positive and gram-٣ negative. Both extract and silver nanoparticles exhibited potent the antibacterial ٤ activities toward *Pseudomonas aeruginosa* (gram negative) and *Staphylococcus aureus* ٥ (gram-positive), although P. aeruginosa was less sensitive to both samples. The ٦ nanoparticles made from water extracts were more effective as bacteriostatic than water extracts with minimum bacteriostatic concentration of nanoparticles of 40-65 µg/mL. ۷ ٨ From this result, silver nanoparticles synthesized by water extract of black peel ٩ pomegranate can be considered as a high potential agent to combat infectious diseases ۱. due to its significant bacteriostatic activity (Khorrami et al., 2020).

11 7.2. Antioxidant activities

۱۲ Antioxidant activities of pomegranate fruits and its parts either in vitro or in vivo ۱۳ in animal models have been reported (Akuru et al., 2020). In vitro, the antioxidant ١٤ activities of pomegranate were evaluated by radical scavenging of DPPH (2,2'-10 diphenyl-1-picrylhydrazyl), ABTS (2,2'-azino-bis (3-ethylbenzothiazoline-6-sulphonic ١٦ acid), FRAP (ferric-reducing antioxidant), metal chelating activity, reducing power ۱۷ assay, β-carotene bleaching assay, ORAC (oxygen radical absorbance capacity assay, ۱۸ NBT (nitroblue tetrazolium chloride) assay, TOSC (total oxyradical scavenging ۱۹ capacity) assay, ferrous ion chelating, superoxide radical scavenging activity and lipid ۲. peroxidation inhibitory activity (Smaoui et al., 2019). Polyphenols extracted from ۲١ pomegranate peel using ultrasound-assisted extraction (UAE) revealed high antioxidant ۲۲ activities using radical scavenging activity of DPPH of 94.91%, due to high content of ۲۳ punicalagin (143.64 mg/g dry matter) as determined by HPLC analysis (Kaderides et ۲٤ 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).

٧ Some clinical studies have been conducted related to the health benefits of ٨ pomegranate juices and extracts. Giménez-Bastida et al. (2021) informed that the most ٩ promising effects in clinical studies are related to improvement of the blood pressure. In ۱. addition, the activities related to inflammation, cancer, cognitive function, physical ۱۱ activity are less evidence. The evidence on human during clinical studies remains ۱۲ inconsistent, making it difficult to support most claimed health effects. The difference ۱۳ on clinical study results might be attributable to design limitations, including ١٤ insufficient product characterization and inter individual variability which influence the 10 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

- ۲ Figure 1. Pomegranate fruit, pomegranate juice and pomegranate tree.
- ٣



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



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

Pomegranate	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 <i>fakihah</i> (fruits) means that both of them have virtues.
	Al-Tabari	The word <i>fakihah</i> (fruits) relies on the words <i>nakhl</i> (palm) and <i>rumman</i> (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

1 Table 1. The Quranic Hermeneutics of pomegranate verses

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

Anthocyanins and their derivative	Ellagitannins and derivatives of ellagic acid
• Cvanidin-3.5-caffeovl hexoside	• Brevifolin carboxylic acid
• Cvanidin-3.5-diglucoside	Casuarinin
• Cvanidin-3.5-pentoside hexoside	• Ellagic acid
 Cvanidin-3-galactoside 	• Ellagic acid (p-coumaroyl) hexoside
Cvanidin-3-glucoside	Ellagic acid derivative
 Delphinidin-3 5-pentoside hexoside 	Ellagic acid dihexoside
 Delphinidin-3-glucoside 	 Fllagic acid gallovl hexoside
 Delphinidin-caffeoyl 	 Ellagic acid bevoside
 Delphinidin-dihevoside 	 Ellagic acid nentoside 1
 Delphinidin tribayoside 	Ellagic acid pentoside 1
 Epiafzalachin evenidin dihavosida 	Ellagic acid pentoside 2
 Epiatzelechin-cyandin-dinexoside Epiafzelechin evenidin hevoside 	Ellagic acid mannoside Ellagitannin 1
 Epiatzelechin-cyanium-nexoside Epiatzelechin delphinidin hevoside 	• Ellagitannin 1
 Epiarzelectini-delphinidin-flexoside Epiarzelectini-delphinidin 2.5 dibayosida 	• Ellagitannin 10
• Epicatechin-Cyanidin-5,5-dinexoside	• Ellagitamin 11
• Epicatecnin-delphimdin-3,5-	• Ellagitannin 2
uniexoside	• Ellagitannin 3
• Epicatechin-delphindin-nexoside	• Ellagitannin 4
• Epicatechin-pelargonidin-nexoside	• Ellagitannin 5
• Epigallocatechin-cyanidin-3,5-	• Ellagitannin 6
	• Ellagitannin 7
• Epigallocatechin-cyanidin-hexoside	• Ellagitannin 8
• Epigallocatechin-delphinidin-3,5-	• Ellagitannin 9
	Granatin A
• Epigallocatechin-delphinidin-hexoside	Lagerstannin A
• Pelargonidin-3,5-diglucoside	• Lagerstannin C
• Pelargonidin-3,5-pentoside hexoside	Pedunculagin 1
	• Pedunculagin 2
	• Pedunculagin 3
	Pedunculagin 4
	Pedunculagin derivative
	• Punicalin derivative 1
	• Punicalin derivative 2
	Punigluconin 1
	Punigluconin 2
Flavonol glycosides	Flavanols
Kaempferol hexoside	Catechin
Dihydrokaempferol hexoside	Epicatechin
• Syringetin hexoside 1	Procyanidin dimer 1
• Syringetin hexoside 2	Procyanidin dimer 2
Flavones	• Procyanidin dimer 3
• Apigenin rhamnoside	Procyanidin dimer 4
	Procyanidin dimer 5
	• Procyanidin trimer 1
	• Procyanidin trimer 2
	• Procvanidin trimer 3
Hydroxybenzoic acids and their derivatives	Hydroxycinnamic acids and their
• Gallic acid	derivatives

Vanillic acid hexoside	• p-coumaric acid hexoside
Monogalloyl hexoside	• 4-p-coumaroylquinic acid
Hexahydroxydiphenic acid hexoside	Caffeic acid hexoside 1
• Digalloyl-hexoside 1	• Caffeic acid hexoside 2
• Digalloyl hexoside 2	• 3-caffeoylquinic acid
Vanillic acid dihexoside	• 5-caffeoylquinic acid 1
Gallagic acid	• 5-caffeoylquinic acid 2
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	



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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.

