

Fatty acids, phenolic, antioxidant, and antibacterial potential of kernel oil of sweet cherry (*Prunus avium*)

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Abstract

*Different studies have been shown that kernel oil contain hydrophobic and hydrophilic components which are important in term of health. Consequently, the pharmacological characteristic of seed made it important for human health. The aim of this article was carried out a literature review regarding sweet cherry (*Prunus avium*) seed and its fatty acids profile, phenolics, antioxidant activity and anti-bacterial activity. Seed of different fruit are often considered as waste. This presented study suggests that sweet cherry kernel oil has good chemical composition, antibacterial activity, also is a good source of fatty acids and antioxidants could be used in food, pharmaceutical and cosmetic industries.*

Keywords: Antioxidant, antibacterial, fatty acids, phenolics, sweet cherry

INTRODUCTION

Medicinal plants are the rich source of secondary metabolites that are used to maintain public health or to treat various conditions such as pain, infection etc. Human all over the world started using the medicinal plants from the beginning of human life on earth. According to World Health Organization (WHO) medicinal plants are the natural source to achieve a variety of drugs. They act as a source to relief illness. Around 1770

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BC, the Babylonian Cira described medicinal plant for the first time. The earliest uses are found in Hammurabi code and in ancient Egypt around 1550 BC. Medicinal plant from Gaza have been recorded and can be found in the dark of museum of Cairo (Anna et al. 1993). According to World Health Organization (WHO) 80% of the world population depends upon medicinal plant for their basic health care. Medicinal plants are the first natural pharmaceuticals, and they are claimed to have chemical constituents that could be used to treat diseases that are not curable with modern medicine. There is a large flora around the world, particularly in the east and west. In the recent years, the traditional medicinal system has grown in importance on a global scale. Currently, it is estimated that a sizable fraction of the world's population mostly depends on traditional healthcare providers (Balandrin et al. 1985). Ayurvedic medicine is a mixture of components made from plant extract however it lacks standardization, quality control, and information of herbal drugs. Even so the active compounds isolated from the natural source do not provide obligatory action. Earlier research manifest that ayurvedic medicine can prevent the damaging effect of radiotherapy and chemotherapy in cancer treatment. Modern science plays a critical role in the development of genetically planted material in this process (Djeussi et al. 2013). Usage of herbal medicine in allopathic and traditional system has been practiced around the world to cure a variety of illness. People who use the allopathic medicine throughout their life are intended to revolve around the therapeutic plants (Sarfraz et al. 2012). Since, ancient time people have been looking for a cure of their illness, they have look for drugs in nature. The use of therapeutic plants began organically, just as it does with animals. There was insufficient evidence at that time both regarding the details for the illness and the plant which could be utilize as a cure. In the modern age, researchers are keen to find the use of specific medicinal plant to cure a disease (Cowan, 1999). The major desert medicinal plant in the Peninsula (Arabian) is a dried plant, it is more active than fresh plants. Medicinal plants are generally anti-inflammatory, anti-cancerous, analgesic, and stimulant. Different parts of plants like stem, leaf, flower, seeds, as well as mutated plant that possess medicinal properties are used as crude drugs. Discovery of new biologically active molecules through random screening is powerful tool in the productive field of antibodies. Even though, high proportion of efficient antibiotics are available today. The higher plants have important identity in modern medicine. Since the old times, there is a connection between the human, plants, and disease. Previous research showed that in developing countries, pure isolated compounds from medicinal plants and their byproduct are utilized in one-fourth of all medicinal prescriptions (Gurib et al. 2006). About 30% of pharmaceutical products globally are made from plants (Khan et al. 1979).

SWEET CHERRY (*PRUNUS AVIUM*)

Since ancient's times, many stone fruits have been cultivated. Common name 'drupe' has been derived for these fruits because of the presence of tough endocarp or pit. Stone fruits are the member of Rose family with 3 sub-genera: the *Prunophora*, *Cerasus* and *Amygdalus*. Blackthorn (*Prunus spinosa*) shrubs in included in the genus *prunus*. Peaches and almonds are closely related to apricot and plums and cherries are apparently sweets and sour (Crisosto et al. 2003). Sweet cherry mainly grows in northern template zone. Trees of sweet cherry are 15 to 32m tall, with well-defined

