AATCC Review

03 August 2024: Received
05 September 2024: Revised
12 October 2024: Accepted
13 November 2024: Available Online

https://aatcc.peerjournals.net/

Review Article Open Access

Nutritional security through millets

Mandava Hemalatha[1]*, V. Ramesh[2] and T. Sucharita Devi[3]

[1]Department of Home Science, DDS-Krishi Vigyan Kendra (Medak 1), Zaheerabad, Sangareddy, Telangana, 502228, India
[2]Department of Agronomy, DDS-Krishi Vigyan Kendra (Medak 1), Zaheerabad, Sangareddy, Telangana, 502228, India
[3]Department of Foods and Nutrition, College of Community Science, Saifabad, Hyderabad, 500004, India

ABSTRACT

Nutritional insecurity is a major health concern in India which can be eliminated by the intake of a wide range of foods which provide the essential nutrients needed for the well-being of human beings. Nowadays majority of the population depends on cereal-based diet and refined products as their primary source of energy. This cereal based diet and refined food products provides high calories but lack in many of the important nutrients like crude fibre, proteins, minerals, antioxidants and vitamins which results in nutritional insecurity. Experiencing this nutritional insecurity results in many health problems like malnourishment, micro nutrient deficiencies and chronic diseases. In this case millets serves as a solution to prevent nutritional insecurity as they are rich in protein, fibre, iron, calcium, essential amino acids, antioxidants and vitamins. Millets are considered superior to major cereal crops like rice, wheat and maize as their grains. Millets are one of the ancient grains that are being cultivated and consumed by the people.They can adapt themselves to marginal soils and varied environmental conditions. India is the largest producer of millets in the world. Worldwide India ranks first place in bajra production and fourth place in jowar production in the year 2020. Area under cultivation of minor millets also need to be encouraged in India. Few state governments in India have already introduced millets in the mid-day meal programmes of schools but still, there was a higher percentage of children suffering with stunting, wasting, under weight. For a complete eradication of nutritional insecurity millets need to be introduced in mid-day meal programmes of all the schools and anganwadi centres. Including millets in various dietary intervention programmes and in Public Distribution System (PDS) will be of great help to address nutritional insecurity.

Keywords: *Nutritional insecurity, malnourishment, diabetes, millets, nutritional benefits, underweight*

Introduction

Nutritional insecurity is a major health concern in India. Nutrition security demands the intake of a wide range of foods which provides the essential nutrients needed for human beings. Experiencing nutritional insecurity has been associated with negative health outcomes like micronutrient deficiencies, malnourishment (under weight, stunting, wasting, overweight), and higher probability of developing many chronic diseases. Diabetes is one of the chronic diseases which was most prevalent in India.

The prevalence of Underweight

The close observation of NFHS-4 & NFHS-5 data reveals that the rate of stunting, wasting and underweight of children under five years are increasing year by year. Malnourishment can be treated with a healthy diet which consists of all the essential nutrients.

Table 1. Prevalence of stunting, wasting and underweight among children under 5 years and malnutrition among Women (15-49 years of age)

Stunting (%)		Wasting (%)		Underweight (%)		Women whose Body Mass Index (BMI) is below normal (BMI <18.5 kg/m2) (%)	
NHFS 4	NHFS 5	NHFS 4	NHFS 5	NHFS 4	NHFS 5	NHFS 4	NHFS 5
(2015-16)	(2019-21)	(2015-16)	(2019-21)	(2015-16)	(2019-21)	(2015-16)	(2019-21)
28	33.1	18.1	21.7	28.4	31.8	22.9	18.8

Source: National Family Health Survey (NFHS-4 & NFHS-5)

Table 2:India Diabetes estimates (20-79 years)

At a glance	2000	2011	2021	2030	2045
People with diabetes, in 1,000s	32,674.4	61,258.4	74,194.7	92,973.7	124,874.7
Age-adjusted comparative prevalence of diabetes, %	-	9.0	9.6	10.4	10.8
People with undiagnosed diabetes, in 1,000s	-	-	39,397.4	-	-
Proportion of people with undiagnosed diabetes, %	-	-	53.1	-	-

Source: Diabetes report 2000 — 2045

*Corresponding Author: ***Mandava Hemalatha***

DOI: https://doi.org/10.21276/AATCCReview.2024.12.04.249

The prevalence of diabetes

In India, among the age group of 20-79 years, Prevalence of diabetes is about 8.3 percent. There were 6,47,831diabetes-related deaths and the proportion of undiagnosed diabetic cases was 53.1 percent (1 in 2 adults). One in every twelve adults (20–79 years) has diabetes. The number of cases of diabetes have been steadily increasing over the past few decades.

