



Review Article

Comprehensive Review on Therapeutic Effect of Jamun and Fenugreek Seeds Against Non-Insulin Dependent Type 2 Diabetes Mellitus

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ABSTRACT

Current lifestyle, eating habits, stress, environmental factors and physical in-activeness have radically increased the progression of several lifestyle diseases. Diabetes Mellitus is one of them considered to be a major public health problem caused by insulin resistance or insulin secretory defects of pancreas that predicted to be turned globally as a pandemic having devastating complications including heart, kidney or neuro-endocrine disorders with increasing number of prevalence ratio day by day. Many drugs are commercially available for managing diabetes, their side effects and high costs underscore the need for herbal alternative drugs. Globally, researchers have been looking for natural therapeutic substances that treat or delay the onset of these lifestyle-related disorders. Numerous types of medicinal plants being implicated as jamun and fenugreek are one of them treat variety of disease ailments but in a few years shift has been focused towards the using of jamun and fenugreek seeds powder in multiple forms which are packed with variety of bio-actively important constituents being effective in controlling blood sugar levels, glycated hemoglobin levels and showed insulin like effect in experimental models, remarkably. In this review we will discuss about chemical composition and potent anti-diabetic potential of jamun and fenugreek seed

INTRODUCTION

Lifestyle adhering diseases which are a subgroup of non-communicable diseases (NCDs) are illnesses that are predominantly caused by people's daily routines [1]. Practices that keep away people from being active and forced them towards an inactive lifestyle can lead to a variety of health problems, some of which possesses life-threatening ailments [2-4]. Diseases related to the way of living now has become increasingly widespread these days, impacting the younger generation as well as the metropolitan population [5,6]. Diabetes Type II (T2DM) is caused by sustained insulin's secretory malfunctioning, which occurs due to the historical events of insulin resistance, which is caused by the body's ineffective use of insulin. The body is still capable of manufacturing insulin, but it has become so resistant that the insulin is no longer functional. Insulin levels may become inadequate over

time, resulting into overt hyperglycemic levels causing further insulin's deficiency and resistance [6,7]. The involvement of insulin as a proliferative hormone causes metabolic imbalances in carbs, lipid, and protein [8]. Defects in the insulin-dependent substrate proteins IRS-1 and IRS-2 mediated signaling pathway are implicated in the development of metabolic disorders, mainly diabetes [9,10]. Further complications result in a decrease insulin release as the body's requirement for insulin increases over time due to progressive deterioration of pancreatic Beta cells, moving many diabetic individuals from self-sufficient to fully insulin-dependent [11]. Diet related hyperglycemic progression of insulin resistance also caused by environmental influences in terms of binge eating, consuming cigarettes, elevated rates of alcohol consumption, Neuro-Endocrinal diseases, elevated

cortisol hormone, irregularities in the secretion of reproductive hormonal system, decreased energy utilization due to lowered physical activity and biological factors such as aging can cause diabetes mellitus (DM)[7]. T2DM is a prevalent metabolic disease which affects approximately 20% of the world wide-populace now a days is one of the leading cause of mortality around the world making it one of the most significant health problem of the twenty-first century [12]. Human population is overburdened by the worldwide epidemic of type 2 diabetes. According to the World Health (WHO), diabetes is the seventh major cause of death in the United States, and it will be the seventh leading cause of mortality around the globe in 2030[13].

Prevalence of Diabetes: Globally, the incidence of diabetics is expected to hit over 300 million by 2025[14]. India is home to the world's largest diabetic populace [15]. India, Bangladesh, Pakistan, Indonesia, and China are expected to account for five of the ten countries with the greatest percentage of diabetics by 2030 [16]. T2DM affects around 230 million individuals worldwide, or approximately 6% of the adult population [17]. Every ten seconds, one individual dies from diabetes-related complications, and 6 million people suffer type 2 diabetes mellitus each year[15]. According to a data published by the International Diabetes Federation in 2013, the worldwide incidence of diabetes in adulthood (20-79 years old) was 8.3%, including 14 millions more males than females, the majority include lies in-between the age group of 40 and 59 yrs, and the figure is projected to expand to 592 million by 2035. Eighty percent of the cases are in low and lower middle nations, "in which the disease is expanding at alarming proportions" [18]. Pakistan is a country in Southeast Asia with a populations of 207.7 million inhabitants and a geographical area of 796 095 km [19].

