

A Review on Role of Millets in Weight Loss

Review Article

Asritha V*

Independent Researcher, Habsiguda, Hyderabad, Telangana, India

*Corresponding author: Asritha V, Independent Researcher, Habsiguda, Hyderabad, Telangana, India Email: asrithavissapragada@gmail.com

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Abstract

Obesity is one of the leading causes of chronic inflammatory disorders like type 2 diabetes, cancer, cardiovascular diseases and neurodegenerative diseases. This is also affecting the health care system by increasing health care costs. This is becoming a burden on both developing and developed nations equally. Weight reduction helps to reduce this burden. A reduction in 1kg body weight reduces the risk of getting diabetes by 16%. Grains occupy the major portion of meal plate, replacing refined grains with whole grains like millets helps to reduce weight as well as improve the nutrient content of food. Millets are ancient foods grains rich in micro minerals, flavonoids, phenolic acids. These millets are weed varieties that can be easily grown in varied climatic zones. They are economical and easily available. Promoting millets to replace refined grains like enriched wheat flour, white rice helps to promote weight loss as well as reduce micronutrient deficiencies.

Introduction

Overweight and obesity rates are rising alarmingly high in the world. The recent pandemic COVID-19 hit worse on obese individuals and people with chronic lifestyle disorders. There is a serious need to make behaviour changes towards lifestyle. Healthy eating is one of the important behaviour modifications required to reduce weight. Healthy eating includes eating more fruits and vegetables, legumes and pulses, heart-healthy fats, and whole grains. Grains contribute a major portion of calorie intake in an individual's meal plate. When the quality of grains improves then there is a good chance of high nutrient-dense food. Low cost, low nutritious, high-calorie food is being available in both developed and developing nations. These foods are depleted of micronutrients and this is the leading cause of obesity. So, replacing refined calorie-dense food with more nutritious whole grain foods like millets helps in weight reduction.⁵ This review focuses on the need for weight loss in the present world, factors that contribute to weight loss, the role of millets in weight loss, bringing millets from farm to plate.

Why weight loss is need of the hour

Overweight and obesity are defined as abnormal or excessive fat deposits that might impair health.¹ Body Mass Index cut off for Asian-Pacific group of people is as follows Underweight ($<18.5 \text{ kg/m}^2$) Normal weight ($18.5\text{--}22.9 \text{ kg/m}^2$), Overweight ($23\text{--}24.9 \text{ kg/m}^2$)

and Obese ($\geq 25 \text{ kg/m}^2$) [1]. According to WHO reports, in 2016 more than 1.9 billion adults aged over 18 years were overweight of these 650 million adults were obese [2]. Obesity was thought to be a disease of the rich man and existed in developed countries, but now underdeveloped and developing nations as well suffer from this disorder. Health care cost is also being affected as a result of obesity. A study done on health care expenditure associated with overweight and obese married women in urban India shows that health care expenditure of overweight and obese women was two times more than normal-weight women [3]. Obesity is known to increase the risk of onset of type 2 diabetes and cardiovascular disorders [3]. A clinical outcome study showed that 15-25% of Indian household income was spent on the treatment of diabetic patients in the household.³ As lower income group people are also being affected with obesity, it is suggested that sustainable and easily affordable strategies are required to bring down the occurrence of overweight and obesity.

Factors that contribute to weight loss

Obesity is caused when calorie intake is more than calories burned [1]. This leads to the deposition of fat cells in the body. Living style contributes to one of the major reasons for obesity. High fatty foods, sugary foods, fast foods, improper meal timings, lack of physical activity are some of the factors that contribute to the onset of obesity. Lifestyle changes like heart-healthy eating, increase physical activity helps to treat obesity [4]. Observational studies show that

consumption of whole grains results lowers the risk of weight gain [5]. Whole grains are the grains that have endosperm, bran, germ from the plant intact to the grains [5]. Whole grains help to reduce body fat. Eating whole grains as part of healthy eating reduces the incidence of diabetes, cardiovascular disorders and obesity. Grains are the main source of energy-giving foods that are part of everyday meals. Replacing refined grains with whole grains is one of the sustainable strategies for weight loss.

