MILLETS to Combat Diabetes

INTRODUCTION

Millets consumption has a long legacy and evidences of millets intake has been observed in Harappan archaeological sites and Kalidasa's legendary literatures. Millets are small-grained, annual, warm-weather cereals belonging to grass family. In Tamil Nadu, besides cholam and cumbu, the millets like finger millet, thinai, kudiraivali, varagu and panivaragu and samai are cultivated which offer the much needed nutritional and livelihood security.

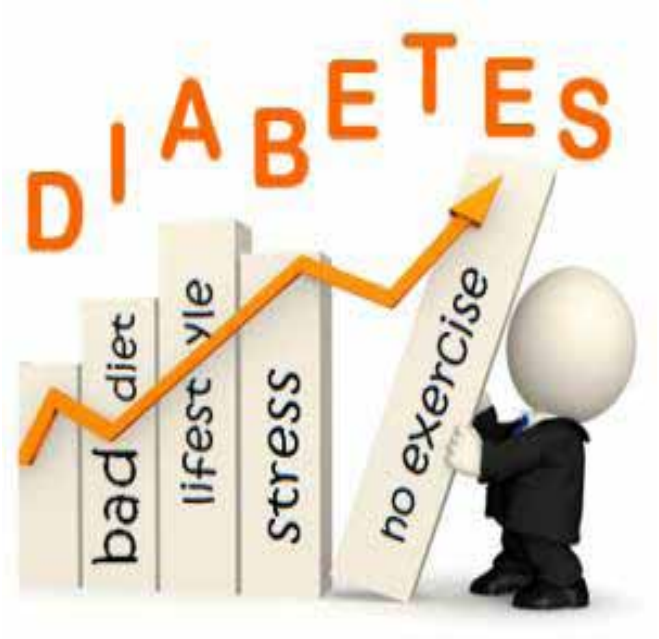
NUTRITIONAL SUPERIORITY

It has been scientifically proven that millets are way ahead of rice and wheat in terms of nutritional content. For instance, millets contain 10.6 grams of protein per 100 grams, as against rice which contains only 6.8 grams. Similarly, millets are also richer in fibre (1.3 grams to 10.1 grams), minerals (1.9 grams to 4.4 grams) and calcium (31 mg to 344 mg) in comparison to rice.

In comparison to rice, millets with their low carbohydrate content, low digestibility and water soluble gum content (β–glucan) have been attributed to improve glucose metabolism. These grains release sugar slowly in the blood and also diminish the glucose absorption. For all these superior properties of minor millets, they are designated as nutritious millets.

MILLETS *Vs* DIABETES

A substantial number of Indian children and women are underweight, anaemic and suffer from micronutrient deficiencies which are the indicators of malnutrition. Changes in lifestyle, decrease in diversification of cereals in food basket and increased share of junk foods during the recent period are the few major factors that hinders millets uptake. Research studies indicate that presence of insoluble fibre in millets not only increases intestinal transit times but also reduces the secretion of bile acids and thereby increases insulin sensitivity and lowers the triglycerides.



Workshop on MTCD

Owing to the nutritional superiority with special reference to diabetic patients and to create more awareness on millets among diabetic patients, a workshop was organized at State Planning Commission, under the chairmanship of Vice Chairperson, SPC on 06.02.2014 in which leading diabetologists, dieticians, medical practitioners, processors and food technology specialists apart from policy makers and officers participated. A small exhibition was organized in association with Adhi Parasakthi Agricultural college, Kalavai, TNAU to make awareness on millets consumption among the public/Govt. servants. Presentations were made by leading diabetic medical practitioners, dieticians and SHG

Record of discussion of the interactive meeting on Millets to Combat Diabetes held on 06.02.2014 at State Planning Commission

The meeting was chaired by Tmt. Santha Sheela Nair, IAS.,(Retd.), Vice Chairperson, State Planning Commission. Thiru. M. Balaji,IAS, Member Secretary, State Planning Commission welcomed the participants.

