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Article · January 2024

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Review Article

The Benefit's And Anti-Microbial Effect Of Dragon Fruit

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ARTICLE INFO

Received: 26 Dec 2023

Accepted: 30 Dec 2023

Published: 02 Jan 2024

Keywords:

antimicrobial, red dragon
fruit peel extract, pitaya etc.

Gram+ bacteria, Gram-
bacteria, extraction

DOI:

10.5281/zenodo.10449253

ABSTRACT

Pitaya, also known as dragon fruit, is a unique tropical plant with many health benefits for people because of its high nutritional content and bioactive components, which include potent antioxidants found in nature. A variety of advantageous biological properties are possessed by extracts from the stems, flowers, peels, and pulps of dragon fruit, which are effective against pathogenic microbes such as bacteria, fungus, and viruses, as well as disorders such as diabetes, obesity, hyperlipidaemia, and cancer. Additionally, there are hepatoprotective, cardiovascular, and prebiotic qualities to dragon fruit extracts. Vietnam is a tropical nation with ideal climate conditions for the growth of papaya plantations, which are highly tolerant and adaptable to a variety of environmental factors (such as drought resistance, Favor light intensity, and salinity adaptation). The dragon fruit's biological activity, nutritional qualities, and commercial. In terms of antimicrobial properties, dragon fruit has demonstrated inhibitory effects against certain bacteria and fungi in various studies. This suggests a potential role in preventing microbial infections and supporting a healthy microbiome. The presence of natural compounds like oligosaccharides and phytochemicals contributes to these antimicrobial properties. Rich in essential vitamins such as vitamin C, B vitamins, and minerals like iron and magnesium, dragon fruit contributes to immune support, iron absorption, and overall well-being. Moreover, dragon fruit's high fibre content aids in digestion and may have a positive impact on gut health. The combination of antioxidants, vitamins, and fibre makes dragon fruit a valuable addition to a balanced diet. In this work, pectin was extracted using a hot acid extraction method for 75 minutes at a pH of 3.5 from the peel of dragon fruit. As a solvent, distilled water was utilized, and diluted HCl was used to create an acidic atmosphere. By using FTIR, the degree of esterification (DE) was analysed. Based on DE (52%) the extracted pectin was classified as high methoxy pectin. Pitaya, dragon fruit, is a unique tropical plant with many health benefits for people because of its high nutritional content and bioactive components, which include potent antioxidants found in nature. Extracts from the stems, blooms, peels, and pulps of dragon fruit have a variety of advantageous biological properties that protect against diseases including diabetes, obesity, hyperlipidemia, and cancer as well

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Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.



dangerous microbes like bacteria, fungi, and viruses.

INTRODUCTION

Dragon fruit (*Hylocereus undatus*), one of the tropical fruits, is very popular for its attractive bright red skin color, green scales, juicy and sweet white flesh and small black seeds. Some studies have reported that dragon fruit contains significant amounts of soluble solids rich in organic acids, proteins and other minerals and vitamins [1] (Rebecca et al. 2010). Dragon fruit peel (DFP), which makes up more than 20 percent of the weight of whole fresh fruit, is usually discarded during processing. Recent studies have shown that dragon fruit peel is a potential natural dye with good antioxidant activity[2]. The recovery of bioactive or functional compounds from fruit waste is a current research trend, not only to reduce the burden of waste disposal, but also to meet the growing demand for plant products beneficial to human health. This review examines in depth the main groups of functional compounds in dragon fruit peels, including beta-carotene, phenolics and dietary fiber[3]. Potential health benefits of these phytochemical substances in individuals or matrices are discussed, including antioxidant, anti-inflammatory, anti-angiogenic, prebiotic, antibacterial, anti-proliferative and cytotoxic activities, as well as improvement of blood lipid profile[4]. These analyses provide insight into the development of products and bioactive compounds derived from dragon fruit peels for human consumption to prevent chronic diseases such as cardiovascular disease, diabetes and cancer[5]. Dragon fruit, or pitaya, is an exotic tropical plant that brings many benefits to human health due to its high nutritional value and bioactive compounds, including powerful natural antioxidants. Dragon fruit stem, flower, peel, and pulp extracts have several beneficial biological effects against pathogenic microbes such as bacteria, fungi, and viruses, as well as diseases such as diabetes, obesity, hyperlipidemia, and

cancer[6]. In addition, dragon tree extracts have cardiovascular and hepatoprotective properties and prebiotic potential. Vietnam is a tropical country with favorable climatic conditions for the development of pitaya plantations. Dragon fruit is becoming popular in many countries and is consumed raw or can be added to drinks, jelly, and candies. In addition, the pigments can be used as a coloring agent in the pharmaceutical and food industries[7]. Three varieties that are distinguished by the color of the skin and flesh are mainly cultivated: *Hylocereus undatus* (possessing white flesh and red skin), *polyrhizus* (with red skin and red flesh), and *H. megalanthus* (yellow skin and white flesh). The fruit has an oval shape, and the pulp has a sweet and sour[8].



