

Quran and Pharmaceutical Plants: Antioxidants

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Background: Free radicals are known as atoms and molecules which are highly reactive with the body's single-electrons, and may cause irrecoverable damages to the macromolecules of organisms. Systems to deal with damages caused by free radicals are known as "antioxidant immune systems". Flavonoids and polyphenolic compounds are from non-enzymatic antioxidants which many nutritional compounds contain them.

Evidence Acquisitions: The current study is a review survey conducted by evaluating the texts, library and internet search for the keywords such as antioxidant, flavonoid, nutrition, and Quran in the Persian documentaries of Google, scientific information database (SID), ministry of healthcare, medical articles library of Iran (medlib.ir), Iranian research institute for information (IranDoc), publication database (Magiran, Iranmedex), and also search in other electronic databases such as Google Scholar, Scopus and PubMed.

Results: Data gathering instrument of the present study was all published texts regarding Quran and antioxidants. To conduct the current study, 31 references were used.

Conclusions: Today, scientific medical studies have demonstrated that antioxidants are necessary for health. Quran, the Muslims' Holy Book, has noted this important matter and has introduced many antioxidants in different verses. Infallible Imams (AS) also have many hadiths in this regard. These foodstuffs include pomegranate, honey, olive, grapes, and garlic.

Keywords: Antioxidants; Flavonoids; Nutritional Sciences

1. Background

Free radicals are atoms or molecules which do not have one or more electron pairs. This condition changes the chemical activity of atom and molecule and makes it more active. Different classifications have been done for free radicals. One of these classifications, which are based on the type of central electron, includes two groups: reactive oxygen species (ROS), and reactive nitrogen species (RNS). For the first group, O₂ superoxide radical, and OH hydroxyl; and for the second group, NO nitric oxide radical and ONOO peroxynitrite can be mentioned (1, 2). Free radicals are induced through contact with some environmental agents or illnesses and cause tissue damage. Since single-electrons exist in the body, free radicals are constantly in circulation and cause excessive damages to the organisms' macromolecules such as DNA, proteins, lipids and carbohydrates (3). Very low concentration of antioxidants scavenges the oxidation of oxidizing substances, significantly. Antioxidants act by different mechanisms. For example, antioxidants in similar levels can prevent formation of free radicals, repair of damages caused by

activity of radicals, increase of excretion or absorption of damaged molecules, and minimize the level of mutations (4). Antioxidant systems are divided into enzymatic and non-enzymatic groups. The most important agents of enzymatic cellular antioxidant defense system are enzymes such as superoxide dismutase (SOD), glutathione peroxidase (GPx), and catalase (CAT). Non-enzymatic cellular antioxidant defense system includes: vitamin E (α -tocopherol), carotenoids, ascorbic acid, uric acid, bilirubin, flavonoids, and polyphenolic compounds which exist in foodstuffs (5-8).

2. Evidence Acquisitions

The current study is a review survey which was conducted to evaluate antioxidants properties of foodstuffs by studying Quran and medical science texts. To evaluate the texts, the singular or combination forms of the following keywords were used: "Quran", "antioxidant", "nutrition" and "flavonoids". To evaluate the electronic Persian databases the following websites were searched: Google, scientific information database (SID), ministry of health-

Implication for health policy/practice/research/medical education:

The present study emphasizes on more consumption of antioxidants, according to Quran's recommendations, to improve the health level of society, and reduce the risk of many diseases.

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care, medical articles library of Iran (medlib.ir), Iranian research institute for information (IranDoc), publication database (Magiran, Iranmedex), and also search in other electronic databases such as Google Scholar, Scopus and PubMed. Also, library search was performed by referring to the journal archives of libraries, and evaluating the available Persian references such as religious books and Quranic texts, and also articles of research-scientific and educational journals, and articles of the annual seminar of medicine and Quran.

3. Results

Data gathering instrument for the present study was any published texts regarding Quran and antioxidants. To conduct the present study, 31 articles were used.