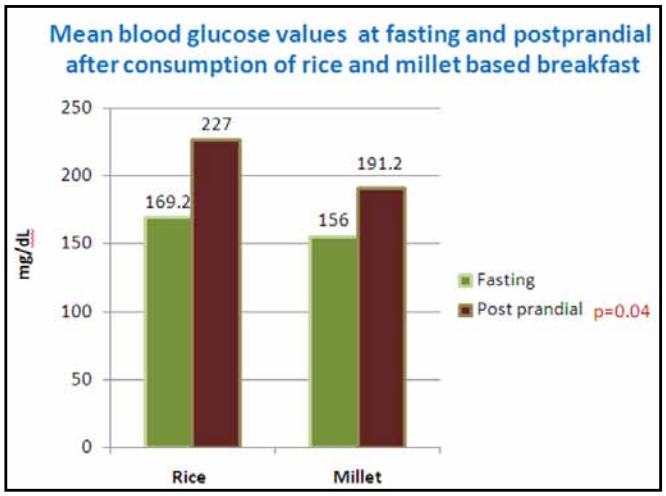
Dr. K. Ramasamy, Member (Agri & Irri) SPC & Vice Chancellor Tamil Nadu Agricultural University and Dr. K. Sridhar, Member (Health) briefed about the importance of millets in dietary schedule of diabetic patients. The low glycemic index nature of millets and nutritional superiority of millets were highlighted.

Role of Millets in the treatment of Diabetes

Dr. Vijay Viswanathan, Head & Chief Diabetologist, M.V. Hospital for Diabetesmade a presentation on role of millets in the treatment of diabetes. It was informed that prevalence of diabetic cases nearly doubled in India during the last decade it rose sharply from 31.7 millions to 62.4 million during the last decade; (2000-2001). Research studies indicated that Indians have relatively low body mass index but increased total, subcutaneous and central (truncal and abdominal) body fat. These unique features led to the coining of the term 'Thin-Fat phenotype' which increases the risk of incidence of diabetes. Moreover, high carbohydrate diets raise plasma glucose, insulin,

triglycerides and non-esterified fatty acids leading to insulin resistance. The higher Glycemic Index/ Glycemic Load of the Indian diet due to intake of refined grains may play an important role in making Indians more susceptible to diabetes compared to Europeans, Chinese and other races.

A study on Urban Indian Population to study the association of dietary carbohydrates & glycemic load with risk of type - 2 diabetes mellitus conducted by the presenter among 1843 adults indicated that total dietary carbohydrates and glycemic load are associated with increased risk of T2DM.



Source : M.V.Hospital for Diabetes, Chennai

The diabetologist informed that millets have a higher proportion of non starchy polysaccharides and dietary fibre and they release sugars slowly and thus have a low glycemic index (GI). A study was conducted to study the Glucose response after consumption of rice and millet based breakfast in persons with Type 2 diabetes. The study was conducted with an aim to determine the short term effect of rice and millet based breakfast on glucose levels in persons with Type 2 diabetes. 34 persons were taken for the study @ 18 males and 16 females and their anthropometric measurements were registered both before and after shifting the food pattern to millets. Moreover, their biochemical parameters like glucose levels both at fasting and post prandial were measured.

Nutritive value of Rice Dosai

Energy (Kcal)	Carbohydrate (g)	Protein (g)	Fat (g)	Fiber (g)
396.4	74.8	10.6	5.94	1.25

Nutritive value of Millet Dosai

Energy (Kcal)	Carbohydrate (g)	Protein (g)	Fat (g)	Fiber (g)
452	74.4	17.77	9.34	7.97

Source : M.V. Hospital for Diabetes, Chennai

The study design included : Day 1- Dosai=2 (Rice=75g & Dhal=20g) with vegetable chutney and wash out period of 2 days and day 3 and Day 4- Millet Dosai= 2 (Millet=90g & Dhal=25g) with vegetable chutney.

Besides, the Carbohydrate was kept constant i.e. 75g in both the recipes, no change in the activity pattern and no change in the OHA regimen during the study period was done.

The study results indicated that Low GI millet based breakfast was effective in significantly reducing the post-prandial glucose levels as compared to rice based breakfast.

One recent study from South India showed that millet based diet lowered HbA1c (19.14%), fasting glucose (13.5 %), insulin concentrations (1.9%), total cholesterol level (13.25 %), triglyceride level (13.51%), and VLDL- C levels by 4.5% in patients with type 2 diabetes.