Chief Editor

Email: foodresearch.my@outlook.com

<img size="30004" style="max-width:100%" src="data:text/html;base64,PCFET0NUWVBFIGh0bWw+ CixodG1sIGRpcj0ibHRyIiB4bWxucz0iaHR0cDovL3d3dy53My5vcmcvMTk5 OS94aHRtbCIgdHJhbnNsYXRIPSJubyI+CiAgICA8aGVhZD4KICAgICAgICA8bW V0YSBjaGFyc2V0PSJ1dGYtOCIqLz4KICAqICAqICA8bWV0YSBodHRwLWVxdW I2PSJYLVVBLUNvbXBhdGlibGUiIGNvbnRlbnQ9IkIFPWVkZ2UiIC8+ CiAqICAqICAqPG1ldGEqaHR0cC1lcXVpdj0icHJhZ21hIiBjb250ZW50PSJu by1jYWNoZSIgLz4KICAgICAgICA8bWV0YSBuYW1lPSJ2aWV3cG9ydCIqY29u dGVudD0id2lkdGg9ZGV2aWNILXdpZHRoLCBpbml0aWFsLXNjYWxIPTEuMCwg dXNlci1zY2FsYWJsZT0wIiAvPgogICAgICAgIDxtZXRhIG5hbWU9Imdvb2ds ZSIqdmFsdWU9Im5vdHJhbnNsYXRIIiAvPqoqICAqICAqIDxtZXRhIG5hbWU9 ImZvcm1hdC1kZXRIY3Rpb24iIGNvbnRlbnQ9InRlbGVwaG9uZT1ubyIqLz4K ICAqICAqICA8bWV0YSBuYW1IPSJzY3JpcHRWZXIiIGNvbnRlbnQ9IjIwMjIw NzI5MDAyLjA5IiAvPgogICAgICAgIDxtZXRhIG5hbWU9InBoeXNpY2FsUmlu ZyIgY29udGVudD0iV1ciIC8+CiAgICAgICAgPG1ldGEgbmFtZT0iZW 52aXJvbm1lbnQiIGNvbnRlbnQ9IlByb2QiIC8+CiAgICAgICAgPG1ldGEgbmFtZT0iYm 9vdEZsaWdodHMiIGNvbnRlbnQ9InNlbmRDbGFpbXNDaGFsbGVuZ2VJblF1ZX J5LHBlcmZvcm1hbmNlRGF0YXBvaW50SGVhbHRoIiAvPgogICAgICAgIDxtZX RhIG5hbWU9ImNkblVybCIqY29udGVudD0iLy9yZXMuY2RuLm9mZmljZS5uZX QvIiAvPgogICAgICAgIDxtZXRhIG5hbWU9ImJhY2t1cENkblVybCIgY29udG VudD0iLy9yZXMtZ2VvLmNkbi5vZmZpY2UubmV0LyIqLz4KICAqICAqICA8bW V0YSBuYW1IPSJjZG5Db250YWluZXIiIGNvbnRlbnQ9Im93YW1haWwvIiAvPg ogICAgICAgIDxtZXRhIG5hbWU9ImRldkNkblVybCIgY29udGVudD0iIiAvPg ogICAgICAgIDxtZXRhIG5hbWU9ImFyaWFVcmwiIGNvbnRlbnQ9IiIgLz4KIC AqICAqICA8bWV0YSBuYW1IPSJjb21wYWN0QXJpYVVybCIqY29udGVudD0iIi AvPgogICAgICAgIDxtZXRhIG5hbWU9Indjc3NGcmFtZVVybCIgY29udGVudD 0iaHR0cHM6Ly93ZWJzaGVsbC5zdWl0ZS5vZmZpY2UuY29tIiAvPgogICAgIC AgIDxtZXRhIG5hbWU9InNjcmlwdFBhdGgiIGNvbnRlbnQ9InNjcmlwdHMvIi AvPgogICAgICAgIDxtZXRhIG5hbWU9Im93YUIzQXV0aGVudGljYXRIZCIgY2

KDI5MjM5KSxmPW4oNzI5NjYxKSxwPW4oNTA0NTcpLEM9bigyMzU2MiksQT1u KDq1MTkzMCksaD1uKDM4Mjc3OCksdj0iUGx1Z2lucyBtdXN0IHByb3ZpZGUq aW5pdGlhbGl6ZSBtZXRob2QiLEk9IINESyBpcyBzdGlsbCB1bmxvYWRpbmcu Li4iLFI9e2xvZ2dpbmdMZXZlbENvbnNvbGU6MX07ZnVuY3Rpb24qVShlLHQp e3JldHVybiBuZXcqdS5Kayh0KX1mdW5jdGlvbiBtKGUsdCl7dmFyIG49ITE7 cmV0dXJuKDAsbC50TykodCwoZnVuY3Rpb24odCl7aWYodD09PWUpcmV0dXJu IG49ITAsLTF9KSksbn12YXIqZz1mdW5jdGlvbiBlKCl7dmFyIHQsbixnLE4s Syx5LHcsYix4LE8sRSxQLGssTSxULEwsRCxCLEYsaj0wOygwLGkuWikoZSx0 aGlzLChmdW5jdGlvbihlKXtmdW5jdGlvbiBpKCl7dD0hMSxlLmNvbmZpZz0o MCxsLm1tKSqhMCx7fSxSKSxlLmxvZ2dlcj1uZXcqZC5BUShlLmNvbmZpZyks ZS5fZXh0ZW5zaW9ucz1bXSxNPW5ldyBwLlIsbj1bXSxnPW51bGwsTj1udWxs LEs9bnVsbCx5PW51bGwsdz1udWxsLHq9bnVsbCxiPVtdLE89bnVsbCxFPW51 bGwsUD1udWxsLGs9ITEsVD1udWxsLEw9KDAsQy5KKSgiQUICYXNIQ29yZSIs ITApLEQ9KDAsQS5ZKSqpLEY9bnVsbH1mdW5jdGlvbiBYKCl7cmV0dXJuKDAs YS5DRCkoVygpLGUuY29uZmlnLGUpfWZ1bmN0aW9uIFYodCxuKXt2YXIqcj1m dW5jdGlvbihlLHQsbil7dmFyIHI9W10sbz17fTtyZXR1cm4oMCxsLnRPKShu LChmdW5jdGlvbihuKXsoKDAsbC5sZSkobil8fCgwLGwubGUpKG4uaW5pdGlh bGI6ZSkpJiYoMCxsLI95KSh2KTt2YXIgaT1uLnByaW9yaXR5LGE9bi5pZGVu dGImaWVyO24mJmkmJigoMCxsLmxIKShvW2IdKT9vW2IdPWE6KDAsZC5qViko ZSwiVHdvIGV4dGVuc2lvbnMgaGF2ZSBzYW1lIHByaW9yaXR5ICMiK2krIiAt ICIrb1tpXSsiLCAiK2EpKSwoIWl8fGk8dCkmJnIucHVzaChuKX0pKSx7YWxs Om4sY29yZTpyfX0oZS5sb2dnZXIsZi5BdyxiKTt4PXIuY29yZSx3PW51bGw7 dmFyIG89ci5hbGw7aWYoUD0oMCxsLkZMKSgoMCxmLkEwKShFLG8sdCxlKSks Tyl7dmFyIGk9KDAsbC5VQSkobyxPKTstMSE9PWkmJm8uc3BsaWNIKGksMSks LTEhPT0oaT0oMCxsLlVBKSh4LE8pKSYmeC5zcGxpY2UoaSwxKSxPLl9zZXRR dWV1ZShQKX1lbHNIIE89KDAsZi5jdCkoUCxlKTtvLnB1c2goTykseC5wdXNo KE8pLGUuX2V4dGVuc2lvbnM9KDAscy5BQSkobyksTy5pbml0aWFsaXplKHQs ZSxvKSwoMCxzLmJQKShYKCksbyksZS5fZXh0ZW5zaW9ucz0oMCxsLkZMKSgo