3.1. Pomegranate in Quran

Pomegranate is a delicious and tasty fruit. It is composed of seeds which are mostly red, sometimes white or even between two colors. From the ancient time, pomegranate was used as a fruit with medical applications (9). 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 (10-12), and in this regard, Imam Ali (AS) says: "feed your children the pomegranate to improve their power of speech". Imam Ali (AS) also in another hadith says: "eat pomegranate with its internal tissues (a thick yellow tissue which pomegranate seeds are placed on it), because this yellow tissue tans the stomach. Any seed of pomegranate can refresh the spirit, brighten the soul, and nullify the evil temptations for forty nights" (13-15). Studies show that the edible part of pomegranate makes up almost 50% of total weight which includes 80% water and 20% seed. This fruit contains polyphenolic flavonoids. Pomegranate juice has antioxidants, antiatherogenic, and cyclooxygenase and lipoxygenase enzymes scavenging components in mice. Also, pomegranate juice is rich in punicalagin polyphenols. In a study on evaluating the effect of pomegranate on the expression of endothelial nitric oxide synthase in atherogenesis, it was reported that the induced atherogenic effect is chronically controlled by the consumption of pomegranate (16). In another research, it was shown that pomegranate juice can significantly reduce the affected areas caused by atherosclerosis in mice, and it can decrease the thickness of intima media in the heart patients under treatment. Pomegranate juice also reduces lipid peroxidation in patients with diabetes type 2 and hypertension, and has the anti-atherosclerotic, antihypertensive, antioxidant and anti-inflammatory effects. The main mechanism of its function includes increase in the level of serum antioxidants, decrease of lipid peroxidation, LDL, and atherosclerotic ulcers. The pomegranate juice, also by interfering with

the function of nitric oxide, causes reduce in inflammation and angiotensin-converting enzymes which leads to decrease in systolic hypertension. Therefore, daily drink of one or two cups of pomegranate juice could be beneficial in patients with diabetes type 2 and cardio-vascular diseases. Clinical studies also revealed that the pomegranate has heart protective effects (17).

3.2. Honey in Quran

Honey, a delicious foodstuff, is made by honey bees. In the scientific researches, honey has showed many benefits. Honey contains minerals such as K, Fe, P, I, Mn, Al, Cu, S, Cr, Li, Ni, Zn, Ti, Na, and organic compounds, mannites, gums, pollens, lactic acid, formic acid (which is anti-rheumatic and prevents degradation of honey), malic acid, tartaric acid, oxalic acid, citric acid, colors, and essential oils. Also, honey contains six vitamins (E, K, D, C, B, A) and one of the most nutritious sugars. So far, 15 different sugars such as fructose 40%, glucose 30%, and sugarcane have been extracted from honey. Honey treats several diseases such as neurological diseases, insomnia, pneumonia, sciatic pain, diphtheria, anemia, liver disorders, bone and lungs relative diseases, and hyper and hypotension. It also has many benefits to treat jaundice. Eating honey when fasting is useful to cure gastric and duodenal ulcer and heartburn. Honey is useful for blood sugar regulation. It is also an antiseptic for urinary tract. Honey has antimicrobial factors. Human pathogenic microbes cannot live in honey (18, 19). In this regard Quran says: "there is healing for people". The Holy Quran has mentioned the word "honey" in two verses; first in Surah Al-Muhammad, verse 15 when admiring the paradise God has promised to the righteous people while the streams of pure honey flow in it. The second is Surah Al-Nahl, verse 68 and 69 which regarding honey and honey bees He says: "your lord revealed to the bee: 'build your homes in the mountains, in the trees, and in what they are building. Eat every kind of fruit, and follow the easy ways of your lord. 'From its belly comes forth a drink (honey) of many hues in which there is healing for people. Surely, in this there is a sign for a nation who reflect" (20). The holy Prophet (SAW) says: "honey has the therapeutic effects for any physical illness, and Quran has the therapeutic for mental illnesses. Therefore, I recommend both" (14, 15). Erejuwa et al. studied the effect of honey on hypertension, and decrease of renal oxidative stresses in rat. In a group that honey was given by gavage for 12 weeks, the level of renal malondialdehyde, expression of mRNA, nuclear factor erythroid 2-related factor, and also glutathione transferase, antioxidants of glutathione S-transferase (GST), and catalase (CAT) were evaluated. The results showed that following the use of honey, the systolic hypertension caused by renal oxidative stress, decreased. During the last decade, it was indicated that ROS and RNS play significant role in the hypertension of