Another study from North India assessed the long term glycemic and lipid control by comparing 100 g of foxtail millet biscuits with 100 g foxtail millet burfi for 30 days and found a significant reduction in serum glucose (23%), serum cholesterol (6%), serum LDL-C (20%) and GHb (16.5%), and a slight decrease in serum triglycerides and VLDL-C. Serum HDL-C increased significantly by 23%. Similar results were observed for foxtail millet burfi as for foxtail millet biscuits. Hidden health profile of millets to combat diabetes

Hidden health profile of millets to combat diabetes

A presentation on hidden health profile of millets to combat diabetes was given by Dr.SaraswathiEswaran, from Ramasamy Chinnammal Trust Coimbatore.

Therapeutic Value of Millets

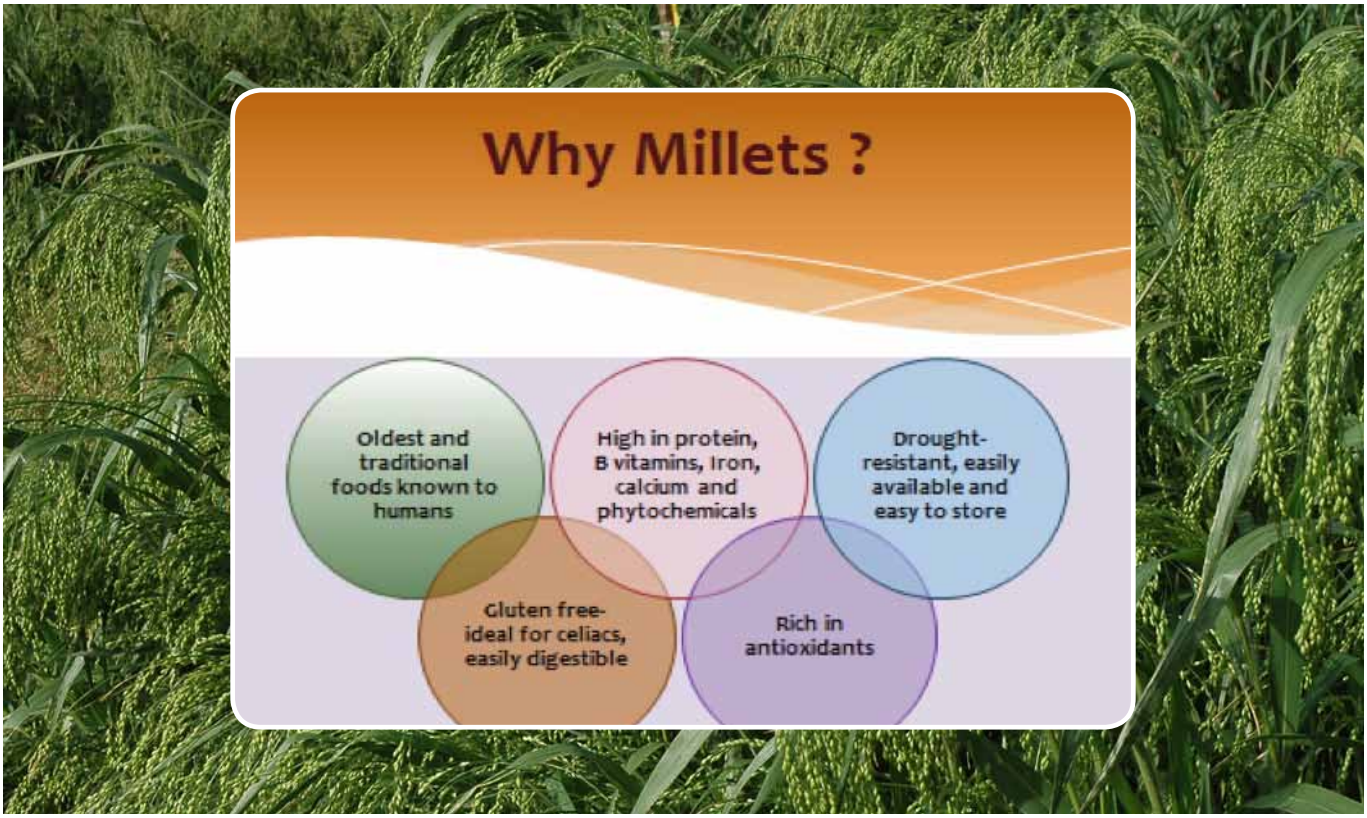
Higher proportion of dietary fiber in millet with low fat provides several nutritional & physiological benefits namely: contains 2 to 9% fibre, posses Hypocholesterolemic & hypoglycemic effects, Low glycemic index – helpful for diabetics , Reduced transit time and Minimisation of undesirable fermentation of undigested food components in the gut and binding with toxins, discharging them with stools in the colon thereby brings down the incidence of colon cancer, constipation & gastro-intestinal complications.