With approximately 8 million (6.72 percent) individuals suffering from T2DM, Pakistan is ranked fourth amongst countries with relatively higher burden. In addition, around 75% of patients with T2DM live in lower-income nations [15, 20]. Pakistan, on the other hand, has performed three nation-wide diabetic survey from 1947 till yet. In 2016-17, Pakistan's second nationwide diabetic census (NDSP-II) was undertaken, while a third diabetic prevalence survey (DPS-PAK) was done in 2017. Despite the fact that the NDSP-II and DPS-PAK assays being done right away, the incidence levels were significantly distinctive (26.3 vs. 16.98 percent). Several provincial diabetic surveys been conducted among Pakistani's over the last twenty years, although the recorded incidence of diabetes varied between 0.95 percentage to 32.9 percentage[15]. Among Pakistani's, T2DM causes 11.77 percentage of men with 9.19 percentage of females, and 11.20 percentage of women's

affecting more rapidly to men's populace then females one [21]. In accordance with Department Of Health, Pakistan reported 12.9 million people with diabetes in 2011, representing approximately 10% of the country's overall populace [22]. Just in 2012, this was reported that approximately 1 and a half million individuals died as a result of T2DM related complications [6]. DM possesses a tremendous influence on the quality and longevity of health of their patients, as well as also causes huge economic finance crisis[23, 24]. DM around the globe not only costs a lot of money in terms of healthcare, but it also costs a loss of money in terms of reduced productivity and economical expansion[6, 25]. Signs and Symptoms of DM are diversified and depend on the course of complications most frequently linked with physical deformities which are commonly found as untimely lethargic or drowsiness, polyuria, polydipsia, unintended weight loss, slow healing sores, tingling or numbness in your hands or feet, extreme fatigue, being cranky, blurred vision polyphagia, low concentration or interest, slow healing of the wounds etc [27-30].

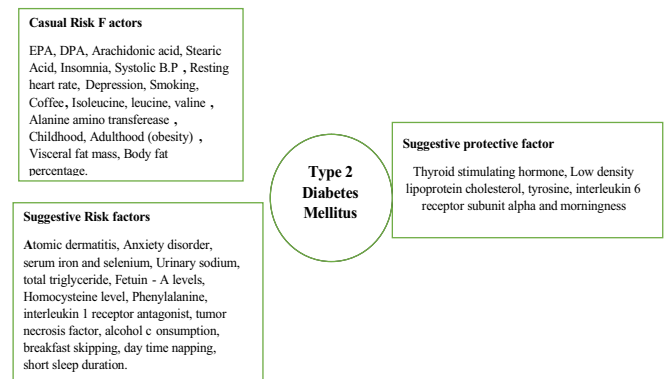


Figure 1: Different Risk factors or Protective factors associated with type 2 Diabetes Mellitus:[27, 28].

Types of Diabetes: The two most common ways which are used for diagnostic criteria for T2DM mostly done by measuring the glucose concentration circulating in the blood in the fasted state (FPG, fasting plasma sugar) also 2 hours after taking last meal. (PP, postprandial glucose test). Plasma Blood Glucose concentration between 70-99 mg/dl in the fasted state are classified as normal, levels came out to be more than 125 mg/dl showed patient is diabetic. In the same way, Post-Prandially blood glucose concentrations range for T2DM is more than 140 mg/dl. Frequently other tests performed for blood glucose level measurement include (HbA1c) or (OGTT). At the camps based commonly health checkups, Random plasma glucose (RPG) test is utilized to determine T2DM [12]. T2DM and its complexities burdensome human populace by co-existing or triggering other diseases making the condition more worsen [27]. Elevation in the blood glucose levels in