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Ahmad Atabik <ahmad.atabik@iainkudus.ac.id> Kepada: mrmuqtada@iainkudus.ac.id

------ Forwarded message ------Dari: **Abdul rohman** <abdulkimfar@gmail.com> Date: Jum, 31 Mar 2023 04.01 Subject: Fwd: FR-2021-504 - Article Production To: <ahmad.atabik@iainkudus.ac.id>

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12 April 2023 pukul 14.49

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From: irnawati irens <irnawati.vhina@gmail.com> Sent: Saturday, 10 July, 2021 9:54 AM To: Food Research <foodresearch.my@outlook.com> Subject: Re: Submission

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: <u>awalmadewa@gmail.com</u>

3. Lily Arsanti Lestari

Department of Nutrition and Health, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, Yogyakarta, 55281, Indonesia Email: <u>lily_al@ugm.ac.id</u>

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

B	est regard nawati
0	n Thu, Jul 8, 2021 at 1:36 AM Food Research <foodresearch.my@outlook.com> wrote: Dear Inarwati,</foodresearch.my@outlook.com>
	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></foodresearch.my@outlook.com></irnawati.vhina@gmail.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

Abdul Rohman, Ph.D Professor in Department of Pharmaceutical Chemistry Faculty of Pharmacy, Gadjah Mada University Yogyakarta, Indonesia Phone: +6287838445216

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١	Pomegranate (Punica granatum L.) fruits in the Quranic Hermeneutics and
۲	scientific perspectives
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۲۱	
22	Abstract
۲۳	Pomegranate is popular fruits consumed because of their pleasant taste and high
۲ ٤	nutritional value having some health benefits to human health. In addition,
40	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 ۲٦

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.

۱.

1. Introduction

۲ Pomegranate fruits with scientific name of Punica granatum L. (belong to ٣ family of Punicaceae) are excellent sources of bioactive compounds mainly ٤ 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 ٥ ٦ geographical regions including the Mediterranean basin, Asia, and California in the ۷ USA. Pomegranate fruit has been used extensively in the folk medicines of many ٨ cultures since ancient times including Greek, Ayurvedic, Unani and Egyptian (Reddy, ٩ 2018). This fruit is regarded as a 'super fruit', which is rich in antioxidant ۱. phytochemicals and is recognized for a myriad of health benefits. Pomegranate fruit is ۱۱ gaining popularity worldwide for its uniqueness, exclusive colour and taste, and ۱۲ associated health benefits (Hegazi et al., 2021).

۱۳ Pomegranate is a type of tree from the family of Myrtaceae. Pomegranate ١٤ (rumman) in a scientific term is called Punica granatum (Talbah, 2011). Since 10 thousands of years ago, human beings have enjoyed it both as food and medicine. The ١٦ fruit is estimated to originate from West Asia and spread to the surrounding areas. ۱۷ Hebron, which is now a part of Israel territories, is well-known for pomegranate which ۱۸ has been planted since the time of the Prophet Moses. Egypt, Ancient Greece, and ۱۹ Rome are the civilizations known for harvesting this fruit. Several archaeological ۲. findings found the residues of pomegranate plants, such as its seeds and barks around ۲۱ Cyprus, Israel, Iraq, Jordan, Lebanon, Palestine, Syria, and Turkey. It is estimated to ۲۲ 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).

0 Pomegranates are becoming more popular with consumers because of their ٦ pleasant taste and high nutritional value. Pomegranate fruit is constituted by peel, arils, ۷ and seeds in an approximate 50:40:10 ratio, respectively. As in the majority of fruits, ٨ the chemical composition of the pomegranate differs according to the climatic ٩ conditions, ripening degree of the fruit at the time of harvest (Guo et al., 2021). The ۱. edible part of pomegranate is about 57%-85% of the whole fruit, among which fruit ۱۱ juice accounts for 36%–63%. The taste of pomegranate is moderately sour and sweet ۱۲ throughout the flavouring improvement by modern cultivation technology. Pomegranate ۱۳ juice is considered as functional food due to some bioactive contents which are ١٤ beneficial to human health. Pomegranate fruit contain 17 kinds of amino acids and 10 minerals, vitamin C, calcium, iron, phosphorus, retinol, riboflavin, ferulic acid, and ١٦ other phenolic compounds. Pomegranate seed oil is also valuable source of bioactive ١٧ compounds with health-beneficial effects, but it is sensitive to oxidation due to high ۱۸ content of PUFA. Therefore, the oil was added with pomegranate peel extract or ۱۹ synthetic antioxidants to improve its stability toward oxidation (Drinić et al., 2020). ۲. This fruit is suitable for both young and old consumers; for example, pomegranate juice ۲۱ drinks are popular in daily life, and pomegranate extracts also serve as food additives, ۲۲ supplements, and for taste correction (Ge et al., 2021). Pomegranate extract and its ۲۳ polyphenols can be considered as cosmeceuticals because both revealed skin protective ۲٤ effects by ameliorating methylglyoxal (MGO)-induced DNA damage through restoring ۲0 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.

