



Health Benefits of Dragon Fruit



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Abstract

Hylocereusundatus is characteristically the most cultivate vine cactus belonging to the family of Cactaceae, originating natively from Mexico and America. Commonly, it is well acknowledged under the name of “dragon fruit” or “pitaya”. It is also called ‘buahnaga’ in Malaysia gives the meaning of dragon fruit. Besides its attractive coloration, fruits of *Hylocereusundatus* are being prevailed globally because of its loaded source of polyphenolic components and their antioxidant activity. A wide ranging of phytochemicals of betalains, polyphenolic compounds and carotenoids are revealed to possess chemo-protective properties against oxidant stress in the body as well as maintain optimum equilibrium between antioxidants and oxidants for the enhancement of human health. The conclusion of this review is imperative to convey an indication of *Hylocereusundatus* and its functional phytochemicals, with next of kin to its impending health benefit in on condition that perspectives of research and application. It presented more environmental benign antioxidant and antibacterial agents that are significant in the fields of healthcare, food processing, nutraceutical and cosmeceutical. Collective work by researchers will help to maximize importance of this fruit to worldwide cultivars in order to expand the global market of dragon fruit.

Keywords: Antioxidant; Betalains; Dragon Fruit; Pitaya; Polyphenol

Introduction

Genus *Hylocereus* belongs to the vine cactus from the subfamily of Cactoideae within the family of Cactaceae. It is a native fruit from Mexico, Central and South America [1], and has been cultivated in Vietnam for at least 100 years, following by the French [2]. There are three cultivars of dragon fruit: *Hylocereusundatus*, red-coloured pericarp with white flesh; *Hylocereuspolyrhizus*, red skinned with red flesh and *Selinecereus megalanthus*, yellow-coloured with white flesh [3]. Typically, *Hylocereusundatus* is a cactus plant which possesses fruit as the Red Dragon Fruit or Red Pitaya Fruit, the most widely cultivated vine cactus. In addition, it knows as Red Pitaya or Strawberry Pear cactus fruit as well. Commonly, this fruit is named as pitaya because of the bracts or scales on the fruit skin and hence the name of pitaya meaning “the scaly fruit” [4].

With the unique properties of Crassulacean Acid Metabolism (CAM), members of family Cactaceae exhibit extraordinarily high water-use efficiency with low water requirements [5]. In addition, as a response to high carbon dioxide (CO₂) atmospheric concentration, CAM plants increase the produc-

tion of their biomass [6]. The fruit consists of red peel covered with green tipped overlapping scales and white flesh dotted with numerous edible soft black seeds. It also classified as a night-blooming flower which only flowers at night and blooming with huge fragrant blooms that typically last for one night only [7]. Over past decades, this fruit is cultivated commercially in Malaysia, Vietnam, Thailand, Taiwan, Nicaragua, Colombia, Australia and the USA [8].

Phytochemical Composition of *Hylocereusundatus*

In recent years, the fruits of *Hylocereus* cacti have greatly increased its popularity worldwide due to its attractive colours, sweet, juicy pleasant taste and have been considered the most beautiful in Cactaceae family. Besides its red-purple coloration, the fruits of *Hylocereus* cacti are being highlighted by global cultivators because of its rich source of polyphenolic components and their antioxidant activity [9]. Polyphenolic compounds are an excellent antioxidant and bio-active free radical scavengers, playing an important role in protecting humans [10]. Antioxidant refers to a compound that is capable of retarding the oxidation of lipids, nucleic acids and proteins

by hindering the initiation and propagation of oxidative chain reactions, and hence preventing oxidative damage towards body's cells [11,12]. This can be achieved through the mechanisms of reduction, free radical-scavenging, potential complexing of pro-oxidant metals and quenching of singlet oxygen [13]. The antioxidant potential of polyphenolics depends on the number of hydroxyl groups in the compound. With the higher number of hydroxyl groups, the tendency of chain breaking antioxidant behaviour of the compound increases [14]. Phenolic is found in abundant in plants, which is the major secondary metabolites of plants, serving in plant defence mechanism for counteracting reactive oxygen species (ROS) [15,16]. In cacti, red-violet betacyanins and yellow betaxanthins are the most important fruit pigments, belonging to betalain pigments [17]. Betalain is a class of water-soluble pigments that provide the colours in a wide ranging of flowers and fruits [18]. Moreover, betacyanins that are attached to N-heterocyclic compounds are a class of compounds that can also be employed as antioxidants, with radical scavenging activities [19].