In India, access to affordable treatment including insulin is critical to the survival of people living with diabetes. Globally there is an agreed target to halt the rise in diabetes and obesity by the year 2025.

There are a number of factors that influence the onset of type II diabetes. Foods with high glycemic index such as white rice and refined wheat may increase the risk of diabetes [1]. Consistent evidence shows that type II diabetes can be prevented by relatively modest intentional weight loss, which can be achieved through a regular healthy diet and physical activity. A healthy diet includes low-calorie food, low glycemic indexed foods and eating plenty of dietary fibre. Optimal nutrition forms a crucial component of overall diabetes care. The low-glycemic index diets were recommended to reduce the dosage of diabetic medication.

The prevalence of malnourishment and diabetes was mainly because of higher dependence on cereals-based diet which is deficient in micronutrients and high glycemic index.

Now-a-days, millets are receiving high demand in combating diabetes as a dietary option. The added benefit of millets is their potential positive contribution towards controlling the symptoms of diabetes[2], [3]. In a study conducted by [4] in India on millets anti-diabetic properties, reported that patients with type II diabetes fed with foxtail millet for a period of 90 days showed improved glycemic control as well as other improvements. Indeed, there are much evidence to support that millets have several benefits which makes them as a good dietary option for people with diabetes.

Nutritional benefits of millets

Millets are the primary sources of energy in the semi-arid tropics and drought-prone regions of India. Millets are nutritionally superior to staple foods like rice and wheat as their grains contain high amounts of proteins, essential amino acids, vitamins and minerals. Ragi has calcium thirty-four times more than rice. Little millet has iron content nine times more than rice (table 3).

Table 3. Nutritional composition of millets in comparison with rice and wheat(per100gm)

	Protein (g)	Minerals (g)	Fibre (g)	CHO (g)	Energy (Kcal)	Calcium (mg)	Iron (mg)
Bajra	11.6	2.3	1.2	67.5	361	42	8
Foxtail millet	12.3	3.3	8	60.9	331	31	2.8
Jowar	10.4	1.6	1.6	72.6	349	25	4.1
Ragi	7.3	2.7	3.6	72	328	344	3.9
Little millet	7.7	1.5	7.6	67	341	17	9.3
Rice	6.8	0.6	0.2	78.2	345	10	0.7
Wheat	11.8	1.5	1.2	71.2	346	41	5.3

Source: Nutritive Value of Indian Foods

Jowar

In India, Jowar is one of the ancient staple crop. It consists of iron, protein, fiber and helps in weight loss. Major portion of jowar protein is prolamin which has a unique feature of lowering digestibility and helps in weight loss. It is a safe food grain for people with celiac disease and gluten insensitivity. Jowar being a gluten-free grain, it is a safe food for those who can't tolerate wheat-based products [5] .

Finger millet

Finger millet is a store house of nutrients like proteins, amino acids, minerals and vitamins. It is a good source of natural calcium which helps in tooth formation, bone strengthening and helps in reducing the risk of bone fractures. Due to its high calcium content, finger millet is good for infants, pregnant women and elderly people. Ragi serves as an excellent nutritional supplement for lactating women as it helps in producing a sufficient amount of breast milk.It is also a good source of iron which helps in prevention of anaemia.

Pearl millet

Pearl millet consists of high amounts of magnesium which helps in controlling the glucose receptors in the body. The fibre present in pearl millet helps in the reduction of occurrence of gall stones.

Foxtail millet

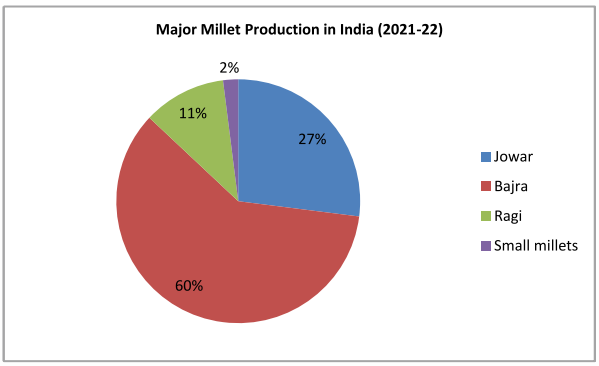
Foxtail millet is very good for diabetic patients. It helps in the slow release of glucose without affecting the metabolism of the body. When people consume foxtail millet, the occurrence of diabetes is reduced and it is also known as healthy heart food because of its high magnesium content [5].

