Original Research Paper

Volume : 5 | Issue : 7 | July 2016 • ISSN No 2277 - 8179 | IF : 3.508 | IC Value : 69.48

Banana Peel (Musa Paradisiaca) : Can It be a Revolunationary Change in Periodontal Therapy? - A Review

Dental Science

KEYWORDS : Musa paradisiaca, Traditional medicine, Phytochemicals, Pharmacological activities

Rajaprasenjit Dhuldhwaj — Post Graduate Student Department Of Periodontology , Aditya Dental College, Beed. Maharashtra ,India

A. Rajender — Professor and Head ,Department Of Periodontology, Aditya Dental College, Beed. Maharashtra ,India

Mangesh Andhare — Post Graduate Student Department Of Periodontology ,Aditya Dental College ,Beed. Maharashtra, India

ABSTRACT

Periodontitis is a disease with multifactorial etiology leads to loss of tooth supporting structures and tooth. Gram negative bacteria play a central role in development and progression of periodontal disease. With many different treatment modalities carried over to treat these periodontal diseases, today even the focus in carried over towards various traditional plants and plant products.Banana, tropical fruit belonging to Musaceae family, is grown in many countries all over the world. All the parts of banana plant,i.e, flower, pulp, stem and leaves have used in many medical conditions like anemia, depression, heart burn, strokes, stress, GIT disorders, mosquito bites, warts etc.Banana peel, is a waste bi-product of banana industry, has shown to contain bio-active compounds such as flavnoids, tannins, phlobatannins, alkoids, glycosides and terpenoids. These products have shown pharmacological effects especially as antioxidant, antidiabetic, anti-inflammatory and antibiotic.So the focus of this review is the possible exploitation of banana peel (musa paradisiaca) to treat periodontal diseases to suggest future investigations.

Introduction

The current practice of medicine today has changed a lot from its practice in medieval times. however in India, we still use traditional practice for treatment of various diseases since Vedic period.1Periodontitis is a disease with multifactorial etiology leads to loss of tooth supporting structures and tooth. Gram negative play a central role in development and progression of periodontal disease.2Here this review focus a scientific information on uses, isolated chemicals and pharmacological activities to evalidate the traditional uses of M.Paradisiaca in different types of diseases.3

Banana peel seen a valuable source of natural products for maintaining human health.4Banana peel (musa paradisiacal) it is a herbaceous plant(up to 9 m long) with robust tree like pseudo-stem, a crown of large elongated oval deep-green leaves with prominent midrib. Fruits are oblong, fleshy 5-7 cm long in wild form and long in the cultivated varieties.3

Taxonomical Hierarchy

Kingdom	:	Plantae.
Sub Kingdom	:	Tracheobionta.
Super Division	:	Spermatophyta.
Class	:	Liliopsida.
Sub Class	:	Zingiberdae.
Order	:	zingiberales.
Family	:	Musaceae.
Genus	:	Musa.
Species	:	Musa paradisiacal.

Cultivation and Distribution

About 300 varieties of banana grown, majority have be grown in Asian,Indo-malysian and now widely found throughout tropical and subtropical countries. India, China, Brazil, Mexico, Colombia, Thailand are the top banana producing countries3.

Banana is one of the most popular fruits distributed all over the world. Production Of the fruit in India is very high, around 23,204,800tones in year 2008.It grows throughout year for the production of fruits5 .The plant is widely distributed throughout India for its nutrious and delicious fruits6.

Traditional Uses

Fruit of musa paradisiaca used in diarrohoea, dysentery, internal lesions in ulcerative colitis,diabetes,uremia,nephritis,gout,hypertension,cardiac disease7.Leaves are used in

eczema,as cool dressings for blister and burns8.Flowers are used in dysentery and menorrhagia. Stem juice of fruited plant is used for treating diarrohoe,dysentery,cholera,ota lgia,heamotypsis8.The root is used as anthelmintic,blood disorders,veneral diseases9.The plant is also used in inflammation, pain and snakebite10.