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2. Methods

٨ This descriptive-analytical paper used a thematic method based on literature ٩ review, referring to scientific articles from *Tafseer* books, reputed journals, book ۱. literature, and conference papers. During this study, some databases of Scopus, ۱۱ American Chemical Society, Science Direct, Springer, and Google Scholar covering ۱۲ abstract and full texts are downloaded and evaluated to be used as references during this ۱۳ review. Scientific studies on Pomegranate published in journals were also used as main ١٤ references. In addition, other sources came from books related to scientific miracles of 10 the Quran compiled by experts in their fields.

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3. Pomegranate fruit

١٧ Pomegranate (Punica granatum L.), Figure 1, is a fruit plant that can grow up to ۱۸ 5-8 meters in sub-tropical areas to tropical ones, from lowland to below 1000 meters ۱۹ above sea level. It is a shrub or a small tree with 2-5 meters in height (Lansky and ۲. Newman, 2007). Its stem is woody with square twigs, a lot of branches, spikes on its ۲۱ axilla, weak in nature, brown-coloured when unripe, and turns into dirty green post ripe. ۲۲ The pomegranate tree has a single leaf with short stems, located in groups. The leaf ۲۳ sheet takes oval to lancet in shape, taper base, blunt tip, pinnate bones, shiny surface, 1-۲٤ 9 cm in length, 0.5-2.5 cm in width, and green-coloured (Ahmad, 2003).

١ Pomegranate is a berry fruit with a rounded shape and 5-12 cm in diameter, with ۲ various bark colours, such as purplish-green, white, reddish-brown, or blackish purple. ٣ The fruit is unique with its red-glazing seeds like crystals. The flower is called Jullanar. ٤ It is an antique fruit that has been known since ancient times. Many people gain some ٥ virtues and benefits found in it (Tayyāra, 2009). The pomegranate tree is a small posture ٦ with thin foliage and flatly shaped, having large and beautiful flowers, with a reddish ۷ colour, a fleshy shell of which contents are red-coloured cobs. The white flowers which ٨ lie in several separate places, one by one serve as a transparent lid. The Persians named ٩ this pomegranate Jalnaz, meaning the red fruit with seeds on it (Olivia, 2015).

۱. In Indonesia, pomegranate is well-known by several names, depending on the ۱۱ regions it grows, such as delima (Malay), glima (Acehnese), Glineu Mekah (Gayonese), ۱۲ (Maduranese), gangsalan (Javanese), dalima (Sundanese), dhalima teliman ۱۳ (Sasaknese), lele kase and rumu (Timor). There are three types of pomegranate ١٤ scattered over Indonesia, classified by its colours; they are white pomegranate, red 10 pomegranate, and black pomegranate. Of these three types, the most famous is the red ١٦ one. Pomegranate fruit is a symbol of prosperity and fertility, which is held in the form ۱۷ of a ceremony of seven months of a pregnancy ritual, conducted by Javanese people and ۱۸ other tribes in Indonesia (Olivia, 2015). Meanwhile, for Chinese people, it is one of the ۱۹ compulsory fruits in welcoming the Lunar New Year. They believe that many of the ۲. 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 (Talbah, 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

١ 0.3% of fat. Moreover, sweet pomegranate also contains fiber as much as 2% as well as ۲ some tannin, inulin, and citric acid as much as 1%. It also contains minerals, mainly ٣ iron, phosphorus, sulfur, potassium, lime, manganese, and vitamin C (Lansky and ٤ 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 ٥ ٦ 9% of proteins and fat as much as 7%. Its outer bark contains tannic acids; the material ۷ that can restrain bleeding. Therefore, its outer bark powder which has been dried can be ٨ used as a remedy to ward off diarrhea and dysentery. It can also be used to restrain ٩ blood discharge in the digestive tract (Al-Qabbani, 2009).

۱. Today, Quran has not only become the main focus of merely studying objects ۱۱ and classical interpretations, but also the attention of various scientific studies, ۱۲ including scientific and medical fields. An effort to comprehend the Quran with a ۱۳ scientific and medical approach by experts is called scientific hermeneutic. This style of ١٤ hermeneutic is an attempt to understand the verses of the Quran containing scientific 10 cues from the perspectives of modern science. Scientific hermeneutic is also an ١٦ interpreter's striving effort to uncover the relationship between the verses of kauniyah ۱۷ in the Quran and scientific discoveries aimed at revealing its scientific miracles ۱۸ (Rahman, 1986).

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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

١ correlating them with treatments and medicines. Scientists have tried to combine the ۲ studies of plants mentioned in the Quran with medicines. The Quran does not mention ٣ all types of plants in general, just like modern botanical science does, but all types of ٤ plants mentioned by the Quran are certainly the top organisms of their respective ٥ 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 ٦ ۷ scattered around the world. Likewise, pomegranate, herbs of 1001 benefits, cure various ٨ diseases, internal and external ones (Ahmad, 2003).

٩ Nowadays, there have been families who have started the 'no vegetables and ۱. fruits' campaign in their family menu. Fruits constitute a major part of the nutrients ۱١ needed by a human. Besides being consumed as nutrients and vitamins, certain fruits ۱۲ have medicinal properties for certain diseases. This is based on knowledge in religious ۱۳ teachings. This fruit is pomegranate which is also mentioned several times in the Qur'an ١٤ and contains many health benefits. Almost all parts of pomegranate plants are useful for 10 medical treatments, starting from the pulp, seeds, flowers, leaves, fruit skins, bark, to ١٦ 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).

٦ The Qur'an as the greatest miracle for Muslims comprises verses showing ۷ various scientific signs from modern science perspectives. The hermeneutic of verses ٨ that talk about science is known as Tafsir Ilmi (Scientific Interpretation) (Al-Qaradawi, ٩ 1999). According to Husain al-Zahabi, scientific hermeneutic discusses scientific terms ۱. in narrating verses of the Qur'an, seeks to explore its scientific dimensions, and ۱۱ uncovers the secrets of miracles related to scientific information that may not have been ۱۲ known to humans at the time the Qur'an was revealed (Al-Żahabī, 1995). Hence, in ۱۳ modern times, this becomes another evidence that the Qur'an is not a human creation, ١٤ rather a revelation of God, The Creator.