The millet based value added products suited for diabetic patients that are produced by the trust were listed : Breakfast foods - Combination of multigrain dosa mixes and variations and millet based traditional mixes – pongal, paniyaram, adai and puttu. For meal items, following stuffs are prepared: Ready to cook / ready to eat, millet based (RTC/RTE), Sambar rice mix, Tomato rice

mix, Bisibele bath mix, Pulav, Jeera mix and biriyani. To meet the Snacks requirement of diabetic patients : Millet Kakkra, Millet bar, Millet laddu, Millet blended chocolate are prepared. Moreover, Nutritious blends like Nutri beverage, Malt and Commercially viable products like Millet based bakery products, extruded products and flaked products are prepared.

Millets – The diabetic boon

A presentation entitled "Millets – The diabetic boon" was given by Ms.Uthara, Chief Dietician, SRM Institute of Medical Sciences, Chennai. It was informed that epidemiologically lower incidences of diabetes has been reported in millet consuming population. It was also informed that sprouting millets increases the bioavailability of many nutrients such as iron and zinc. The dietary advantages of common millet preparations viz., Cumbankali, cumbu roti, cumbu poori, cumbu paniyaram, cumbu dosai, cumbu rasam, cumbu adai, ragi dosai, ragi dosai with drumstick leaves, ragi kanji, ragi idli, ragi pakoda, chola idiyappam, chola vada, thinai murukku, samai pongal, kuthiraivali murukku, kuthiraivali karappam and varagarisi idli. The nutritional superiority of thinai was discussed in detail viz., thinai shown to prevent CVD by reducing TG, TC, LDL and VLDL. Similarly cholam grain is good for diabetes as it has high ratio of insoluble fibre to soluble fibre which indicates about the low availability in soluble sugars.



Recommendations

- Importance on awareness on millets has been emphasized and it is suggested to conduct an intensive awareness campaign on health benefit of millets. TV shows through celebrities/ well-known dialecticians / dieticians / doctors would be the most appropriate one.
- The diabetologists / dieticians may suggest to include one millet meal per day in the dietary schedule of the inpatient (diabetes) / diabetic patients.

- Similar to the recommendation of oats in control of cardiac related ailments, millet may also be recommended in the list of heart-diabetic health patients owing its rich sources of essential elements viz., Magnesium. Since, magnesium act as a co-factor for more than 300 enzymes, particularly related to insulin secretion and glucose metabolism, consumption of millets become more important.
- The cooperative department may initiate necessary steps for the availability of Ready to cook-Millets through PDS /cooperative outlets and production oriented schemes of SHGs of Puduvazhvu may be dovetailed for easy availability.
- Promotion of Processing clusters and support for entrepreneurs of ready-to-eat millet food preparations is need of the hour. Setting up of block level small scale processing units with adequate of post-harvest processing technological and financial support would be a better option in this regard. Preparation of new generation products like millet pasta, millet vermicelli, millet cookies, millet noodles etc may be give more emphasis for increased consumption among the consumers.

- Research Institution especially TNAU may undertake research on design of machinery for processing of different type of millets for ensuring the nutrient retention during millet processing. Research institutes like TNAU/ICAR institutions should concentrate more on development of Hybrid/High yielding millet varieties which are drought tolerant/saline resistant

The interactive workshop concluded with a vote of thanks extended by Dr.K.R.Jahanmohan, Head of Division (APP), SPC.

Special Thanks to
Tamil Nadu Agricultural University, Coimbatore and other presenters.