Phytochemicals Of Banana Peel

Cellulose,hemicelluloses,arginine,aspartic acid,glutamic acid,valine,phenylamine and threoine have been isolated from peel of M.paradisiaca11. Hemiterpenoid glucoside(1,1-dimethylallyl alcohol),syringin,benxyl alcohol glucoside have been isolated from flower of M.paradisiaca12.Banana peel contains bioactive compounds such as flaven oids,tannins,alkoids,glycosides and terpenioids. These bioactive exerts pharmacological effects, especially as an antioxidant,antidiabetic,anti-inflammatory and antibiotic13. Also banana peel contains vitamin A,C,E,B6,gallocatechin,d opamine,succanic acid,palmiticacid,magnesium,phosphorus ,potassium,fibers ,iron and fatty acids14.

Pharmalogical Activities in Banana Peel

Antimicrobial Activity

The use of natural antimicrobial compounds is not only in preservation of food borne diseases but also safe for human consumption13.many studies showed that peel contains various bioactive components like tannins and flavenoids which are effective against pathogenic microbes14. Both are toxic to fungi, bacteria and viruses and inhibit their growth15.

Aq.extract of banana peel shows greater antimicrobial activity than extracts of leaves. The peel extract is more active against Staphylococcus (gram+) than pseudomonas sp16.

Also methanolic extract of Musa paradisiaca fruit peel showed significant activity against Bacillus subtilis, Staphylococcus aureus, E.coli, Pseudomonas aeruginosa in comparison to benzyl penicillin and streptomycin. It also had inhibitory effect on candida albicans and Cryptococcus neoformans17.

Antibacterial Activity

In vitro study, antibacterial activity of alcoholic extract of banana peel against standard stains of Gram-negative anaerobes like P.gingivils and A.actinomycetemcomitans which are associated with periodontal diseases. P.gingivalis is a Gram-negative,anaerobic,nonmotile,saccharolytic rod that usually exhibits coccal to short rod morphologies18. It is mainly associated with adult periodontitis, acute periodontal abscess and failure of the regenerative procedure119.

A.actinomycetenconitans is a small, nonmotile, Gram-negative,saccharoluyic, capnophilic, round-ended rod18. It is associated with adult periodontitis,aggressive periodontitis,refractory periodontitis.and Papilon-Lefevre Syndrome20.

Secondary metabolites such as flavenoid, tannins, phlobatannins, alkoids, glycosides and terpenoids are responsible for antibacterial activity of banana peel21.

Antioxidant activity

Plasma oxidative stress is significantly reduced only after a single banana meal in healthy human due to the presence of dopamine, ascorbic acid and other antioxidants present in banana22.glycosides and monosaccharide are mainly responsible for the antioxidant activity23.

Vijaykumar et al. reported the antioxidant activity of the extracted flavenoids from Musa.paradisiaca in rats. They found that the flavenoids from banana stimulates the activities of superoxide (SOD) and catalase which might be responsible for the reduced level of peroxidation products such as malondialdehyde,hydroperoxidase and conjugated dienes24.

The effect of a single banana meal on plasma lipids and lipoprotein profile, plasma oxidative stress and susceptibility of LDL to oxidation was studied in 20 healthy volunteers. Before meal and 2 hr after meal Lipid and lipid peroxide (LPO) levels were measured. Results showed that the LPO contents in plasma, very low density lipoprotein (VLDL), LDL and high density lipoprotein (HDL) decreased significantly in the 2 hr post-dose phase. Results suggest that the consumption of banana reduces the plasma oxidative stress and enhances the resistance to oxidative modification of LDL22.

Hypoglycemic activity

The green fruit of M.paradisiaca has been reported to have hypoglycemic effects due to stimulation of insulin production and glucose utilization25.Its high potassium(K) and sodium (Na) content has been correlated with the glycemic effect26.fibers from M.paradisiaca fruit increased glycogenesis in the liver and lowered fasting blood glucose27. Antihyperglycemic effect of the hydromethanolic extract of M.paradisiaca root has been found significant28.

Result showed that significant reduction in blood glucose and glycosylated haemoglobin and increase in total haemoglobin. There was decrease in thiobarbituric acid reactive glutathione,glutathione peroxides, superoxide dismutase and catalase. Thus the study shows that banana flower extract has hypoglycemic activity29.