Millet in Weight loss

Despite the intake of calorie-dense foods in developed countries, micronutrient deficiency is existing among those nations [6]. Modern food processing techniques are relatively depleting micronutrients from foods. Low cost, low nutrient foods with high calories is leading to malnourishment in obese people [6]. Micronutrients play an important role as cofactors in enzymatic activities in the body [6]. Moderate levels of thiamine deficiency affect glucose metabolism, thiamine is absent in refined grains, but metabolism of grains need thiamine [6]. Malnutrition affects the immune system; this leads to an increased risk of mortality due to infection [7]. T cells a special class of immune cells, in obese people play a critical role in inflammation, macrophages get infiltrated in obese adipose tissue and lead to inflammation [7].

Millets are whole grains and are rich sources of micronutrients like iron, zinc, and calcium [9]. Millets in the combination of legumes in a 3:1 ratio enhance the nutrient quality of food [8]. Millets are gluten-free grains and are less allergic to foods [9]. They have 30 % more calcium when compared to regular rice and wheat varieties [9]

Millets are diabetic friendly food with a low glycemic index ≤ 55.9 . They reduce the sudden spike in blood sugar levels. Eating millets promote slow steady sugar levels in the blood. Eating foods with a low glycemic index (GI) regulates fat percentage in the body [9]. This helps to reduce adipose tissue in the body and promotes weight loss. A study on the effect of millet diet versus non-millet diet on diabetic people showed that a millet diet regulates blood glucose levels better than a non-millet diet [10].

Obesity is an inflammatory disorder, Inflammation results in free radical production. Antioxidants from foods play a crucial role in scavenging the free radicals and reducing inflammation [11]. An article published in the American Chemical Society showed that millets like finger, foxtail, proso, kodo, pearl and little millet showed to have a good number of phenolic compounds and possess antioxidant, metal chelating and reducing powers [11]. A study on flavonoids and phenolic compounds in pearl millet revealed that pearl millet is a repository of antioxidants, flavonoids, and phenolic acids that have free radical scavenging capacity there helps to treat oxidative stress-related disorders like cancer, cardiovascular diseases and neurodegenerative diseases [12].

A study published on Arabinoxylan a polysaccharide present in finger millet showed to prevent adiposity in high fat diet-induced rats [13]. As millets are a rich source of micronutrients, gluten-free, low GI, and possess antioxidant properties, millets play a vital role in controlling obesity rates in both urban as well as rural populations.

Challenges and Future perspectives

The goodness of millets come with limiting factors like antinutrient factors. Antinutrient compounds in these grains help these grains to protect themselves from pests, these include phytates and tannins. These antinutrient factors have chelating properties. They chelate with minerals and reduce the bioavailability of micronutrients like iron, calcium, and magnesium.

The phytates and tannins present in millets can be reduced by soaking, germination and fermentation [14]. Sprouting of finger millet for 48 hours helps to reduce tannins and phytates to undetectable levels and a threefold decrease in trypsin inhibitory activity [14]. Fermentation of pearl millet helps to reduce tannins and phytates to 90%-80% respectively [15]. Fermentation also improves protein and fibre values in these grains. A study on "Effect of fermentation on physicochemical and antinutritional factors of complementary foods from millet, sorghum, pumpkin and amaranth seed flours", showed that fermentation has 92.8% of protein digestibility of Millet Amaranth Pumpkin flour [16]. This study also showed that there is a decrease in polyphenols, tannins and phytates by fermentation [16]

Conclusion

Lifestyle modification is the key to sustainable weight loss [17]. Healthy eating is one of the lifestyle modifications for weight loss. Grains are the staple foods and are the main source of carbohydrates in a meal plate for every individual. When the staples are sourced from whole grains then the major part of the meal plate gets corrected and there is a good chance of intake of a sufficient number of micronutrients. Millets are whole grains. They are rich in minerals, flavonoids, polyphenols and carotenoids. They also have a low glycemic index and have a good amount of digestible fibre. This fibre acts as a prebiotic. Millets also help to correct gut dysbiosis [13]. Though they possess antinutrient factors like phytates and tannins, proper cooking procedures like soaking, germination and fermentation helps to reduce the antinutrient content and promote bioavailability of phytochemicals present in them. Making fermented versions of millets, like idli, dosa and paniyarams helps in better digestibility of millet and cooking the whole grain into upma, Pongal helps to retain phenolic acids to some extent and helps in antioxidant activity of millets. Thus, including millets in a regular diet promotes health by reducing malnutrition and obesity. Thereby solving the two major health constraints of the nations.

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