CHAPTER 1

BIOACTIVE COMPONENTS IN BANANA

Mrs. Afeefa Farsana. M. K.

Post Graduate students, PG Department of Home Science

KAHM Unity Women's College, Manjeri.

Mrs. Anitha Begum (Co-author)

Head and Associate Professor, PG Department of Home Science

KAHM Unity Women's College, Manjeri.

Introduction

The banana pulp was observed to contain bioactive compounds, like phenolic acids and flavanoids with high antioxidant potential and antitumor activity. Eating bananas provides high quantity of potassium to the body, which is beneficial for the muscles. Owing to its high iron content, banana is mainly recommended for anaemic patients and was also proven to be beneficial in controlling blood pressure as it has low salt and high potassium content. Serotonin in banana helps to overcome or prevent depression by changing mood and relaxing the body. Banana fruit contains resistant starch which has lower digestibility, unlike the high glycaemic indexed cereal starches. Resistant starch present in banana is suitable for the diet of heart patients and diabetic people, owing to its hypocholesterolemic action and positive effects in the human intestine.

The consumers are more health conscious and prefer fresh fruits and vegetables rich in antioxidant compounds, vitamins, dietary fibre, and minerals. Antioxidant compounds of fruits reduce risk of neurodegenerative disorders, retards aging process and help in lowering the incidence of degenerative diseases, such as heart disease, arteriosclerosis, inflammation, arthritis, cancer, and brain dysfunction. Dopamine, ascorbic acid, and other antioxidants present in banana reduce the plasma oxidative stress and

enhance the resistance to oxidative modification of low-density lipoproteins. Norepinephrine and dopamine present in banana elevates blood pressure and serotonin inhibits gastric secretion by stimulating the smooth muscle of the intestines.

The antipeptic ulcer effect of some banana varieties while histological examination of the ulcerated area. Extensive investigations have been carried out by many researchers to explore antiulcerogenic and ulcer healing activities of banana. A natural flavonoid leucocyanidin was responsible for anti-ulcerogenic properties of unripe plantain banana. The protective effect of this natural flavonoid to gastric mucosa from aspirin-induced erosions.

The banana lower fasting blood glucose and LDL cholesterol/HDL-cholesterol ratio. Feeding rats with dietary fiber of banana pulp has reduced the levels of fasting blood glucose and concentration of liver glycogen. The banana is a good source of dietary fructo-oligosaccharides, which are considered to be functional components of foods. They decrease levels of serum cholesterol, improve mineral absorption, and stimulate the growth of nonpathogenic intestinal microflora, due to their prebiotic effect. The daily consumption of banana improves insulin sensitivity in diabetic patients and also shows hypocholesterolemic activities. Banana might be useful for the treatment of hyperlipidaemia and several atherosclerosis diseases affecting the quality of human lives. Flavonoids extracted from unripe fruits of banana have shown hypolipidemic activities, such as decrease in the concentrations of cholesterol, phospholipids, free fatty acids, and triglycerides in the serum, liver, kidney, and brain of male rats observed hypolipidemic activities of flavonoids extracted from unripe fruits of M. paradisiaca in male rats. It was observed that the tissue cholesterol deposits were effectively lowered by feeding rats at a dose of 1 mg/100 g body weight/day. Flavonoids increase the degradation and elimination of cholesterol via bile acids and neutral sterols. This beneficial effect could be utilized in humans as banana is a favourite food item for people all over the world.

Health benefits of phenols

The flavonoid, leucocyanidin, has been identified as a predominant component of aqueous extract of unripe banana pulp that showed significant anti-ulcerogenic activity. Thus, many flavonoids, especially leucocyanidin analogues, may offer immense therapeutic potential in the treatment of gastric disease conditions. The structure–activity relationship of flavonoids indicates that their antioxidant capacity, scavenging free radicals, and chelating action are related to the presence of functional groups in their nuclear structure. They also attributed most of the health benefits from the consumption of flavonoids to their antioxidant and chelating properties. Because of these properties, flavonoids are also shown to exhibit antimutagenic and antitumoral activities.

