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A Review on Role of Guava on Diabetes Patients

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Abstract:- Diabetes mellitus (DM) is a disease that causes abnormal blood glucose levels. This is a globally prevalent metabolic disorder. Diabetes is the fourth biggest cause of death, as reported by the international diabetes federation. The use of herbal products has significantly risen globally in the modern era. Guava, also known as Psidiumguajava L., is a vital tropical food plant with a range of therapeutic uses. It is extensively utilized as a treatment for various illnesses and is easily accessible around the world, particularly in Asian nations. Psidiumguajava contains bioactive constituents including polyphenols, flavonoids, and heteropolysaccharides that are found to be antihyperglycemic properties.

I. INTRODUCTION

One of the most prevalent metabolic diseases in the world is diabetes (Ma'arif *et al.*, 2023). Diabetes Mellitus is a progressive condition that causes hyperglycemia on several occasions. This might be due to decreased insulin secretion by pancreatic beta cells or peripheral insulin resistance. Insulin deficiency occurs when the pancreas fails to create enough insulin or the body is unable to properly use the insulin produced. Diabetes is a globally prevalent chronic illness (Yusuf *et al.,* 2024). Diabetes classification based on the disease's aetiology, diabetes is now classified as four categories; Type 1 diabetes (resulting from the degeneration of pancreatic islet cells); Type 2 diabetes (resulting from a malfunction in the β-cell insulin secretory apparatus and insulin resistance); additional particular forms of diabetes (resulting from ailments like endocrinopathies, exocrine pancreas disorders, hereditary abnormalities, steroid-induced, etc.); Gestational diabetes (that manifests itself for the first time during pregnancy) (Bilous *et al.,* 2021).

A popular tropical fruit grown in many tropical and subtropical areas is the guava. The scientific name for the common guava, Psidiumguajava (L) (also known as the lemon guava or apple guava), is a tiny tree that is a member of the Myrtle family (myrtaceae) (Afroz *et al.,* 2023). Guava has bioactive components which protect the heart and eyes, control blood sugar, and have anti-inflammatory and anti-cancer properties (Chen *et al.,* 2024). Guava has multiple mechanisms of action to counteract hyperglycemia, including as stimulating insulin sensitivity, protecting pancreatic cells, and inhibiting the α-glucosidase enzyme, SGLT1, and GLUT2 transporters. These results validate the guava fruit's ability to help individuals with diabetes improve their glycemic and control by acting as an antidiabetic (Ma'arif *et al.,* 2023).

II. ABOUT GUAVA

The guava (Psidiumguajava L.), a fruit that is native to tropical America and the Caribbean, is a member of the Myrtaceae family. It was first domesticated in Mexico or Central America. In the seventeenth century, it was initially brought to India (Singh *et al.,* 2023).

The Food and Agriculture Organization of the United Nations (FAO) estimates that more than 2.3 million tons of guavas are produced per yearworldwide. The world's top producer of guavas is India, which is followed by China, Mexico, Egypt, and Brazil (Zou *et al.,* 2023). Guavas are best harvested in India because they grow well in tropical and subtropical climates and can withstand high temperatures. Due to its ideal climate, guava may be produced all throughout India, although Uttar Pradesh leads the country in output, followed by Madhya Pradesh and Bihar. Guavas are grown mostly in the districts of Madurai, Salem, and Dindigul in Tamilnadu (Senthilnathan *et al.,* 2023).

Guava's traditional applications have been supported by numerous pharmacological investigations that have shown it to have antioxidant, hepatoprotective, antibacterial, antidiabetic, anti-inflammatory, and anticancer properties (Zou *et al.,* 2023). Guavas, being high in soluble sugars, proteins, dietary fiber, and vitamins, have significant nutritional and therapeutic benefits. Guavas also include a variety of bioactive substances, such as polyphenols, tannins, flavonoids, carotenoids, and pentacyclictriterpenoids. It has been discovered that these bioactive components protect the heart and eyes, control blood sugar, and have anti-inflammatory and anti-cancer properties (Chen *et al.,* 2024).