trunk and spreading branching that makes it look more elegant. Fruit is intense red to pitch-dark purple when cultivated in summer season, succulent, sugary, juicy, and bitter (Colombo, 2010). Each cherry fruit contain hard shelled stone 8-10mm long, kernel inside the stone is 6-8mm long and 1-2 cm in diameter. *Prunus avium* is the most favorite table fruit and it is cherished worldwide due to its tempting characteristics and sweetness (Crisosto et al. 2003). Different cultivar of sweet cherry (*Prunus avium*) grows in European temperate forest. Less than 100 cultivars have been cultivated up to this point in the world's primary production system (Goncalves et al. 2018). Quality and maturity of sweet cherry depends on anthocyanidin contents. Diverse phenolics and anthocyanins have been identified in sweet cherry, which contribute to total antioxidant activity. Furthermore, *Prunus avium* contain several dietary components like carbohydrates, vitamins, proteins, and minerals. It provides prevention from nutritional disorders such as various illnesses and congestive heart failure. Consumption of sweet cherry can reduce the risk of oxidative stress, arthritis, and colon carcinomas etc. Cherry fruit contain low glycemic index, high level of water, low fats level, and calories without cholesterol. Beside these aspects sweet cherry is often valued for its nutritional properties in addition to the health benefits, especially their bioactive compounds.

CHERRY (KERNEL)

kernels are a by-product of fruits that are usually disposed. Fruits kernels contain oil with health benefits comparable to field crop. In addition, it provides energy to human body, maintain body temperature, bears liposoluble vitamins (A, D, E, K) and carotenoids. Nutritional composition of kernel oil correlate with lowering the risks of degenerative diseases like cancer, cardiovascular, diabetes. Adding kernel oils to different foods improves texture and flavor (Arbex et al. 2015).

KERNEL OIL FACTS AND HEALTH BENEFITS

Cherry kernel oil is a soothing oil with a high nutritional content of vitamins, natural tocopherols, Oleic and Linoleic acids. These properties are mostly like almonds, peach, and plums bit oils. Cherry kernel oil contain various types of minerals and nutrients with a lots of health benefits. It also contains antioxidants (alpha, beta, delta, and gamma tocopherols) as well as vitamins E. Some health care benefits of cherry kernel include, reduce blood pressure, improve cardiovascular health, good for hairs, boost immune system, prevent various cancer. Being a natural emollient, it improves dryness of skin and improves large pores. It is also helpful for the people with acne prone skin a prevent the skin from sun damaged (Rabak, 1932).

CHEMICAL CONSTITUENTS OF CHERRY KERNEL OIL

Most essential component in cherry kernel oil are fatty acids triacylglycerols. These have a basic structure with multiple long chains. Fatty acids and bioactive compounds within the kernel cause health promoting effects. Kernel oil of sweet cherry constitute of triglyceride & other components like phytosterols, phenols, carotenoids, tocopherol, and phospholipids (Verardo et al. 2004).

FATTY ACIDS

Mainly there are reportedly, six fatty acid presents in kernel oil include SFAs (stearic, palmitic acid), MUFAs (oleic, palmitoleic acid) and PUFAs (linoleic, linolenic acid) with diverse health benefits. Some other fatty acid includes arachic acid, behenic acid, lignoceric acid, heptadecanoic acids also contain low concentration in oil. Pre-harvest factors are recognized as crucial in determining the quality and functionality of oil, such as cultivar and fruit growing area. Fatty acid composition of *Prunus avium* kernel oil basically depends on certain factors involving area, variety, soil, environmental condition, temperature, and maturation stage etc (Gornas et al. 2017).

TOCOPHEROLS AND TOCOTRIENOL

Vitamins E, tocopherols which are found in fat and oil are a strong anti-sterility factor. As the vitamins E is essential vitamin and cannot be manufacture by the human body, it must be obtained from food. It is particularly synthesized by photosynthetic eukaryotes and other organisms like cyanobacteria. Vitamins E is an interesting class of compound that perform a broad range of biological function in plants, animals, and human. Deficiency of vitamins E is rare in human, but it can occur in premature infants and people who have chronic lipid malabsorption, moderate anemia, and retinal pigmentation abnormalities. Moreover, natural forms of tocochromanols (tocopherols and tocotrienols) are receiving a lot of attention because they are thought to be promising compounds for maintaining a regular blood cholesterol level and a healthy cardiovascular system. According to various studies, the antioxidant activities of tocochromanols from natural or synthetic source may be differ in potency (Colombo & M.L. 2010).

PHENOLIC COMPOUNDS

Secondary metabolites derived from pentose phosphate are known as phenolic compounds. In plants these compounds are widely accruing in groups of phytochemicals. Phytochemicals are the energetic biological compounds found in all plants that have significant antimicrobial activity. These biological constituents are the active components, have marked pharmaceutical activities. These secondary metabolites have been demonstrated to have antioxidant, antipyretic, analgesic, anti-inflammatory, and anticorrosive activity in addition to being effective against microorganism (Brovo, 1998). Phenolic compounds contain benzene ring attach to hydroxyl group, with low molecular weight. Phenolic compounds are classified into two groups based on their chemical structures: flavonoids comprise of (flavonols, flavons, iso-flavones, flavanones) non-flavonoids (lignans, phenolic acids non-flavonoids, stilbenes) (Han et al. 2007). The level of phenolic compounds in sweet cherry depends upon cultivar, normally increase during ripening. In general, sweet cherry are high in phenolic compounds, with total amount ranging from 357.26-1898.56mg/100g. Health benefits of sweet cheery is due to hydroxyl group of phenolics that confer antioxidants, metal chelate and antimicrobial properties. The signal transduction pathways and cell receptor were altered as a result of the ability to modify the activities of particular enzymes (Daglia et al. 2012). Furthermore, different research has investigated the

