



Beneficial Effects of Jackfruit to Control Type-2 Diabetes: A Practice of Medical Nutritional Therapy (MNT) along with Anti-Diabetic Drug: An update

Srilatha Bashetti*

Associate Professor, Department of Biochemistry, Sukh Sagar Medical College, Jabalpur, M.P, India

*Corresponding Author: Srilatha Bashetti, Associate Professor, Department of Biochemistry, Sukh Sagar Medical College, Jabalpur, M.P, India.

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Abstract

Diabetes the world's common metabolic disorder, which has spread its wings in no time and is global emergency plus concern leading to spend millions of rupees in learning about the disease, better tool for diagnosis, its medication and to for awareness. As it is said to be lifestyle disorder one can address the risk factors leading to diabetes and deliver very simple yet affordable lifestyle changes that one should adapt to either prevent or to manage the disease. In recent advances made in the field of diabetic management MNT is advised to practice as a primary therapy as recommended by nutritionists. Promising results are obtained by the practice of MNT along with anti-diabetic drugs. Jackfruit is listed one among the exotic tropical fruits cultivated in South India in a large scale. Jackfruit known to be a natural sugar, rich in antioxidant property that doesn't spike in the blood sugar levels, it is proven to be good source to manage diabetes as it contains good amount of fibers and proteins which are digested and absorbed by the body slowly. It is of public health interest and recommended to consume jackfruit both by non-diabetic and diabetic population. These may help to prevent or manage the disease, may further help in reducing the disease related complications.

Keywords: Diabetes; Jackfruit; Awareness; Jackfruit Flour; Jackfruit Powder; Jackfruit Seeds; Fiber; Phytochemicals; Antioxidants

Introduction

Diabetes the world's common metabolic disorder, which has spread its wings in no time and is global emergency plus concern leading to spend millions of rupees in learning about the disease, better tool for diagnosis, its medication and to for awareness. Diabetes is listed among the top 10 leading causes for mortality [1]. Studies state that about 592 million people cause of death could be diabetes by the year 2035 [2]. Diabetes has reached a peak in epidemic proportion in many economically developing countries like China ranking first followed by India [1]. The world health organization (WHO) states that, there is rapid spread of diabetes in countries with low to middle economic status [3,4], effecting the younger generation starting from 30 or 35 years. This metabolic disorder is a result of sedentary lifestyle, unhealthy food habits due to industrialization and urbanization [5]. The prevalence of

this disease in India was about 7.1% in the year 2009 which had gradually increased to 8.9% by 2019. It is also noted that in the current scenario, globally about 1 million deaths are directly attributed to diabetes. The prevalence for diabetes had greatly increased in India since a decade spreading its effects on both south and north India [6]. According to the report obtain in 2016 the rise is to 7.7% in 2016 i.e., 65 million which was 5.5% in 1990 i.e., 26.0 million [7]. Wherein, Tamil Nadu ranked first followed by Kerala, Delhi, Punjab, Goa and Karnataka. It's alarming; a huge rise in the cases of pre-diabetes, diabetes and its associated complications among the younger generation of India is of great concern.

In India there are greater challenges in addressing the health related issues caused by diabetes, huge diverse population being the major reason. Listing the major challenges in the prevalence

and management of diabetes are as mentioned- like, unavailability of robust surveillance and data related to diabetes, low or lack of disease awareness among people, lack of accessibility to basic requirements like affordable medicines, nutritional food, etc. for prevention and management of diabetes, improper use of allocated funds, lack of coordination and also lack of awareness among the individuals and further many more reasons, hindering the success to overcome the disease. As it is said to be lifestyle disorder one can address the risk factors leading to diabetes and deliver very simple yet affordable lifestyle changes that one should adapt to either prevent or to manage the disease. Spreading the awareness about the benefits of consuming nutritional foods like including whole grains, legumes, vegetables, nuts and fruits in once regular diet and the importance and positive outcomes of practicing simple exercises as a daily routine would gain much beneficial results in handling the lifestyle disorders. In short, the world still need to learn that very simple changes in diet and exercise can prevent the disease and can also revert back the disease to normal condition. It is also recommended by the American Diabetic Association that patients with type 2 diabetes should consume diet with high amounts of fiber rich food and should reduce the consumption of lower amounts of carbohydrates and low calories to improve the glycemic control [8]. A very simple disease yet very dangerous progressive disorder too, showing its damaging effects from head to toe surprising has such simple remedies to prevent and manage its affects. Well established results emphasizing the health benefits of Jackfruit are available and have become the area of interest for many researchers from 2020. Although, consumption of jackfruit to manage various diseases like diabetes, cancers, and inflammatory diseases is of common practice in Indian Ayurveda since ancient period of time. In the present article it is aimed to detail about the beneficial effects of jackfruit to control diabetes. The article will also direct the way to consume and its mechanism of action in controlling diabetes. This is an attempt to spread the awareness about the practice of Medical Nutritional Therapy (MNT) and its positive effects in the research area of diabetes.