Antioxidant activity of dragon fruit is mainly due to the content of ascorbic acid (Vitamin C) [20]. In living organisms, ascorbic acid serves in many physiological functions, such as acts as reductant to prevent cellular components from oxidative damage [21]. This is because ascorbic acid has the capability of serving as a scavenger in the oxidation of free radicals and oxygen-derived species, e.g., singlet oxygen, hydrogen peroxide and hydroxyl radicals [22]. Hence, ascorbic acid is found to be very useful in the treatment of photo-aging [23]. Instead, pro-oxidant properties of ascorbic acid also contribute to its antibacterial effects [24].

In the human body, the formation of free radicals is regulated by various enzymes and antioxidants in response to exogenous stimuli. In the case of extensive production of free radicals, it could lead to traumatic injury, inflammation and other chronic events, such as cancer and degenerative disease, due to the oxidant stress [25]. Over last few decades, few antioxidant vitamins which have the ability of limiting oxidative damage, have been introduced such as β -carotene, Vitamin C and Vitamin E, thus minimizing the threats of particular chronic diseases [26]. This can be observed from the closely association of heart disease and low plasma levels of β -carotene, tocopherol and L-ascorbic acid in epidemiological studies [27].

Health Benefit of Dragon Fruit

In addition to being used as a food colouring agents, consumption of Dragon fruit mostly as fresh fruit as relieving thirst due to it contains high water level compared with other nutrient levels for typical nutritional value per 100g of Dragon Fruit [28]. Dragon fruit can also take the form of juice, jam, or preserves according to the taste needed. Regular consumption of Dragon fruit helps in fighting against cough and asthma; also it helps for healing wounds and cuts quickly due to it con-

tains high amount of vitamin C. However, the high level of vitamin C found in Dragon fruit plays an important role to enhance immune system and also to stimulate the activity of other antioxidant in the body [29]. Moreover, Dragon fruit is also rich in flavonoids that act against cardio related, also dragon fruit aids to treat bleeding problems of vaginal discharge. As Dragon fruit rich in fibers, however it aids in digestion of food [30]. Dragon fruit is also packed with B vitamin group (B1, B2 and B3) which possess an important role in health benefit. Vitamin B1 helps in increasing energy production and in carbohydrate metabolism, Vitamin B2 in Dragon Fruit acts as a multivitamin; however, it aids to improve and recover the loss of appetite. And Vitamin B3 present in dragon fruit plays an important role in lowering bad cholesterol levels; it provides smooth and moisturizes skin appearance. As well as it improves eyesight and prevent hypertension [31,32]. Dragon fruit is also helpful in reducing blood sugar levels in people suffering from type2 diabetes, studies suggest that the glucose found in Dragon fruit helps in controlling the blood sugar level for diabetes patients. Dragon fruit contains high level of phosphorus and calcium; it helps to reinforce bones and play an important role in tissue formation and forms healthy teeth [33].

Conclusion

It is interesting to note that the cultivation of *Hylocereus undatus* is expanding in recent years due to its health and economic importance. Therefore, this could lead to utilization of dragon fruit as a source of functional materials to provide phytochemicals with the powerful antioxidant capability of preventing nutrition-related illnesses and enhancing human defense system of consumers. Apart from their attractive antioxidant properties, dragon fruit can also be in corporate as food preservatives owing to their effective antibacterial activity against some food-borne pathogens. The research and development of dragon fruit should be intensified and extended by emphasizing its value chain and production aspects for long-term perspective.

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