the body will influence the regulatory effects of renal system or related bodily organs affecting most appropriately on eyes, tissues of the brain or the heart, lower sides of hands or legs, visual-impairment, amputated lowered legs, kidney failure, heart attack or neurological defects [31]. The complexities arise from T2DM are being divided into two categories, one included the microvascular diabetic eye disease, kidney disease and diabetic ulcer including triggering the extensive one which is macrovascular including peripheral neuritis, cardiovascular disease and stroke [32]. Group of heart diseases along with congestive heart failure being the most common cause of increased death ratios among diabetes mellitus patients [33, 29]. Pancreatic Islets cell tumors [34] and basal ganglia syndrome also seen common comorbidity of DM [35].

Treatment: Today's expenditures of diabetic treatment and its varied complexities are surprisingly astonishing. On a therapeutical level, foremost policy is to design a plan that worked to upgrade the key metabolic processes linked with the developing and progressing of complications. Basic approach for designing a treatment plan may constitute diet based alterations, increased physical activity grouped together with anti-diabetic agents in numerous cases [36]. In the United States, It was put forwarded by the Food Drug Administration agency that above 29,000 supplemented nutraceuticals are commercially used by their population Capita [37]. Patients used their pharmacological regime orally with anti-diabetic supplemented agents in various mineral/vitamin aggregation mainly originated from the natural sources, both herbally and botanically. For the potential curative action against diabetes above 1200 traditionally available plants have been consumed for perceived or real beneficial effects [38]. To be effective, therapeutic interventions for NIDDM must reduce hepatic glucose production either by improving islet dysfunction and raising plasma insulin levels, or improving the effectiveness of insulin on the liver [39]. Botanicals in terms of showing marked actions, supposed to attenuate blood glucose concentration at a much higher pace in multiple bodily tissues, supposed to influence the overall bodily metabolic rate by modulating adipogenesis, upregulating various endocrinal hormonal secretions that exhibited improved insulin action in skeletal muscles [40]. Fenugreek (*Trigonella foenum graecum*) is yearly grown tree that is a part of the legume family Fabaceae. A self-fertilization dicotous tree having trefoil leaflets with branched stems which hold whitish flowers and give rise to goldenish yellowed color seeds [41].

Composition: Fenugreek is well-known for ages having bitter-sweet taste. Seeds are accessible in variety of different forms whereas the whole or grounded

consistency is used as a flavor enhancer for many different food including curry, beverages, decoctions and for flavoring spices [42]. It has been noticed that at the level of 200 µg engrossment extracted component of husk, fenugreek seed and endosperm exhibited 72%, 64%, and 56% anti-oxidative effects following the method of free radical scavenging. Notable levels of bio-active constituents are found in the fenugreek seeds which are supposed to be the polyphenolic compounds as isovetexin, rhaponticin, [43] alkaloidal derivatives, Amino acids (4-hydroxyisoleucine), spirostanols and furastanols derivatives showing potent biological effect against diabetes [44].

CONCLUSION

T2DM is prevalent around the globe with devastating complications in a world-wide population at a faster pace. Numerous oral hypoglycemic drugs being prescribed only showed curative effects as long as they are used but also cause damage to metabolic organs. So, plant based nutraceuticals are proven to have shown marked anti diabetic curative potential as jamun and fenugreek which are packed with variety of bioactive compounds as jambosine, 7 hydroxy isoleucine, methanolic or ethanolic extracts, mycaminose, disogenin or saponins being experimentally proven to exacerbate marked hyperglycemic, hypoinsulinemic, dyslipidemia, LDL-C levels and insulin regulatory effects without causing negative side effects. It can be concluded that jamun and fenugreek seeds regulated the blood glucose profile and can be used as a complementary therapy in controlling the type 2 diabetes, further approached is needed in terms of elucidation of bio-active mechanism in the future study.

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