

Pomegranate –Fruit in Holy Quran Full Of Medicinal and Antibacterial Properties A Review Article

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ABSTRACT: Fruits are one of the oldest forms of food known to man. There are many references to fruits in ancient literature. Moreover, fresh and dry fruits are thus not only a good food but also a good medicine. Holy Quran is one of the reference books describing the importance of plants used for different ailments in various verses. There are several verses in Quran talking about the fruits in Paradise, Pomegranate is one of them. What has been mentioned in the Quran is what scientists have achieved over the time, since the Quran is governed by logic. Although we do not know the reasons for many things in the Quran, we consider it as the foundation.

KEYWORDS: Pomegranate, plant, Medicine, Ailments, Quran.

I.INTRODUCTION

POMEGRANATE

Pomegranate (*Punica granatum* L.) fruits are widely consumed, fresh and in commercial products, such as juices, jams, and wines. Most pomegranate fruit parts are known to possess substantial antioxidant activity¹. The flower¹, seed oil², seed extract, and peel extract³ of pomegranate also have a potent antioxidant activity. Furthermore, the water-methanol extract of pomegranate peel possesses antimicrobial activity against eleven microorganisms, such as *Bacillus subtilis*, *Staphylococcus aureus*, *Yersinia enterocolitica*, *Listeria monocytogenes*, *Candida utilis*, *Saccharomyces cerevisiae*, and *Aspergillus niger* ⁴. Bragaet al⁵ reported that the methanol extracts of *P. granatum* whole fruits were able to inhibit not only the growth of *S. aureus* FRI 722 but also the production of enterotoxins. However, rare studies have reported antibacterial activity of pomegranate arils. In this study, we examined the antibacterial activity of hotwater extract, ethanol extract, and acetone extract of pomegranate fruit peels and arils (with seeds) by agar-well diffusion and broth-dilution method against four food-related bacteria—two Gram-positive bacteria (*B. subtilis* and *S. aureus*) and two Gram-negative bacteria (*E. coli* and *S. typhimurium*).

Pomegranates, contain a plentiful supply of potassium as well as such minerals as phosphorus, calcium, iron, and sodium, and vitamins A, B1, B2, B3, and C. Acting together with sodium, potassium regulates the body's water equilibrium and ensures that the heart beats normally. By maintaining the body's potassium-sodium balance, it also helps the nervous and muscular senses to function regularly, prevents edema, and decreases the amount of sugar circulating in the blood. Pomegranates revive tired muscles and enable them to move easily, and also strengthen the heart. Nutritious Value. The uses of the pomegranate, as was seen with the two other plants of the Quran, dates and olives, are numerous. The fruit is nutritious and has a calorific value of 65. Its protein and fat contents are insignificant, while it is "a rich source of sodium and also contains a good amount of riboflavin, thiamine, niacin, vitamin C, calcium and phosphorous" (Farooqi, 1997). It is delicious when served slightly chilled. The juice of the pomegranate is a favorite in many Middle Eastern countries and can be bought from vendors selling the cool, tasty red juice. The juice is also used to make jellies, sauces, flavorants and syrups. Pomegranate juice is a powerful anti-oxidant. Anti-oxidants guard the body against free radicals, harmful molecules that are believed to contribute to heart disease, premature ageing and cancer.

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MEDICINAL USES

Pomegranates are used medicinally for diarrhea, earache, bad vision, fevers, teeth and gum disorders and indigestion according to Unani Tibb medicine. Apart from its nutritious value, the pomegranate also has medical benefits. It is commonly prescribed under the homeopathic as well as the Unani Tibb medical systems. Unani Tibb, with roots in Greek, Egyptian, Arabic and Indian medicine, is a healing system based on scientific data and holistic principles, while homeopathy is a system of medicine that is based on natural laws applied therapeutically some 200 years ago (11-17).

POMEGRANATE IN HOLY QURAN

According to the emphasis of Quran on the consumption of pomegranate, this fruit has many health benefits. In Holy Quran, the pomegranate has been repeated three times.

The princely pomegranate, ar-Rumm in Arabic, is mentioned in the Quran as one of the many delicious rewards awaiting in Paradise. Its numerous uses in cooking and medicine, as well as its beautiful structure, make the fruit a wonder for Muslims who believe that each pomegranate seed is a sign of the sustainer. Pomegranates are mentioned three times in the Quran: As one of the fruits that will be found in paradise.

II.OBJECTIVES

1. To investigate the medicinal importance of Pomegranate, as it emphasized in the QURAN and Hadith.
2. To find the Antibacterial activity of Pomegranate.