Little Millet

Little millet is a good source ofminerals like iron, zinc, potassium, calcium and Bvitamins. It also provides essential fats to the body which helps in weight loss. Weight loss is considered key to the management of type 2 diabetes which aids in reducing blood glucose levels and also reduces the dosage of medications[6].

Millet Production in India

For centuries, Millets have been an integral part of the diet. In addition to a plethora of health benefits, millets are also good for the environment with low water consumption. The cultivation of millet aids in reducing the carbon footprint. Millets are one of the most abundant crops grown in India and provide staple food for many poor communities. India is the largest producer of millets in the world. Worldwide India ranks first place in bajra production with a share of 40.51 percent and fourth place in jowar production with a share of 7.58 percent in the year 2020 [7]. In India, among the total millet production Bajra contributes for highest percentage (60%) followed by jowar (27%). For a wider varieties of millets, the area under cultivation of small millets need to be increased in India.



Source: APEDA, Ministry of Commerce and Industry

Summary

The number of children suffering with malnourishment and people suffering with diabetes is rising globally and country wide. It is imperative to develop preventative measures involving intervention of diet and lifestyle, which would greatly reduce the risk of onset of diabetes. Usually, diabetic patients experience fluctuation of blood glucose levels which results in various health complications. Dietary intervention can control this fluctuation using dietary regulation with or without exercise and medications. Now it's a time for the country to encourage farmers to further increase area of millet cultivation. The government institutions, KVKs, health departments, women and child welfare departments should conduct more nutritional awareness campaigns on millets. Few state governments in India have already introduced millets in the mid day meal programmes of schools but still nutritional insecurity was observed especially among children and women in the reproductive age group. For a complete eradication of nutritional insecurity millets need to be introduced in mid-day meal programmes of all the schools and anganwadicentres. Including millets in various dietary intervention programmes and in Public Distribution System (PDS) will be of great help to address nutritional insecurity.

Acknowledgements

The authors are thankful to the Director of Agricultural Technology Application Research Institute (ATARI) zone X along with Senior Scientist and Head of the DDS-KVK for providing constant support and encouragement.

References

1. Villegas R, Liu S, Gao YT, et al. Prospective study of dietary carbohydrates, glycemic index, glycemic load, and incidence of type 2 diabetes mellitus in middle-aged Chinese women. Arch Intern Med 2007 November 26; 167(21): 2310–2316

2. Choi, Y. Y., K. Osada, Y. Ito, T. Nagasawa, M. R. Choi and N. Nishizawa. 2005. Effect of dietary protein of Korean foxtail millet on plasma adiponectin, HDL-cholesterol, and insulin levels in genetically type 2 diabetic mice. Biosc. Biotechnol. Biochem. 69:31-37.

3. Park, K. O., Y. Ito, T. Nagasawa, M. R. Choi and N. Nishizawa. 2008. Effects of dietary Korean proso-millet protein on plasma adiponectin, HDL cholesterol, insulin levels, and gene expression in obese type 2 diabetic mice. Biosc. Biotechnol. Biochem. 72(11):2918-2925.

4. Jali,M.V.,Kamatar,M.Y.,Jali,S.M.,Hiremath,M.B.,andNaik,R.K. (2012). Efficacy of value added foxtail millet therapeutic food in the management of diabetes and dyslipidamea in type2 diabetic patients. Recent Res. Sci. Technol. 4, 3–4.

5. O.S.K.Reddy (2017), Smart Millet and Human Health, Green Universe Environmental Services Society.

6. Wilding JP. The importance of weight management in type 2 diabetes mellitus.Int J ClinPract. 2014 Jun;68(6):682-91. doi: 10.1111/ijcp.12384. Epub 2014 Feb 18. PMID: 24548654; PMCID: PMC4238418.

7. https://apeda.gov.in/milletportal/Production.html