About Jackfruit (*Artocarpus heterophyllus*)

Jackfruit is listed one among the exotic tropical fruits cultivated in South India in a large scale. It has an undisputed nutritional value packed with carbs, vitamins, minerals, proteins, fat, tannins, volatile acids and antioxidants [9-11] Hence the fruit is known to have many beneficial effects in preventing and managing certain

diseases like heart diseases, chronic inflammations, diabetes and many more. According to United States Department of Agriculture (USDA) it is learnt that on cup of raw jackfruit contains about 143kcal of calorie, 111g of water, 35g of carbohydrates, 2.6g of proteins, 0.966g of fat, 2.26g of fiber, sodium about 3.02mg, potassium about 676mg, magnesium-43.8mg, phosphorus about 31.7 and Vitamin B6 and C about 0.497 and 20.7mg respectively. Jackfruit known to be a natural sugar that doesn't spike in the blood sugar levels, it is proven to be good source to manage diabetes as it contains good amount of fibers and proteins which are digested and absorbed by the body slowly.

Benefits of jackfruit, in the management of diabetes

Not just the fruit but also the seeds and leaves of the jackfruit can be consumed. There are many studies those explained the beneficial effects of jackfruit when consumed in mentioned amount. The glycemic index of jackfruit is about 50 to 60 stating that this will not contribute for the sudden increase in the glucose levels.

- **Benefits of consuming raw jackfruit:** Consuming raw jackfruit is beneficial over the ripe fruit especially in case of diabetes. As the unripe jackfruit contains only about 20% of the sugar and rich in proteins and fibers. This helps in the blood glucose levels by slowing down the process of digestion and absorption of the sugars by the body. Further food rich in fiber and protein helps to maintain the satiety therefore prevents unhealthy and overeating. This way it also contributes in weight loss too. Study stated that consumption of high intake of fibers with low calories significantly reduce HbA1c levels [12].
- **Benefits of consuming raw jackfruit powder:** Studies state that, consumption of about 30g of raw or green jackfruit powder regularly will lower the HbA1c levels and also reduces the levels of fasting and post-prandial sugar levels too. In a study by [13,14] had performed a double-blind study administrating 30g of green jackfruit powder for one diabetic group for a period of 3months and the other group was given normal food without jackfruit powder. Surprisingly found positive changes in blood glucose levels in the group which consumed jackfruit powder when compared to the group without jackfruit powder.
- **Beneficial effects of consuming Jackfruit leaves for diabetes:** Studies in animal model had proven that, extracts or the fermented leaves and stems of jackfruit are much helpful

in managing the sugar levels in diabetic condition. It leaves and stems of jackfruit are learnt to be rich in phytochemicals like flavonoids [15,16]. It is also studied that β - carotenes, the antioxidant present in jackfruit has inhibitory effect on lipid peroxidation [17]. Decoction made out of fruit leaf had also learnt to be effective in improving the glucose tolerance [18].