Wound Healing Activity

Wound healing activity of both methanolic and aqueous extracts showed that increase in hydroxyproline,hexauronic acid,hexasamine and superoxide dismutase as well as the wound breaking strength and reduced glutathione level. They also decreased the wound area, scar area and lipid peroxidation30.

Banana peel can be applied directly to burn or boil for good healing effect31. Also enhances immune system which helps in wound healing and cure of gastrointestinal disorders13.

Conclusion

In the present study we have providing an updated overview of the chemical constituents, photochemistry, pharmacology and toxicology of Musa paradisiacal. So the focus of this review is the possible exploitation of banana peel (Musa paradisiacal) to treat periodontal diseases and to suggest future investigations. The review suggests that the traditional uses of the plant in diarrohoea, dysentery, ulcer diabetes, hypertension and cardiac diseases. Besides, still there are options to investigate the unexplored potential of the plant based on its uses.

Reference:

1. Kapadia SP, Pudakakatti PS, Shivanaikar S. Detection of antimicrobial activity of banana peel(musa paradisiaca L.) on Porphyromonas gingivilis and Aggretibacter actinomycetemcomitans : An in vitro study. Contemp Clin Dent 2015;6:496-9.
2. Van Winkerhoff AJ, Loss BG, Van der Reijdenti WA, Van der Velden U. Porphyromonas gingivilis, Bacteroids Forsythus and other putative Periodontal pathogens in subjects with and without Periodontal destruction. J Clin Periodontal 2002;29:1023-8.

Volume : 5 | Issue : 7 | July 2016 • ISSN No 2277 - 8179 | IF : 3.508 | IC Value : 69.48