phenolic conformation of sweet cherry (*Prunus avium*) uses in the preparation of pharmaceutical, nutritive, and cosmetic products. To increase the knowledge of certain compounds, several methodologies for quantitative investigation have been developed, including chromatographic and spectrophotometric methods.

ANTIOXIDANTS

In the recent years, the increase in the knowledge of free radical and reactive oxygen species (ROS) in biology created a medicinal revolution. Due to the production of certain chemical molecule known as ROS, which tend to provide oxygen to other components, oxygen can have some negative effects (Bagchi et al. 1998). Free radical is defined as the molecule or compounds that contains an unpaired electron in an outer most shell (Cheeseman et al. 1993). Many radicals are highly reactive and unstable. Free radical is derived from the body regular metabolic process or from external sources like, smoking, air pollution, radiation, and x-rays. Significant macromolecules like DNA, proteins, carbohydrates, and lipids are leading towards the damage and homeostatic disruption by the attack of free radicals. Targets of free radical take in all kinds of molecules in the body, among them lipids, nucleic acids, protein are the major target (Young et al. 2001). Reactive oxygen species (ROS) comprises of superoxide, anion radicals, hydrogen peroxide, oxygen singlet, and hypochlorite etc. These are involved in different chemical reactions, result in biochemicals change & causing oxidative damage in the body. Free radicals adversely alter the nucleic acids, proteins, lipids and trigger several diseases (Halliwell et al. 1995). For maintaining, the appropriate level of free radical for healthy life, antioxidants play a significant role. Antioxidant is a sturdy molecule that donate an electron to rampaging the free radical and neutralizes it, thus have reducing capacity to damage, these are also called as the scavenger of free radicals (Shi et al. 1999). In recent year, there is a lot of interest in finding phenolic compounds and antioxidants. Because they suppress the property of proliferation of free radical and protect the human body from disorders. Epidemiological, studies suggest that daily intake of vegetables, and fruits have suspicious importance because they are rich in bioactive substance especially anti-cancerous (breast cancer, colon cancer), antioxidant (free radical, ROS) and anti-inflammatory activity (insect bite, rheumatism, muscle swelling). Some studies report that plant is the promising source of bioactive substance and can be used in pharmaceutical, cosmetics, for curing disease.

ANTIBACTERIAL POTENTIAL

Now-a-days, microbial infection is common all around the world and it is responsible for millions of deaths every year. Infectious diseases are the major cause of mortality and morbidity. As a result of the emergence of resistance, existing antibacterial medication become less effective, if not completely ineffective (Baym et al. 2016). In the recent years various solution for combating antibiotic resistance have been proposed. One of the best techniques for achieving this goal includes combining the other molecules with failed antibiotics which appears to restore the desired antibacterial activity. These molecules may be non-antibiotic drugs with potential antibacterial properties (Rana et al. 2019). Natural remedies have a long history of playing a significant role in the treatment of wide range of diseases. However, because their prescription and

mechanism of action are still unclear, herbal medicine have not been established as commercial pharmaceuticals. Despite the fact that natural antibacterial components appear to be more stable and have fewer side effect than the vast majority of commercial antibiotics in use currently, they also appear to be less harmful. In vitro, cherry (*Prunus avium*) extract has been found to be useful in regulating the growth of microorganism of medicinal importance (Marasini et al. 2015).

CONCLUSION

Fatty acids, oleic and linoleic acids, are essential fatty acids for human health, are abundant in cherry kernel oil. One of the important indicators of nutritional quality is the content of fatty acid. Cherry kernel oil is rich in unsaturated fatty acids, so the seed oil may be employed as a natural antioxidant to improve the quality and stability of food by-products. Unsaturated fatty acids have been associated with several diseases. Basically, they are involved in the treatment of type 2 diabetes mellitus, & in the reduction of colon cancer. The main saturated fatty acids in cherry kernel oil are palmitic and stearic acid. Cherry kernel oil is stable and emollient oil that is rich in vitamins, antioxidant, and natural tocopherols. It provides natural and effective hydration, making it useful ingredient in a variety of skincare products. It's fantastic for hair care. Its antioxidant effect and capacity to cleanse the skin of dead cells make it an excellent choice.

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