Best time and method of consumption of jackfruit

If one consumes the fruit should consider eating only after the meal as it prevents craving for sweet, inhibits mid-meal snacking. Therefore helps both in preventing overeating leading to obesity and to maintain sugar levels. Only about 75g of jackfruit should be taken in diet regularly. More consumption may increase the sugar levels. Prefer to have unripe or raw jackfruit as this ensures to maintain the sugar levels as raw jackfruit has low or less sugar content. Include jackfruit powder in once regular meal by adding it with wheat flour, barely, millets, dosa or idli batter. About 30g of jackfruit powder should be mixed in about 300g of flour (wheat, jowar, bajra, barley), which makes about four rotis/bread. Jackfruit flour or powder doesn't contain any strong taste and aroma hence can be mixed with any food of our interest. Jackfruit can be as such consumed or can be mixed with any fruits used for fruit salad. It can also be consumed with vegetables like carrots, olives, cabbage, beetroot, garlic, etc. Roasted seeds of jackfruit with added spices can also be consumed. Extract or fermented stems and leaves can also be consumed and even those contribute for good health. A study showed that jackfruit flour had about 33% lower carbohydrates, 25% low calories and about 57% of fibers when compared to the placebo flour, explaining the intake of jackfruit in regular diet may prove to have promising results in controlling the sugar levels and also it may be a good intervention to administrate replacing rice and wheat to get successful reports achieving glycaemic control [14]. Overall it is assumed that the lowering effect of glucose on consumption of jackfruit may be either due to increase in the secretion of insulin or availability of insulin/release from the bond form [19].

There are certain related studies to understand the mechanism of action of jackfruit in reducing the blood glucose levels in type 2 diabetic patients. Preclinical studies were conducted in diabetic rats to study the efficiency of anti-diabetic activity in jackfruit extract. It was noticed that there was significant rise in anti-hyperglycemic activity when compared with Glibenclamide- standard drug on the administration of ethanol extract obtained from jackfruit seeds into glucose loaded normal rats [20]. Fraction of ethyl acetate from mature jackfruit leaves about 20mg/kg also showed the similar effect in streptozotocin- induced rats [21]. Wherein, in a

study by Jain S., *et al.* had shown reduced levels of total cholesterol and LDL with an increase in HDL and body weight, however having similar effect of reducing blood glucose levels with increase in the levels of serum insulin. This study was performed in alloxan-induced diabetic rats.

Negative effects of overconsumption of jackfruit

As mentioned above only about 75g of jackfruit should be taken regularly, as it may contribute the rise in sugar levels. Diabetic person should avoid the intake of ripe jackfruit as it is rich in sugars. High intake may also lead to bloating, flatulence and indigestion problems as jackfruit is rich in fiber.

Other health benefits of jackfruit include improvement in digestion, it helps to relieve constipation, prevent ulcers and sores it's the action of phytochemicals, reduces inflammation contributed by flavonoids, carotenoids and vitamin C present in Jackfruit. Wherein Vitamin A and Vitamin C present in jackfruit contribute to strengthening the immune system and acts as powerful antioxidant helping in lowering the risk of cancers. Jackfruit also contributes to beauty, has its role in improving skin and hair texture too.

Discussion

Diabetes is an alarming health concern in the present scenario as it is the causes for various health complications like diabetic retinopathy, neuropathy, nephropathy, etc., leading to multi-organ failure when uncontrolled. In recent advances made in the field of diabetic management MNT is advised to practice as a primary therapy as recommended by nutritionists. Promising results are obtained by the practice of MNT along with anti-diabetic drugs but all that depends on the patients' adherence and awareness to the dietary patterns and making sure to strictly follow the guidelines according to the prescription. The main aim of MNT is to promote and support healthy eating patterns and to encourage maintaining the habit to achieve positive results in controlling a particular disease or disorder. Certain studies explained that they observed a significant reduction about 1-2% in HbA1c levels along with improvement in quality of life in the individuals receiving MNT along with anti-diabetic drugs than those of on exclusively receiving anti-diabetic drugs alone [22]. However, it should be understood that the patterns and clinical profile of diabetes differ greatly between the Western and Indian population [23]. It is observed that about 30% of diabetic patients in India are noticed to be non-obese [24]. Overall it is assumed that the lowering effect of glucose on consumption of jackfruit may be either due to increase in the secretion of insulin or availability of insulin/release from the bond form [19].

Conclusion

The present article highlights the beneficial effects of consumption of jackfruit in various forms and its extracts in lowering the blood glucose levels and helping in maintaining the glycemic index. Introducing MNT along with anti-diabetic drugs is much effective and much simple practice to incorporate jackfruit in regular diet. It is of public health interest and recommended to consume jackfruit both by non-diabetic and diabetic population. These may help to prevent or manage the disease, may further help in reducing the disease related complications.

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