10 Muslim scientists have tried to uncover the contents of the Qur'an which leads to ١٦ scientific discoveries or to keep some of the natural sciences which are not widely ۱۷ known by humans. They scientifically describe those contents in depth. Despite the ۱۸ Qur'an's zahir (visible) characteristics, of which texts briefly talk about this issue, the ۱۹ scientists' commentary can almost be proven by modern sciences (Al-Shirbasī, 1962). ۲. This argument is based on the fact that all sciences obtained from the Qur'an, after being ۲۱ analyzed accurately, will lead people to think at a certain point that everything said in ۲۲ the Our'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 Qaradāwī, 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).

٦ Scientific hermeneutic has existed since the Abbasid dynasty. At that time, there ۷ were attempts made by some scholars to compromise Islamic teachings with translated ٨ foreign cultures, as well as pure sciences found among the Muslims (Abderrahman, ٩ 1986). Al-Ghazali was one of the figures who was persistent in supporting these ۱. interpretive ideas. In his monumental masterpiece, *Ihya 'Ulumiddin*, he put forward his ۱١ argumentations to prove his stance (Al-Ghazālī, 2000). He said that all kinds of ۱۲ sciences, both preceding and subsequent ones, whether known or not, come from the ۱۳ Qur'an (Musbikin, 2014).

١٤ In another work, Jawahir al-Qur'an, Al-Ghazali also discussed his support for ١٥ scientific hermeneutic. He stated that all sciences are gathered in one among several ١٦ oceans of Allah's knowledge which has no end. Furthermore, he strengthened his ۱۷ 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-۱۸ ۱٩ Shu'ara: 80). Al-Gazali explained that medicine and diseases cannot be discovered ۲. except by those who are involved in the medical field (Al-Ghazālī, 2003). Thus, the ۲١ 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).

٥ In this modern era, scientific hermeneutic is increasingly popular and used as a ٦ reference to study the sciences presented in the Quran. The development of scientific ۷ interpretation in the modern era was at least due to the influence of western technology ٨ 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 ٩ ۱. under the control of European countries (Jansen, 1980). This western hegemony has ۱۱ gradually led to resistance on one hand and on the other hand, advances in modern Arab ۱۲ scholars' thoughts in terms of religious and social sciences.

۱۳ The development of scientific hermeneutic is also an implication of the change ١٤ 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 10 ١٦ 'lamusi'un', in the QC al-Zariyat: 47, "We built the universe with 'great' might, and We ۱۷ are certainly expanding *it*". Along with new scientific discoveries, astronomers ۱۸ concluded a scientific theory, stating that nebulae which lie outside the galaxy we live ۱۹ in continues to move away at different speeds, even celestial bodies in one galaxy are ۲. moving away from one another (Hanafi, 2015). This shows that the discoveries of ۲۱ 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

١ diseases and immune disorders that can be cured by these fruits (Tayyāra, 2009). This ۲ statement was strengthened by Ibn Qayyim al-Jauziyah, claiming that the fruits ٣ mentioned in the Qur'an have efficacies that other fruits don't. All of these fruits can be ٤ 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 ٥ ٦ Koran. The disclosure of scientific facts means that the guranic hermeneutic is open to ۷ modern science. In interpreting the pomegranate verses must be based on botanical ٨ science data.

٩

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-Shāfi'ī, 2000). Hermeneutical interpretations of these verses were compiled in Table 1.

١٤ 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 10 ١٦ speaks of the signs of His power for the believers. Among of which on earth is that He ۱۷ created a variety of trees, such as palm trees, olive trees, and pomegranate trees which ۱۸ take similar shapes and colours, despite the difference in taste (Al-Alusi, 1997). ۱۹ Commenting on those verses above, Qatadah stated that the creation of this ۲. pomegranate fruit is similar in its shape, partly to some of the others, but different in the ۲۱ fruit it produces, either in terms of its colour, taste, or content. The power of God's ۲۲ creation on the pomegranate can be seen from the origin of its creation. At the initial ۲۳ phase, it is grain, then grows into a tree, and produces the same fruit colour but different ۲٤ taste and smell (Kathīr, 2000).

١ 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 ۲ ٣ Lord's favors will you both deny?". In this verse, God particularly mentions that there ٤ 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 ٥ ٦ both are classified as fruits. This is to explain the virtue of both fruits (Al-Jauzi, 2002). ۷ Al-Tabari also stated that in the verse, there is a conjunction indicating a particular thing ٨ to the general one, mentioning the word 'fruits' followed by the word 'dates' (nakhl) and ٩ pomegranates (rumman) (Al-Tabari, 1998). However, the mention of the two words ۱. specifically shows the virtue of the two fruits over the others.

۱۱ Al-Maragi stated that the series in Al-Rahman verses 62 to 77 describe that there ۱۲ is a tree of fruit grown with leafy green in heaven. Inside of it, there is a clear water ۱۳ spring that sparkles. Meanwhile, the dwellers and angels are leaning back on green ١٤ pillows and beautiful carpets. The angels who happen to be the dwellers' servants have 10 never been touched by any human beings nor genies. They can easily pick the fruit up ١٦ close as the trees are short. Among the various fruits, the only special ones are dates and ۱۷ pomegranates which have been mentioned (Al-Maragi, 1996). Then which of your ۱۸ 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-Qurtubī, 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

١ not; one grows in hot land and the other is in cold land; one with high trunk and the ۲ other with opposite trunk (Al-Rāzī, 2012). Whereas, a medieval commentator, ٣ Muhammad al-Shawkani, presented several opinions from the interpretation of surah al-٤ 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 ٥ ٦ classified into fruits, but particularly mentioned because of their abundant benefits ۷ compared to other fruits. Both are also plants existing on the land of Arabs. Another ٨ opinion stated that pomegranate is a type of fruit that can be used for medication with ٩ extraordinary efficacies (Al-Shawkānī, 2014).