The flavonoids can also inhibit many enzymes, such as oxygenases (prostaglandin synthase), required in the synthesis of eicosanoids. Thus, the flavonoids inhibit hyaluronidase activity and help in maintaining the proteoglycans of connective tissues. This would prevent the spread of bacterial or tumor metastases. As the flavonoids get preferentially oxidized, they are reported to prevent the oxidation of body's natural water-soluble antioxidants like ascorbic acid.

Health benefits of biogenic amines

Banana peel and pulp are known to be good sources of certain biogenic amines (catecholamines) which are produced by the decarboxylation of amino acids or by the amination of aldehydes and ketones. Catecholamines include dopamine, serotonin, epinephrine, and norepinephrine and are reported to occur in many plants in considerable amounts . In animals, these biogenic amines are reported to work as neurotransmitters for the hormonal regulation of glycogen metabolism. When banana is consumed by humans, serotonin present in the pulp (ranging from 8 to 50 μg/g) creates a feeling of well-being and happiness.

The banana contains a large amount of dopamine and norepinephrine. The amount of various catecholamines in banana pulp as follows: serotonin, 28 μg/g; norepinephrine, 1.9 μg/g; and dopamine, 7.9 μg/g. The concentrations of dopamine in the pulp of yellow banana (*M. acuminata*), red banana (*Musa sapientum*), and plantain have been reported to be 42, 54, and 5.5 μg/g, respectively. They highlighted the role of dopamine in human brain and body as a neurotransmitter having a strong influence on mood and emotional stability. Dopamine in the peel and pulp of commercially ripened . The decline in dopamine concentration during over-ripening stage may be due to its oxidation to quinones which may further polymerize to melanin pigments.

Health benefits of phytosterols

These naturally occurring plant sterols have attracted the attention of food manufacturers to produce functional foods having higher health benefits. Because of their structural similarity with cholesterol, they compete with cholesterol for absorption in the gut, thus lowering the blood cholesterol levels. They reported that a daily intake of 3 g of phytosterols results in marked reduction of LDL cholesterol levels. Now the health professionals recommend the consumption of plant sterols–rich diet to lower the LDL cholesterol in patients who do not tolerate cholesterol-lowering statin drugs.

The banana fruit has been shown to contain a good amount of phytosterols both in the peel and pulp. The phytosterols content in unripe banana in the range of 2.8 to 12.4 kg . The *Musa balbisiana* cultivars, such as ‘Dwarf Red’ and ‘Silver’, had higher amounts of phytosterols than the *M. acuminata* cultivars. The lipophilic extract of ripe banana pulp from several cultivars of the *M. acuminata* and *M. balbisiana* species has been found to be a source of ω-3 and ω-6 fatty acids, phytosterols, long-chain aliphatic alcohols, and α-tocopherol, thus offering well-established nutritional and health benefits .

Conclusion

The above discussion brings out the importance of consuming banana fruits for obtaining various health benefits. It is not only the banana fruit pulp, but also the peel of this fruit is known to contain many important phytochemicals and offers many health benefits. More research is needed to be carried out to and ways of using banana fruit peel in the development of many new functional foods.

References

1) Juarez-Garcia, E., Agama-Acevedo, E., Sayago- Ayerdi, S. G., Rodriguez-Ambriz, S. L., and L.A. Bello- Pérez. (2006). Composition, digestibility, and application in breadmaking of banana flour. *Plant Foods Human Nutrit*. (61), 131-137.
2) Kaur M, Kaur P, Kaur A. (2017). Engineering properties of peeled and unpeeled garlic cloves. *Agric. Res. J.* 54(1), 85-89.
3) Pakkawat, Detchewa & Anuchita. (2021). The effects of unripe banana flour on resistant starch content and quality characteristics of gluten-free rice cookies. *Journal of Sustainability Science and Management*, (16), 67-78.
4) Roman, R., Gomez, M., Hamaker, R., & Marinez, M. M., (2019). Banana starch and molecular shear fragmentation dramatically increase structurally driven slowly digestible in fully gelatinized bread crumb. *Food Chemistry*. (274), 664-671.
5) Sadia, Q., Azizuddin, S. (2018). Therapeutic potentials and compositional changes of valuable compounds from banana-a review. *Trends in Food Science & Technology*. (79), 1-9.