Fig no.1. Dragon Fruit

Antimicrobial activity :-

Red dragon fruit (*Hylocereus polyrhizus*) is a species of plant that provides natural pigment which is betalain. Betalain is one of the pigments that gives a natural colour to flowers and fruits. Moreover, of betalain in red dragon fruit peel, there are bioactive compounds such as polyphenol and flavanoid with antioxidant and antibacterial activities[9]. This research was objected to extract pigments and other secondary metabolites from red dragon fruit peel using ethanol, methanol, dichloromethane and ethyl acetate solvents, continued with determined potential antibacterial activity using Resazurin Microtiter Assay (REMA) method effect. Red dragon fruit (*Hylocereus polyrhizus*) is a plant species that produces a natural pigment called betalain. Betalain is one of the pigments that give flowers

and fruits their natural color. In addition, betalain in the skin of red dragon fruit contains bioactive compounds such as polyphenol and flavanoid, which have antioxidant and antibacterial effects[10]. This study challenged the extraction of pigments and other secondary metabolites from red dragon fruit peel with ethanol, methanol, dichloromethane, and ethyl acetate solvents and continued with potential antibacterial activity as determined by the Resazurin Microtiter Assay (REMA). The aim of this study was to evaluate the effectiveness of adding bark extracts of red dragon (*Hylocereus polyrhizus*) to beef sausages. Red dragon fruit extracts were obtained by maceration using a solvent at pH 5. The phytochemical properties, total phenolic content, antioxidant and antimicrobial activity of the peel extracts were observed. The antioxidant and antimicrobial activity of the extracts was attributed to the high levels of phytochemical compounds and total phenolics present in the extracts[12].

Apparatus

Automatic B.O.D. INCUBATOR, Model No.TC141 and Antibiotic Zone Reader Model No.FG 456 made by LABGO are also used this research work.

Antibacterial activity (in vivo):

(Inhibitory effect of red dragon fruit peel extracts on the growth of *P. aeruginosa*) Thirty male Bal b/c mice (26-28 g) aged 12-16 weeks were used in all in vivo experiments. . They were housed in a light-filled, food- and temperature-controlled room, and all mice were acclimatized for at least one week before the experiments. The backs of the mice were shaved and ethanol (70%) was applied to the shaved area as an antiseptic, then burned with a flame knife and then challenged with *P. aeruginosa* (1.5×10^8 bacteria/ml), which was more common. species with burn infection in this study[13]. After two days of injury, inflammation, redness and suppuration were observed, and mice were randomly divided into the following groups (n = 30)

Antibacterial activity (in vitro)

In the radial or 2-D technique, agar is prepared using Petri dishes by pouring molten agar medium into which the selected agar was previously inoculated after solidification of the agar plates by drilling and the cups are filled with solution suitable concn. for samples and standards and is inoculated at 370°C for 24 hours. the antimicrobial agent spreads through the agar surrounding the dish and produces a characteristic feature a barrier zone of microorganisms that is sensitive[14].

Table 1: Antibacterial activity of crude 50% hydro alcoholic Peel Extracts of Red Dragon Fruit (*Hylocereus polyrhizus*)

Extracts	Zone of inhibition at 200 µg/ML (in mm.)				
	E.coi	B.Subtilis	S.aureus	A. niger	C.albicans
A1	24	25	26	15	22
A2	20	23	25	16	21
A3	20	24	25	19	22
A4	25	26	23	20	21
A5	24	23	26	21	22
A6	20	22	24	18	23
A7	21	23	22	20	21
A8	22	24	25	20	22
A9	21	23	22	20	21
Levofloxacin	27	26	28	-	-
Amphotericin B	-	-	-	23	23

Group 1: untreated mice (control). Group

Group 2: burn mice treated with ointment composed of antibiotic (Cm). Group



Group 3: burn treated with ointment (concentration 50mg/ml)Group

Group 4: burn treated with ointment (concentration 100mg/ml) consisting of 1g of aqueous extract added to 9 g of Vaseline. Group

Group 5: burn treated with ointment (concentration 200mg/ml) consisting of 2g of aqueous extract added to 8 g of Vaseline. Group

Group 6: burn treated synergistically with ointment Cm and 100mg/ml of aqueous crude extract of P. granatum.