۱. A modern Indonesian commentator, M. Quraish Shibab, tends to interpret the ۱۱ verses about pomegranate based on its efficacies which have empirically been ۱۲ examined. In his commentary book, *al-Misbah*, he explained that its juice contains very ۱۳ high levels of citric acid compared to other types of fruits, and when roasted, it is very ١٤ helpful in reducing the acidity of urine and blood which in turn can prevent gout on the 10 body. The citric acid contained in pomegranate can also help form some kidney stones. ١٦ This juice also contains sufficient sugar levels, around 11%, to ease the roasting and ۱۷ produce energy (Shihab, 2002).

۱۸

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.

٥ With the advance of experimental design applied in extraction of ٦ phytochemicals, response surface methodology (RSM) was used to evaluate the effect ۷ of three factors namely (1) condition liquid/solid ratio, (2) extraction time and (3) ٨ ethanol percentage on ultrasonic assisted extraction (UAE) in obtaining the maximum ٩ of total polyphenols (TP), total flavonoids (TF) and condensed tannins (CD) from ۱. pomegranate peels. The optimum condition was obtained using liquid/solid ratio of 20, ۱۱ extraction time of 30.94 min and 59.26% of ethanol offered the highest contents of TP, ۱۲ TF and CT simultaneously. The results obtained during experimental design were in ۱۳ agreement in those with the predicted values (Hayder et al., 2021).

١٤ Pomegranate fruit is rich in polyphenol compounds that may potentially 10 revealed some biological activities such as antioxidant, antibacterial and antifungal ١٦ activities. The main phenolic compounds in pomegranate peel were anthocyanins, ۱۷ phenolic acids, and flavonoids. During storage, some changes in polyphenolic contents ۱۸ may occur. The study on the content changes of polyphenolic compounds of ۱۹ pomegranate peel and arils during storage for 50 days at temperature of 5°C was ۲. undertaken. The change patterns of pomegranate peel and aril were different among ۲۱ different phenolic compounds. The concentrations of the major phenolic compounds ۲۲ detected in arils and peels decreased during storage, except for syringic acid, catechin ۲۳ acid, p-coumaric acid, chlorogenic acid, caffeic acid, epicatechin, and dihydroquercetin ۲٤ (in arils). In addition, some phenolics compounds were decreased in pomegranate peel ۲0 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).

٤ Polyphenolics can be divided into two types: extractable (soluble in aqueous-organic solvents) and non-extractable polyphenols (NEPPs, which are not ٥ ٦ soluble in aqueous–organic solvents (Pérez-Ramírez et al., 2018). The main extractable ۷ phenolic compounds were anthocyanins, gallotannins and gallagyl derivatives, while the ٨ main non-extractable phenolic compounds include vanillic acid and dihydroxybenzoic ٩ acid. Six compounds were then isolated from the EtOAc extracts whose structures were ۱. identified as β -sitosterol-3-O-glycoside (1), β -sitosterol (2), ursolic acid (3), corosolic ۱۱ acid (4), asiatic acid (5) and arjunolic acid (6). Using supercritical extraction CO_2 : ۱۲ EtOH, punicalagin α -anomer, punicalagin β -anome and ellagic acid were isolated ۱۳ (Harscoat-Schiavo et al., 2021).

١٤ The identified polyphenolic compounds in pomegranate fruit are grouped into 10 (1) ellagitannins (hydrolyzable tannins) such as corilagin, granatin A and B, ١٦ tellimagrandin, pedunculagin, punicalagin (an unique compound to pomegranate which ۱۷ is found in the seeds, peel, leaves and juice) with the chemical structure in Figure 2; (2) ۱۸ anthocyanins and their derivatives (sugar derivatives of delphinidin, cyanidin and ۱۹ pelargonidin such as delphinidin-3-glucoside, delphinidin-3,5-diglucoside, cyanidin-3-۲. gluco side, cyanidin-3,5-diglucoside, pelargonidin-3-glucoside and pelargonidin -3,5-۲۱ diglucoside, and punicalin with chemical structures in Figure 3; (3) derivatives of ۲۲ ellagic acid; (4) flavanols such as kaempferol, quercetin and myricetin, flavones; (4) ۲۳ flavan-3-ols such as catechin, epicatechin and epigallactocatechin 3-gallate; (5) ۲٤ hydroxybenzoic acids and their derivatives; (6) hydroxycinnamic acids and their ۲0 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).

٩ Pomegranate is a very special fruit with a lot of efficacies and benefits. It is ۱. closely related to the fact that the Quran particularly mentions pomegranate in the QC. ۱۱ Al-Rahman verses 68-69, "In both of them will be [all kinds of] fruit, and date-palms ۱۲ and pomegranates. Then which of your Lord's favors will you both deny?". The Quran ۱۳ does not mention a type of vegetation unless it is the top organism of its species. ١٤ Therefore, modern scientific commentators of the Quran state that pomegranate 10 conceives scientific miracles, which is very beneficial for human life. These benefits did ١٦ not only appear in the days when this verse was revealed but also had existed in ancient ۱۷ times. Pomegranate has been utilized for treatment in the times of the Pharaoh Kings to ۱۸ 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).

١ In modern alternative medical treatment, all elements of the pomegranate fruit ۲ tree are efficacious for treatment, starting from its flesh of fruit, seeds, flowers, leaves, ٣ rinds, barks, to its root, which can serve as medicine. Pomegranate fruit produces ٤ anthocyanin, sugar, ascorbic acid, ellagic acid, gallic acid, caffeic acid; catechin, ٥ epigallocatechin gallate, and many minerals, especially iron, and amino acid (Jurenka, ٦ 2008). Fakhruddin al-Razi in his exegesis stated that sweet pomegranate serves to strain ۷ the shaft of male genitals; meanwhile, the sour one can eliminate sexual stimulus. The ٨ sweet pomegranate causes thirst, while the sour one relieves jaundice and discontinues ٩ vomiting (Al-Rāzī, 2012).

۱. Besides, pomegranate can also cleanse and open the respiratory tract for people ۱۱ suffering from flu. Its juice may also serve as sweet thick syrup which is the most well-۱۲ preserved acidity. This syrup can be added to any food and medically used to treat ۱۳ various diseases on the mouth and gums (Al-Najjar, 2006). Its antioxidant content is ١٤ also higher than that in green tea, cranberry juice, and orange juice. The benefits of the 10 fruit which grows a lot in Iran, northern India, and Southeast Asia-including Indonesia-١٦ are no longer just a myth nor advertising campaign. Even more, both red and white ۱۷ pomegranates are equally efficacious. They can serve as herbs to prevent cancer, ۱۸ antidiarrhea, increase or decrease weight, delay skin-aging, protect the heart and ۱۹ 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).