3. Mohammad Zafar Imam and Saleha Aktar. Musa paradisiaca L. and Musa sapientum L: A Phytochemical and Pharmacological Review. Journal of Applied Pharmaceutical Science 01 (05); 2011:14-20.
4. Gislene G.F. Nascimentot *; Juliana Locatelli1; Paulo C. Freitas1,2; Giuliana L. Silva1. Brazilian Journal of Microbiology (2000) 31:247-256.
5. Venkatesh,Krishna V*, Girish Kumar K, Pradeep k, Santosh Kumar S R. Antibacterial Activity of Ethanol extract of Musa Paradisiaca CV.Puttable and Musa Accuminative CV.Grand Naine. Asian Journal of Pharmaceutical and Clinical Research vol6,Suppl2,2013.
6. Nandkarni KN. The Indian Materia Medica. Bombay: KM Nandkarni; 1927.
7. Ghani A. Medicinal plants of Bangladesh: Chemical Constitituents and uses.2nd Ed. The Asiatic Society of Bangladesh,Dhaka,Bangladesh (2003) 315.
8. Okoli R.I.,Aigbe O., ohaju-obodo J.O.,Mentsah J.K.Medicinal Herbs Used For Managing Some Common Ailments among Esan People of Edo State, Nigeria. Pakistan J . Mutr.2007;6(5):490-496.
9. Khare CP. (Ed). Indian Medicinal plants, Springer science+BussinessMedia, New York, USA (2007) 426.
10. Coe f.anderson GJ. Ethnobotany of the Sumu (ULwa) of southestern Nicaragua and comparisons with Miskitu plant Iore. Econ. Bot. 199;53:363-383.
11. Ketiku A.O. Chemical composition of unripe (green) and ripe plantin(Musa paradisiaca) . J.Sci. food Agr. 1973;24(6) 703-707.
12. Duita P.k. Das A.K., Banerji N. A Tetracyclic Triterpenoid from Musa paradisiaca.Phytochem.1983;22(11): 2563-2564.
13. Shadma Anjum, Shanthy Sundaram, G.K.Rai. Nutritional application and value addition of Banana (Musa paradisiacal L. variety " Bhusawal Keli) Peel: A Review. International Journal of Pharmacy and Pharmaceutical Sciences.Vol 6, Issue 10,2014.
14. Anaagnostopoulou MA, Kefalas P, Papageorgiou VP, Assimopoulou AN,Boskou D. Radial scavenging activity of various extracts and fractions of sweet orange peel (Citrus sinensis). J Food Chem 2006;19-25.
15. Colak MS, Yapici NA. Determination of antibacterial activity of tannic acid in pickling process.Rom Biotechnol Lett 2010;15(3)5325-30.
16. Alisi C.S., Mwananyanwu C.E., Akujobi C.O., Ibegbulem C.O.Inhibition of dehydrogenase activity in pathogenic bacteria isolates by aqueous extracts of Musa paradisiacal (var.sapientum). Afr.J.Biotechnol.2008;712): 1821-1825.
17. Mangathayaru K, Umeshhankar G, Muralitharan G, Cordiaryen E, Vasantha J. Antimicribial activity of some indigenous plants.Indian J pharmac Sci.2004;66(1):123-25.
18. Haffajee AD, Socransky SS, Microbial etiological agents of destructive periodontal diseases.Periodontal 2000 1994;5:78-11.
19. Slots J.Actinobacillus actinomycetemconittans and Porphyromonas gingivilis in periodontal diseases: Introduction.Periodontal2000 1999;7-13.
20. Slots J Timg M. Actinobacillus actinomycetemcomitans and Porphyromonas gingivilis in human periodontal diseases. Occurrence and treatment, Periodontal 2000 1999;20:82-121.
21. Imam MZ,Akter S.Musa paradisiaca L. and Musa sapientum L.: A phytochemical and pharmalogical review. Int J Pharm Sci 2014;81-5.
22. Yin X., Quan J., Kanazawa T. Banana Prevents Plasma Oxidative Stress in Healthy Individuals. Plant Foods Hum.Nutr.2008;63:71-76.
23. Mokbel M.S., Hashinga F. Antibacterial and Antioxidant Activities of Banana (Musa, AAA cv.(canvendish) Fruits peel. Am.J.Biochem.Biotechnol.2005;(3)125-131.
24. Vijaykumar S.presannakumar G.Vijayalakshmi N.R. Investigations on the effect of flavenoids from banana.Musa paradisiacal L. on lipid Metabolism in Rats.J.Diet.Suppl.2009;6(2):111-123.
25. Ojewale J.A. Adewunni C.O. Hypogyacemic effect of methanolic extracts of Musa paradisiaca (Musaceae) green fruits in normal and diabetic mice. Methods Find Exp.Clin.Pharmacol.2003;25(6):453.
26. Rai P.K., Jaiswal D., Rai N.K.,Pandhija S.Rai A.K.,Watal G. Role of glycemic elements of Cynodon and Musa paradisiaca in diabetes management. Lasers Med.Sci.2009;24(5):761-768.
27. Usha V., Vijayammal P.A. Effect of diatery fiber from banana (Musa paradisiaca) on metabolism of carbohydrates in rats fed cholesterol Free diet,Indian J.Exp.Biol.1989;27(5):445-449.
28. Mallick C., Maiti R., Ghosh D., Comparative Study on Antihyperglycemic and Antihyperlipidemic Effects of Separate and Composite extract of Seed of Eugenia jambolana and Root of Musa paradisiaca in Streptozotocin-Induced Diabetic Male Albino Rat.Iranian Pharmacol. Ther.2006;(1)27-33.
29. Pari L., Umanmaheshwari J. Antihyperglycemic activity of Musa sapientum Flowers; effect on lipid peroxidation in alloxan diabetic rats. Phytother res.2000;14(2):136-38.
30. Agarwal PK, Singh A, Gaurav K, Goel S, Khanna HD, Goel RK. Evaluation of wound healing activity of extracts of plantin banana (musa sapientum var.paradisiaca) in rats. Indian J Exp Biol.2009;47:322-40.
31. Zainab Adil Ghani Chabuk, Alaa H.Al-Charrakh, Nada Khazal Kadhim Hindi,and Shatha Khazal Kadhim Hindi. Antimicrobial effects of aqueous banana Peel Extract,Iraq.Research Gate:Pharmaceutical Sciences,1(2013)73-75.