cardio-vascular patients. Honey, besides sugar, contains bioactive, flavonoids, carotenoid-like compounds, ascorbic acid, and antioxidants. Also, many studies conducted in recent years showed the antibacterial, antimutagenic, hepatoprotective, antihypertensive, and antioxidant effect of honey (21). In this regard, *ex vivo*'s studies show the antibacterial and antioxidant effect of honey. Honey, could also release small quantities of sugar which leaves protective effects on kidney and pancreas of streptozotocin (STZ)-induced diabetic rats. Since oxidative stress is implicated in diabetes, honey causes the modification and improvement of this disease, through affecting hypertension, antioxidative enzymes, and oxidative stress markers (22). Honey, the natural product of honey bee, contains carbohydrates such as fructose, sucrose, minerals, proteins and 17.2% water. It also has flavonoids and metabolites with antioxidant activity. In the study by Denshary et al. on the protective effects of honey on hepatotoxicity induced by (CCl₄) carbon tetrachloride in rat, the results showed that honey can reduce the toxic effects of CCl₄ in the liver and kidney (23). Another study which was conducted on the antioxidant effects of honey on streptozotocin-induced diabetes in rat, it was shown that honey increases catalase (CAT) activity, and decreases glutathione peroxidase (GPx) activity and reduces the level of lipid peroxidation (LPO) products. Effect of honey in the protection of diabetes induced by oxidative stress is more than glibenclamide and metformin (24).

3.3. The Olive in Quran

Olive is an oval shaped fruit with 2-3 cm length. The olive tree gives 10 to 20 kg fruit. Olive has high medicinal value. If it is taken orally, is a nutritional, relaxing, mild laxative fruit which improves gastric ulcers. Olive oil is laxative. External use of olive oil softens the skin and eczema blisters, and is suitable for massaging. The Holy prophet (SAW) in a hadith recommends people to take olive oil orally and use for massaging, since the olive is obtained from "blessed tree" (9). "Olive" in Quran, has been repeated six times. Also, Surah Al-Mumenoon, verse 20, pointed indirectly to a tree which gives oil and grows in Sina Mountain. The olive name alone has been mentioned twice, whereas it has been repeated five times with other fruits such as dates, grapes, and fig. "He sends down water from the sky, and with it we bring forth the plant of everything. From these we bring forth green foliage and composite grain, palm trees laden with clusters of dates within reach, vineyards and olive groves and pomegranates alike and unlike. Behold their fruits when they bear fruit and ripen. Surely here are signs for a nation who believe" (10). The Quran has sworn to the olive and fig. "By the fig and the olive! And the mount, Sinai, and this safe country (mecca)! Indeed, we created the human with the fairest stature" (25). Nabour et al. in evaluating the protective effects of olive oil and Gallic acid on in-

duced apoptosis induced by hydrogen peroxide showed that olive plays antioxidant and inhibitory role in apoptosis. Olive oil contains oleic acid, phenolic compounds, and powerful antioxidants. Different studies on human, animals, and cells showed that olive oil polyphenols, by decreasing cell death and reducing ROS, cause anticancer effects (26). In another study, it was shown that olive oil reduces malondialdehyde and increases GPx in HepG2 cells with nitro derivatives-induced oxidative stress (27). Nakbi et al. in the study on evaluating the effect of olive oil on the level of antioxidants and fatty acids in erythrocytes of rat exposed to 2,4-dichloro, found that olive oil causes decrease of lipid peroxidation, and increase of enzymatic antioxidants. Olive oil is the main source of dietary fat among Mediterranean countries. It has been reported that olive oil by controlling LDL and unsaturated fatty acids, reduces the level of markers in cardio-vascular patients, and also DNA and mitochondria protection was strengthened in rats treated by olive oil (28).