٥ Meanwhile, pomegranate bark contains phenolic punicalagin, gallic acid, fatty ٦ acid; catechin, epigallocatechin gallate (EGCG), quercetin, rutin, flavonol, flavone, ۷ flavanone, anthocyanidin. Besides, its outer bark contains tannic acid, the materials ٨ which can restrain bleeding. Therefore, the dried pomegranate bark powder can serve as ٩ a remedy to ward off diarrhea and dysentery (Al-Futuh, 2006). It can also be used to ۱. withstand blood discharge in the digestive tract. Meanwhile, the boiled one also ۱۱ provides the same benefits and can be used to ward off caterpillars or worms, ۱۲ particularly tapeworms. This is because, on its bark, there are pelletierene alkaloid ۱۳ materials. The bark can also benefit people as anti-aging materials, so they make use of ١٤ it to colour their skins along with the tree (Tayyāra, 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,

١ 1994). The juice is a potion that is nutritious and refreshing, because it contains high ۲ enough carbohydrates, salt, and rich in vitamins, especially vitamin C. The juice can ٣ also exterminate germs with a comparison of 1:60 bacteria (Al-Audat, 1994). The bark, ٤ 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. ٥ ٦ Punicalagin is an ellagitannin found only in pomegranate fruit. Punicalagin has isomer ۷ structures, that is, 2.3-(S)-Hexahydroxydiphenoyl-4.6-(S, S)-galagil-D-glucose (Kumari ٨ and Khatkar, 2016). Its bark, stem, and root contain no less than 20% of tannins. Of the ٩ existing tannins are four separate alkaloids; first, pelletierine alkaloid called also ۱. punicine; second, isopelletierine alkaloid; third, ethyl pelletierine alkaloid; and fourth, ۱۱ the pseudo-pelletierine alkaloid also called Methylgrantanine (Talbah, 2011). ۱۲ Pomegranate also contains other polyphenol compounds, that is, catechin, and ۱۳ gallocatechin, as well as anthocyanin compounds such as prodelphinidin, delphinidin, ١٤ cyanidin, and pelargonidin (Mertens-Talcott et al., 2006).

10 In Western countries, pomegranate usually appears in the fall. Now, food ١٦ manufacturers add this fruit to chocolate, chewing gum, or made into juice. In 2005, ۱۷ 215 new foods and beverages were recorded containing pomegranate in the United ۱۸ States. Pomegranate is a versatile plant. Besides consumption, it is also made as juice ۱۹ for medication. This fruit contains many benefits. in addition to a great number of ۲. antioxidants, it helps prevent heart disease and stroke, and the seeds in each ۲۱ pomegranate grain contain fiber which is very beneficial for the body's immunity ۲۲ (Olivia, 2015).

۲۳ 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

١ (MIC). Some extracts of Pomegranate peels extracted by conventional extraction (CE) ۲ based on liquid-solid extraction using water bath, extraction assisted by infrared ٣ irradiation (IR), ultrasound- assisted extraction (UAE), extraction using pulsed electric ٤ fields (PEF), and extraction using high-voltage electrical discharges (HVED) are evaluated for antibacterial activities using gram negative bacteria of Escherichia coli ٥ ٦ and gram positive bacteria of *Staphylococcus aureus*. The inhibition of polyphenol rich ۷ extracts are assessed using ELISA technique. Based on HPLC studies, all extract ٨ contains high levels of ellagic and gallic acids (polyphenols). All extracts exhibited ٩ antibacterial activities with the inhibition efficiency toward S. aureus up to ۱. approximately of 80% as compared to E. coli (up to approximately 33%) (Rajha et al., ۱۱ 2019). Phloretin and coumaric acid present in pomegranate fruit exhibited potent ۱۲ antimicrobial activity against *Staphylococcus epidermidis*, while punigratane revealed ۱۳ the most substantial antimicrobial effect on Micrococcus kristinae (Nazeam et al., ١٤ 2020).

10 Giménez-Bastida et al. (2021) have compared the antibacterial activities of ١٦ different parts of pomegranate fruit. The pomegranate peel revealed strong antibacterial ۱۷ activities, compared the other parts (flower, leaf, and stem), against Salmonella ۱۸ enterica, Escherichia coli, Shigella sonnei, Enterococcus faecalis, Staphylococcus ۱۹ aureus and Bacillus subtilis. These antimicrobial activities are primarily attributed to ۲. the polyphenolic compounds, including high tannin content especially punicalagin. The ۲۱ other polyphenolic compounds identified are gallic acid, punicalagin- α , punicalagin- β , ۲۲ catechin, chlorogenic acid, epicatechin, and ellagic acid. However, it is believed that the ۲۳ antimicrobial activities not only depend on a single or an individual component but also ۲٤ due to a various metabolite.

١ The antibacterial activity of water extract of black peel pomegranate and silver ۲ nanoparticles synthesized by water extract toward strains of gram-positive and gram-٣ negative. Both extract and silver nanoparticles exhibited potent the antibacterial ٤ activities toward *Pseudomonas aeruginosa* (gram negative) and *Staphylococcus aureus* ٥ (gram-positive), although P. aeruginosa was less sensitive to both samples. The ٦ nanoparticles made from water extracts were more effective as bacteriostatic than water extracts with minimum bacteriostatic concentration of nanoparticles of 40-65 µg/mL. ۷ ٨ From this result, silver nanoparticles synthesized by water extract of black peel ٩ pomegranate can be considered as a high potential agent to combat infectious diseases ۱. due to its significant bacteriostatic activity (Khorrami et al., 2020).

11 7.2. Antioxidant activities

۱۲ Antioxidant activities of pomegranate fruits and its parts either in vitro or in vivo ۱۳ in animal models have been reported (Akuru et al., 2020). In vitro, the antioxidant ١٤ activities of pomegranate were evaluated by radical scavenging of DPPH (2,2'-10 diphenyl-1-picrylhydrazyl), ABTS (2,2'-azino-bis (3-ethylbenzothiazoline-6-sulphonic ١٦ acid), FRAP (ferric-reducing antioxidant), metal chelating activity, reducing power ۱۷ assay, β-carotene bleaching assay, ORAC (oxygen radical absorbance capacity assay, ۱۸ NBT (nitroblue tetrazolium chloride) assay, TOSC (total oxyradical scavenging ۱۹ capacity) assay, ferrous ion chelating, superoxide radical scavenging activity and lipid ۲. peroxidation inhibitory activity (Smaoui et al., 2019). Polyphenols extracted from ۲١ pomegranate peel using ultrasound-assisted extraction (UAE) revealed high antioxidant ۲۲ activities using radical scavenging activity of DPPH of 94.91%, due to high content of ۲۳ punicalagin (143.64 mg/g dry matter) as determined by HPLC analysis (Kaderides et ۲٤ 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).