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Table 1 Nutrient of (per 100 g) (Gopal *et al.*, 2024)

No.	Composition	Composition Guava Amount
1)	Water	80.8 (g)
2)	Energy	68 (Kcal)
3)	Protein	2.55 (g)
4)	Total lipid	0.95(g)
5)	Ash	1.39(g)
6)	Carbohydrate	14.3(g)
7)	Fiber	5.4(g)
8)	Sugar	8.92(g)
9)	Calcium	18(mg)
10)	Magnesium	22(mg)
11)	Potassium	417(mg)
12)	Zinc	0.23(mg)
13)	Manganese	0.15(mg)
14)	Iron	0.26(mg)
15)	Vitamin A	624(IU)
16)	Vitamin B-6	0.11(mg)
17)	Vitamin E	228(mg)
18)	Vitamin E	0.73(mg)

III. DIABETES

Diabetes is a serious worldwide chronic illness that affects people of all ages. Diabetes mellitus, is typified by hyperglycemia on two or more occasions, which can be brought on by peripheral insulin resistance or decreased insulin secretion by the pancreatic beta cells. It appears when the body is unable to properly use the insulin that the pancreas does create, or when it does not produce enough of it. It is a metabolic ailment (Yusuf *et al.*, 2024).

An estimated 537 million adults globally, or 10.5% of all adults in this age range, suffer from diabetes. Globally, the number of persons with diabetes will rise from 643 million in 2030 to 783 million in 2045 (Kumar *et al.*, 2024).

Five to ten percent of cases of diabetes are caused by type 1 diabetes, commonly referred to as insulin-dependent diabetes or juvenile onset diabetes. It occurs when the immune system destroys the pancreatic beta cells. Ninety-five percent of those who have diabetes have type 2 diabetes. Insulin resistance can result from a variety of factors, including insufficient insulin or issues related to insulin secretion. Another type of diabetes is called gestational diabetes, which is exclusive to women who acquire diabetes mellitus during pregnancy. Typically, the third trimester of pregnancy is when it first appears. Prolonged hyperglycemia is associated with elevated hyperlipidemia, production of oxygen radicals, and decreased antioxidant capacity (Yusuf *et al.*, 2024). Clinical symptoms include weight loss, weakness, polyphagia, polydipsia, and polyuria, along with blood sugar levels that are at least 200 mg/dL and 126 mg/dL during fasting (Mulyaningsih *et al.*, 2022).

➢ *Classification of Diabetes*

The following broad classifications apply to diabetes:

- *Diabetes Type 1:*

Insulin-dependent diabetes or juvenile-onset diabetes are other names for type 1 diabetes. The autoimmune-mediated degeneration of pancreatic beta cells, which are specialized cells in charge of producing insulin, is the hallmark of this illness. Due to a total lack of insulin brought on by the immune-mediated onslaught, there is a significant reliance on exogenous insulin to control blood sugar levels. The early onset of type 1 diabetes usually occurs in childhood or adolescence. On the other hand, it could emerge at any moment. The exact reason behind this autoimmune reaction is unknown. Environmental variables and genetic predisposition, however, are generally regarded as important contributing factors (Zakir *et al.*, 2023).

- *Diabetes Type 2:*

Adult-onset diabetes or non-insulin-dependent diabetes are other names for type 2 diabetes. One of the most prevalent metabolic diseases in the world, type 2 diabetes mellitus (T2DM) is mainly brought on by a combination of two main factors: the pancreatic β-cells impaired ability to secrete insulin and the tissues incapacity to react to insulin. The molecular mechanisms involved in the manufacture and release of insulin, as well as the insulin response in tissues, must be strictly regulated in order for insulin release and action to precisely satisfy the metabolic requirement. Consequently, abnormalities in any of the underlying systems may result in a metabolic dysregulation that triggers the development of type 2 diabetes. Main risk factors, including mitochondrial dysfunction, genetic predispositions, intestinal dysbiosis, obesity, and lifestyle factors (Galicia-Garcia *et al.*, 2020).