III.MATERIALS AND METHODS

Pomegranate fruit and preparation of the extracts

Pomegranate fruits were purchased from local markets in Siddipet. After opening the fruit, the arils (with seeds) were manually separated from the peels. Collected peels and arils were then rinsed with tap water. These peels and arils were ground separately in a blender. Fifty grams of blended peels or arils were placed in 250-ml Erlenmeyer flasks, followed by adding 100 ml of solvents having an increasing polarity: acetone, 95% ethanol, and hot water. The flasks were then shaken at room temperature for 18 h prior to filtration. The filtrates were concentrated under reduced pressure with a rotary evaporator at 40 °C. These crude extracts were kept at 4 °C until use. Microorganisms and culture

A total of four food-related bacteria were kindly provided by the Culture Collection of Department of Microbiology. They are two Grampositive bacteria (*B. subtilis* and *S. aureus*) and two Gram-negative bacteria (*E. coli* and *S.*

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typhimurium). The strains were maintained at 4 °C in Mueller Hinton agar slants. Before experimental use, cultures from solid media were sub-cultivated in Mueller Hinton broth, incubated for 24 h at 37 °C, and used as the inocula for the determination of antibacterial activity.

DETERMINATION OF ANTIBACTERIAL ACTIVITY

The modified agar well-diffusion method⁶ was conducted to evaluate the antibacterial activities of the extracts. A freshly grown culture was serially diluted, and 0.1 ml of prepared cells (1.5107 colony forming units per millilitre, CFU/ml) was aseptically spread onto the surface of Mueller Hinton agar and then left to dry for 30 min. Wells (8 mm in diameter) were made in media using a sterilized stainless steel borer. Each well was filled with 30 µl of the crude extracts. The plates were left at room temperature for 30 min to allow diffusion of materials in media. The controls were prepared using residue obtained by concentrating each solvent under reduced pressure (the same as done with the filtrates) and diluting with 10 ml DMSO. Plates were incubated at 37 °C for 18–24 h. Inhibition zones in mm (including well diameter) around wells were measured. The antibacterial activity was expressed as the diameter of inhibition zones produced by the extracts against test bacteria. All tests were performed in triplicate. The results were expressed as mean standard deviation. Statistical significance was calculated by ANOVA, followed by Scheffé's test. The p values of < 0.05 were considered significant.

Determination of MIC

The broth-dilution method⁷ was adopted to determine the minimal inhibitory concentration (MIC) of the active extract revealed by the previous well assay. The inoculum of each test bacterium was prepared by diluting the overnight culture of the bacterium in Mueller Hinton broth to a level of 1.5107 CFU/ml. Two millilitres of the extracts diluted in two-fold dilution with DMSO were added to a sterile glass tube containing 0.5 ml Mueller Hinton broth (the concentration of bacteria approximately 1.5107 CFU/ml). The tubes were incubated at 37 °C for 18–24 h. Because of the turbidity and dark colour of the extracts, 0.1 ml of the mixture in the tubes were spread onto the surface of Mueller Hinton agar. Plates were incubated at 37 °C for 18–24 h. The MIC was defined as the lowest concentration (mg/ml) of the extract resulting in bacteria density lower than 300 colonies per plate. The test was conducted twice.

IV. RESULTS AND DISCUSSION

Four food-related bacteria were tested for their sensitivity to hot-water extract, ethanol extract, and acetone extract of pomegranate fruit peels and arils (with seeds). The antibacterial potency was initially determined by the agar well-diffusion method. Table 1 presents diameters of inhibition zones (clear zones around wells) exerted by the different extracts towards test bacteria. The solvent residue diluted with DMSO (the control) showed no inhibitory zone. On the other hand, all extracts from pomegranate fruit peels and arils exhibited inhibitory activity against all test bacteria (Table 1), with the highest inhibition zones on ethanol extracts (26.3–34.0 mm inhibition zones for peels and 19.7–24.3 mm inhibition zones for arils). The ethanol extracts of arils have significantly higher antibacterial activity than other aril-extracts. On the other hand, the antibacterial activity of ethanol extract of peels was not significantly different from other extracts of peels. Siri et al⁹ found that both water and ethanol extracts of pomegranate fruit peels showed anti-*Aeromonas caviae* activity with more effectiveness in water extracted samples. In contrast, Al-Zoreky⁴ reported that only water-methanol extract of peels have marked inhibition (12–20 mm inhibition zones) and the water extract was inactive against eleven microorganisms tested, such as *S. aureus* (2 strains), *B. subtilis*, *E. coli*, *Listeria monocytogenes*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Yersinia enterocolitica*, *Candida utilis*, *Saccharomyces cerevisiae*, and *Aspergillus Niger*. Meléndez and Capriles¹⁰ found that methanol extract of pomegranate fruit was active against *E. coli*, *S. aureus*, and *B. subtilis* with the diameter of inhibition zone 12, 22, and 12 mm, respectively. The activity of ethanol extracts of peels against *S. aureus*, *B. subtilis* and *E. coli* (29–34 mm inhibition zones, Table 1) was comparable to the study of Ahmad and Beg⁶ (10–40 mm inhibition zones), but higher than that of Al-Zoreky⁴ (13–17 mm inhibition zones). This may be due to the different extraction method, strain sensitivity, antimicrobial procedures used in the test. The extract seems to be thermostable because the hotwater extract (using boiling water) still retained the activity nearly the same as other extracts. This was also found by Al-Zoreky⁴. Quantitative evaluation of antimicrobial activity of all extracts was carried out against test bacteria by broth dilution techniques. The MIC, in mg/ml, of all