3.4. Grape in Quran

Grape is one of the best natural sources for glucose and fructose. These sugars constitute 20% of grape. Beside sugars, grape contains tartaric acid and malic acid. There are high amounts of minerals, such as Na, K, Ca, and Fe, in grape; but its protein and fat is negligible. Grape is useful for skin and eye diseases (9). Grape is one of the most delicious fruits God created. In Holy Quran, grape has been mentioned eleven times in singular (Enab) and plural (Anab) forms. "And in the land, there are adjoining plots, gardens of vines, sown fields and palm trees in pairs and single that is watered with one water, yet we make some excel others in produce. Surely, in that are signs for a nation who understand" (29). The Holy Prophet (SAW) says: "your best food is bread, and your best fruit is grape". Imam Ali (AS) in a nice interpretation says: "grape is stew, food, and also sweets (15, 30). Studies show that grape antioxidant dietary fiber (GADF) is a natural compound which increases the production of reduced glutathione, and by increasing the expression of BCL2 and BCL-XL in apoptosis pathway, causes reduction of oxidative stress in rat. Using grape reduces cancer risk, especially gastrointestinal tumors. Polyphenolic compounds of grape have antioxidant, anti-inflammatory effects, and also affect apoptosis signaling pathways. Grape inhibits the growth of cancer cells, especially breast, lung, and gastrointestinal. Grape consumption, *invitro* and *invivo*, increases antioxidant activity through increasing the activity of glutathione peroxidase, cytosolic superoxide dismutase, and catalase. Grape antioxidants cause hypocholesterolemia and LDL reduction in rat (31). Grape polyphenols reduce age-related endothelial dysfunction in rat, and has beneficial effects on antioxidant and lipid peroxidation capacity, and DNA damages in old rats. Grape has high amount of flavonoids, β carotene, tocopherols, and dietary fibers.

Also, it has beneficial effects on antioxidant and lipid peroxidation capacity, and DNA (the mentioned works) damages in liver and red blood cells. In this regard, Keevic et al. reported that drinking grape juice for a week reduces platelet aggregation. Grape juice contains flavonoids, anthocyanidins, and nucleic acids. Quercetin which exists in grape skin and seed inhibits LDL oxidation and platelet aggregation which leads to cardio-vascular protection (32). Effect of grape seed was studied on the oxidative stress induced by ionizing radiations in the liver of rat, and the results showed that the grape seed reduces the toxicity induced by ionizing radiations, and these seeds have oxidation protective effects (33).

3.5. Garlic in Quran

Different studies show that garlic (*Allium sativum*) has attracted the attention of medical sciences for centuries. Today, garlic cloves are used in west Europa, Asia, and developing communities of the United States. Garlic is a rich source for organic sulfur compounds, which cause its special taste, odor, and therapeutic feature. Garlic is used in the form of powder (tablet), oil (capsule), and liquid extract. Results of in vitro and in vivo studies show that the extract of aged garlic extract (garlic has left for 20 months) has antioxidants, organic sulfur compounds and s-allyl cysteine. Also, these studies indicated that garlic can eliminate oxygen active and nitrogen active compounds, and can increase the level of antioxidant enzymes, and peroxidase enzymes such as xanthine oxidase, cyclooxygenase, and NADPH oxidase (34). Kanth et al. in the study on the effect of methanol extract of garlic on oxidative stress induced by streptozotocin in diabetic rats concluded that since oxygen active compounds play an important role in diabetes and metabolic disorders, consuming low amount of garlic causes reduction in the level of lipid peroxidation, catalase and glutathione peroxidase enzymes (35). Results of another study on the effect of garlic oil on oxidative stress and neurotoxicity induced by sodium nitrite in rats showed that garlic moderates neurotoxicity through protection of superoxide dismutase in mitochondria (36). Garlic has also been mentioned in Surah Al-bagharah, verse 61: "green herbs and cucumbers, garlic, lentils and onions" (37). Evaluating recent a study of Quran on antioxidants such as pomegranate, honey, garlic, grape and olive indicates a complete conformity between new studies and Quranic references.

4. Conclusions

According to the reviewed studies, in Quran God has paid special attention toward therapeutic and beneficial properties of foodstuffs. Holy Quran says: "He sends down water from the sky, and with it we bring forth the plant of everything. From these we bring forth green foliage and composite grain, palm trees laden with clusters of dates

within reach, vineyards and olive groves and pomegranates alike and unlike. Behold their fruits when they bear fruit and ripen. Surely here are signs for a nation who believe" (10). According to Holy Quran, believers are the most competent people to use divine blessings, such as clean foods. Centuries ago, Quran has mentioned the beneficial and antioxidant properties of many foodstuffs, and today scientists have found a part of them through many studies, it helps to realize the greatness of God and values of Islam, and surrender to God, and bow down to him. Finally, more consumption of these foodstuffs with antioxidant properties for health care is recommended.

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Authors' Contribution

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