- *Gestational Diabetes:*

Diabetes is a long-term medical disorder that affects our body uses ofglucose, which is the main fuel that our cells use for energy. Hormonal changes during pregnancy may impact insulin sensitivity, resulting in blood sugar variations. It is much more important to manage diabetes in women who had

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the disease before becoming pregnant or who acquire gestational diabetes while pregnant. Pregnancy is the only time that gestational diabetes can develop. Complications include high birth weight in newborns, preterm birth, hypertension, and a higher chance of type 2 diabetes in the future for both the mother and the kid can result from it. As such, it is imperative to successfully control diabetes during pregnancy and to keep a close eye on blood sugar levels (Olimjonovna *et al.*, 2024).

IV. ROLE OF GUAVA ON DIABETES PATIENT

Patients with diabetes have higher blood glucose levels because insulin is ineffective, which limits the amount of glucose from diet to be maximally converted into energy and glycogen. Free radicals are created when hyperglycemia undergoes autoxidation. Oxidative damage can be caused by free radicals damaging the cell membrane and converting it to lipid peroxide. Consuming antioxidants is meant to reduce lipid peroxidation. As a result, lipotoxicity and the cell damage brought on by hyperglycemia can be avoided by consuming guava (Ismawanti *et al.*, 2020). The high fiber content of guavas also reduces the amount of glucose absorbed by the intestines, which helps to avoid the rapid spike in blood sugar levels that happens right after eating (Vanjarapu *et al.*, 2024).

The nutritional value of guava varies depending on variety. Carotenoids and polyphenols, the two main antioxidant pigments found in plant-based foods, are found in guavas. Guava have more pigments, which include polyphenols, carotenoids, and vitamin A, can determine the color of the peel and pulp. By binding α-amylase and α-glucosidase, polyphenols and antioxidants operate as a functional food. By preventing glucose from being absorbed from the small intestine and promoting insulin secretion and the regulated release of glucose from the liver, polyphenols have a significant impact on the management of diabetes. The medicinal properties of guavas are mostly ascribed to flavonoids, which are also largely responsible for the antibacterial and therapeutic properties of the fruit (Shabbir *et al.*, 2020).

Guavas contain a significant amount of pectin, a form of fiber. One kind of food fiber that is soluble in water is pectin which has hypoglycemic and hypocholesterolemic properties and can lower blood sugar and cholesterol levels. It is a substance that has the ability to bind carbohydrates and prevent them from being absorbed, releasing them gradually. By lowering the quantity of sugar that enters the blood after a meal, this absorption barrier helps to prevent increased blood sugar levels. Pectin also promotes bile acid excretion, slows down the emptying of the stomach, enhances postprandial satiety, and increases the bulk of stool. Utilized in both the fruit's meat and skin, guavas are high in water-soluble fiber that might obstruct the body's ability to absorb fat and blood sugar from meals and expel them externally (Mulyaningsih *et al.*, 2022).

V. CONCLUSION

The most important public health issues of the twenty-first century is diabetes mellitus (DM). Since the turn of the century, it has become an increasingly prevalent epidemic. When looked into guava, a traditional diabetes treatment, because of its active ingredients and their mechanisms of action. Additionally, studies have indicated that guava fruit has health benefits, including antioxidants, a high vitamin C content, and significant amount of bioactives (high levels of dietary fiber, polyphenols, and antioxidants). Guava is a good option for those with diabetes because of its dietary fiber, which promotes healthy digestion and may help control blood sugar levels.Guava is easily available and has good nutritional value, it's an inexpensive option so, much more research is needed before the various benefits may be applied in the industrial sector and thus reach the general people.

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