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extracts is presented in Table 2. It appeared that the hot-water extract of the peels was the most effective against all test bacteria with the MIC values less than 210 mg/ml (Table 2). Moreover, the hot water extract of the arils was also effective against *B. subtilis* and *S. typhimurium* with the MIC value of 105 mg/ml. This may relate to some components in the extract that dissolved well in the water but did not diffuse well through the agar. The opposite was found by Prashanth ET al11 who reported that methanol extracts of peels were more active than water extracts against *E. coli*, *S. aureus*, and *B. subtilis*. The MIC of the methanol extracts was 6–12 mg/ml, while that of the water extracts was 25–50 mg/ml. In this study, the MIC for ethanol extract of peels was 242–500 mg/ml against all test bacteria (Table 2). Voravuthikunchai et al12 found that the aqueous extract of pomegranate peel was active against *E. coli* O157:H7, MIC/MBC 0.19/0.39 mg/ml. Variations in results among studies on pomegranate fruit peel extracts were recorded with MIC determination. The values for MIC against *S. aureus* ranged from 0.62 to > 250 mg/ml⁴. The MIC varied from 0.39–25 mg/ml against several strains of *E. coli* 4, 11, 12.

Table 1 Antibacterial activity of different extracts of pomegranate fruit peels and arils determined by agar well-diffusion method.

Microorganism	Inhibition zone (mm)					
	Hot water extract		Ethanol extract		Acetone extract	
	Peel	Aril	Peel	Aril	Peel	Aril
<i>B.subtilis</i>	28.0±1.7 ^a	15.0±0.0 ^z	31.0±1.7 ^a	24.3±0.6 ^y	31.0±1.0 ^a	14.3±1.2 ^x
<i>S.aureus</i>	30.0±0.0 ^a	16.7±1.5 ^z	34.0±1.7 ^b	20.7±1.2 ^y	30.7±1.2 ^a	19.3±1.2 ^{xy}
<i>E.coli</i>	27.0±1.0 ^a	14.0±1.0 ^z	29.0±1.0 ^a	23.7±0.6 ^y	30.3±0.6 ^a	15.7±1.2 ^x
<i>S.typhidium</i>	23.7±0.6 ^a	15.7±1.2 ^x	26.3±1.2 ^b	19.7±0.6 ^x	24.7±0.6 ^a	17.0±2.6 ^x

Means and standard deviation for n = 3. For each bacteria, the experimental values within each row that have no common superscript are significantly different (p < 0.05) according to Scheffé's multiple comparison test. Any two means not marked by the same superscript (for example, a and b for the extracts of peels and x and y for the extracts of arils) are significantly different (p < 0.05). Any two means marked by the same superscript (for example, a and a or x and x) are not significantly different.

Table 2 Minimum inhibitory concentration (MIC) of different extracts of pomegranate fruit peels and arils determined by broth dilution method.

Microorganism	MIC (mg/ml)					
	Hot water extract		Ethanol extract		Acetone extract	
	Peel	Aril	Peel	Aril	Peel	Aril
<i>B. subtilis</i>	<104	105	242	194	444	222
<i>S. aureus</i>	<104	840	242	778	444	888
<i>E. coli</i>	207	840	499	778	3500	888
<i>S. typhimurium</i>	<104	105	242	778	<222	1776

V.CONCLUSIONS

Besides having high antioxidant activity, pomegranate arils also have antibacterial activity and may be used as medicine for humans. This reduces the cost and the risk of antibiotic consumption. Furthermore, added value from the peels which is the byproduct could provide health benefits to humans and may be employed in food preservation and pharmaceutical purposes.

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