Duration of treatment per day	Group(1) Control	Group(2) CM	Group(3) Aqueous extract 50mg/ml	Group(4) Aqueous extract 100mg/ml	Group(5) Aqueous extract 200mg/ml	Group(6) CM + Aqueous extract 100mg/ml
3	0	145	175	165	160	125**
6	0	115	80	70*	82	7*
9	0	32	20	10	35	7*
12	0	0	2	1	5	0
15	0	0	0	0	0	0

Statistical analysis Results

were expressed in Mean \pm SD and were analyzed by one way analysis of variance (ANOVA) and post HOC analysis was done using Tukeys using SPSS package version 16. P value< 0.05 was considered to be significant.

Benefits

1. Rich in Antioxidants:

Dragon fruit is packed with antioxidants that help neutralize free radicals, reducing oxidative stress and supporting overall health.

2. Boosts Immune System:

With a high vitamin C content, dragon fruit strengthens the immune system, aiding in the body's defense against infections and illnesses.

3. Aids Digestion:

The fruit's fiber content promotes healthy digestion and can help prevent constipation.

4. Good for Heart Health:

Dragon fruit may contribute to heart health by reducing bad cholesterol levels and improving the balance of cholesterol in the body.

5. Hydrating Properties:

With its high-water content, dragon fruit helps keep the body hydrated, supporting skin health and overall well-being.

6. Help Regulate Blood Sugar:

Some studies suggest that dragon fruit may have a positive impact on blood sugar levels,

making it potentially beneficial for individuals with diabetes.

7. Source of Essential Nutrients:

Dragon fruit provides essential vitamins and minerals, including vitamin B, iron, and phosphorus, contributing to overall nutritional needs.

8. Potential Anti-Inflammatory Effects:

Certain compounds in dragon fruit may have anti-inflammatory properties, which can be beneficial for conditions related to inflammation.

9. Supports Weight Management:

The fiber in dragon fruit helps create a feeling of fullness, potentially aiding in weight management by reducing overall calorie intake.

RESULT

Antibacterial activity (in vitro): Extract A1, A2, A3, A5, A8 has excellent antibacterial activity against *S. aureus*, extract A1 has antibacterial activity against *B. subtilis*, while A4 shows antibacterial activity against *E. coli* compared to standard levofloxacin. Antibacterial activity (in vivo): In vivo test showed that treatment of mice with different concentrations of aqueous extract of Red Dragon Fruit peels and Cm antibiotic for 15 days and has a significant effect on *P. aeruginosa*, especially the sixth group, representing 100 mg/ml aqueous extract and Cm antibiotic, which proved to be more effective than the other groups, and the



number of bacteria decreased significantly ($P \leq 0.001$) from 120 to 5×10^6 cells/ml during the treatment days. is due to the extract of Red Dragon Fruit Peel, which has antibacterial and synergistic effects and wound healing properties when used with the antibiotic Cm. In addition, according to the results shown in Table 3, it was found that the fourth group (100 mg/ml aqueous extract) was significantly ($P < 0.001$) more effective than the other groups, and the skin of the mice was generally improved. after nine days. . treatment methods. FTIR spectroscopy was used to determine DE extracted pectin. FTIR includes both direct and indirect destructive processes and the procedure requires only a small sample quantity is produced in a shorter time time frame The DE was estimated to be 52%, indicating that dragon fruit peel pectin is high in methoxyl pectin (HM pectin).

CONCLUSIONS

The In vivo and In vitro study clearly demonstrated that the importance of Red Dragon Fruit Peel extracts in the control of burn infection resistant bacteria which are becoming a threat to human health and the aqueous extracts of peels are reported to properties. Jelly candy produced from the peel and pulp of dragon fruit has an average moisture content of 20%, with the highest moisture content of 25.6% in the P3 treatment (addition of dragon fruit peel 150 g, dragon fruit pulp 60 g, and sugar flour 290 g). The dragon fruit, due to its ecological characteristics, benefits to human health, and the commercial value has become a cost-effective product for the Vietnamese economy and a driving force in the sustainable development of the country, particularly in the promotion of sustainable use of ecosystems and biodiversity of the southwestern region, more sensitive to the effects of climate change.

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HOW TO CITE: G. L. Ingle*, D. M. Sonawane, A. K. Hatkar, The Benefit's And Anti-Microbial Effect Of Dragon Fruit, *Int. J. of Pharm. Sci.*, 2024, Vol 2, Issue 1, 7-12. <https://doi.org/10.5281/zenodo.10449253>