٧ Some clinical studies have been conducted related to the health benefits of ٨ pomegranate juices and extracts. Giménez-Bastida et al. (2021) informed that the most ٩ promising effects in clinical studies are related to improvement of the blood pressure. In ۱. addition, the activities related to inflammation, cancer, cognitive function, physical ۱۱ activity are less evidence. The evidence on human during clinical studies remains ۱۲ inconsistent, making it difficult to support most claimed health effects. The difference ۱۳ on clinical study results might be attributable to design limitations, including ١٤ insufficient product characterization and inter individual variability which influence the 10 efficiency of pomegranate polyphenols.

8. Conclusion

۱۷ Pomegranate is mentioned three times in the Qur'an. Classic commentators have ۱۸ different ways of interpreting it from modern ones who relate it to scientific ۱۹ hermeneutics. The former generally interpreted the verses on pomegranate as a special ۲. fruit which is mentioned by the Qur'an besides dates. Meanwhile, the latter stated that ۲١ pomegranate contains scientific miracles, which are very beneficial for humans' life ۲۲ since its tree components have medical efficacies, starting from its pulp, seeds, flowers, ۲۳ leaves, rind, bark, to roots which can be formulated into cosmetic and herbal ۲٤ medication. From scientific perspective, pomegranate fruit and its part contained

- bioactive compounds, especially polyphenols, having some biological activities which
- ⁷ are beneficial to human health.

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Pomegranate Juice and Fruit

Pomegranate Tree

- ۲ Figure 1. Pomegranate fruit, pomegranate juice and pomegranate tree.
- ٣



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



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

Pomegranate	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.
Shuraal-Rahmanverses68-69	Ibn al-Jauzi	palms and pomegranates are called after the word of <i>fakihah</i> (fruits) means that both of them have virtues.
	Al-Tabari	The word <i>fakihah</i> (fruits) relies on the words <i>nakhl</i> (palm) and <i>rumman</i> (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

1 Table 1. The Quranic Hermeneutics of pomegranate verses

١ Table 2. Some phenolics compounds identified in pomegranate fruits (Topalović et al.,

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Casuarinin

Ellagic acid

Ellagic acid derivative

Ellagic acid dihexoside

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

Lagerstannin A

Lagerstannin C

Granatin A

Ellagic acid galloyl hexoside

- ۲ 2021).
- ٣

Anthoo	cyanins 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-3,5dihexoside
- 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 •

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- Pelargonidin-3,5-pentoside hexoside
 - Pedunculagin 1 •
 - Pedunculagin 2 •
 - Pedunculagin 3 •
 - Pedunculagin 4 •
 - Pedunculagin derivative • Punicalin derivative 1 •

Ellagitannins and derivatives of ellagic acid Brevifolin carboxylic acid

Ellagic acid (p-coumaroyl) hexoside

- Punicalin derivative 2
- Punigluconin 1 •
- Punigluconin 2 Flavonol glycosides Flavanols Kaempferol hexoside Catechin • • Dihydrokaempferol hexoside • Epicatechin Syringetin hexoside 1 Procyanidin dimer 1 • Syringetin hexoside 2 Procyanidin dimer 2 • Procyanidin dimer 3 Flavones • Procyanidin dimer 4 Apigenin rhamnoside • Procyanidin dimer 5 • Procyanidin trimer 1 • • Procyanidin trimer 2 Procyanidin trimer 3 • Hydroxybenzoic acids and their derivatives Hydroxycinnamic acids and their derivatives Gallic acid

• Vanillic acid hexoside	• p-coumaric acid hexoside				
Monogalloyl hexoside	• 4-p-coumaroylquinic acid				
Hexahydroxydiphenic acid hexoside	Caffeic acid hexoside 1				
• Digalloyl-hexoside 1	Caffeic acid hexoside 2				
• Digalloyl hexoside 2	• 3-caffeoylquinic acid				
Vanillic acid dihexoside	• 5-caffeoylquinic acid 1				
Gallagic acid	• 5-caffeoylquinic acid 2				
• 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					

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

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Abstract

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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 regions including geographical 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* (Talbah, 2011). Since thousands

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

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

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

land (Mubashir and Mahran, 2010).

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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 healthbeneficial 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).



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 (Tayyāra, 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 (Talbah, 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-Qaradāwī, 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-Shirbaşī, 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 (Tayyāra, 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

Table 1. The Quranic Hermeneutics of pomegranate verses

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*

	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 <i>fakihah</i> (fruits) means that both of them have virtues.
		Al-Tabari	The word <i>fakihah</i> (fruits) relies on the words <i>nakhl</i> (palm) and <i>rumman</i> (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-Qurtubī, 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 OC. 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 ultrasonicassisted 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°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, pcoumaric acid, chlorogenic acid, caffeic acid, epicatechin, and dihydroquercetin (in arils). In addition, compounds some phenolic were decreased in pomegranate peel except syringic acid, catechin acid, pcoumaric 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 CO₂: 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-3,5cyanidin-3-glucoside, cyanidin-3,5diglucoside, 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).



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

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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).





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

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Table	e 2. Some	phenolic	compounds	identified in	pomegranate	fruits (Topa	alović <i>et al., 1</i>	2021).

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

• Tri-hexahydroxydiphenic acid hexoside 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 (Tayyāra, 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 (Talbah, 2011). Pomegranate also contains other polyphenol compounds, that catechin, is, 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

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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 antimicrobial activity exhibited potent 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, punicalagin. The other especially polyphenolic compounds identified are gallic acid, punicalagin-a, punicalagin-β, catechin, chlorogenic acid, epicatechin, and ellagic acid. However, it is believed that antimicrobial activities not only depend on a single or an component but also individual 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 gramnegative. 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 μ g/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-1picrylhydrazyl), ABTS (2,2'-azino-bis (3 ethylbenzothiazoline-6-sulphonic acid), FRAP (ferricreducing 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 Our'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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