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Original Research Article

"Millet Products: Traditional Medicinal Diet For Modern Lifestyle Health Issues"

Sagar Bhatt[1], Dr. Prince Verma[2]*, Dr. Sumant Sharma[3], Chef Sonu K Katnoriya[4]

[1]Assistant Professor, GNA University, Phagwara, E-mail: sagar.bhatt1010@gmail.com

[2]*Assistant Professor, GNA University, Phagwara, E-mail:meprinceverma@gmail.com

[3]Assistant Professor, GNA University, Phagwara, E-mail:sumant.sharma1@gmail.com

[4]Assistant Professor, GNA University, Phagwara

***Corresponding Author:-** Dr. Prince Verma

*Assistant Professor, GNA University, Phagwara, E-mail:meprinceverma@gmail.com

ABSTRACT:

In the present era of world environment fluctuations, water insufficiency, accumulative world population, rising food prices, and other socio-economic impacts are expected to generate a great threat to health and food security worldwide, especially for the poorest people living in under-developed and developing countries such as Africa and Asia continents. Also, the method of agriculture has changed over the period of time with more water requirements and excessive usage of fertilizers. It affects the human health with fatal disease such as cancer becoming more common. These impacts present a challenge to scientists as well as nutritionists to examine the possibilities of producing, processing, and utilizing other potential healthy food sources to achieve food security. Here total twelve grains some of those are positive negative and neutral. few of those kodo millet, little millet, barnyard millet, brown top millet and foxtails millets are come in category of positive grain Millet is widely grown in the Indian subcontinent and constitutes a major source of carbohydrates and proteins for people living in these parts. In addition, because of their important contribution to national food security and potential health benefits, millet grain is now receiving increasing interest from food scientists, researchers, technologists, and nutritionists. An extensive number of earlier reviews have discussed their role in improving the human health. However, an ephemeral review on millet-derived peptides and their alleged role in human health is still lacking. The aim of this work was to review the health benefits and consequence research carried out to date for purposes of evaluation of nutritional quality and potential health benefits of millet grains.

Keywords: Millet, Agro Tourism, Fiber, Sorghum, Wellness & Health Tourism

INTRODUCTION:

Millet grains are one of the small grained cereals, few of the smallest are finger, kodo, foxtail, proso, little and barnyard millets. Millets are the small seeded crop that are named as Pennisetum Glaucum. This is one of the ancient crops found around the globe. It can be grown in less drizzle areas as well. Millet grains are divided into three categories those are positive, negative and neutral. (Reddy, Smart millet and human health. , 2017)Twelve millet grains are grown around the globe out of these five are known as positive millets named as Kodo Millet, Little Millet, Barnyard Millet, Browntop Millet, Foxtail Millet and it have dietary fiber from 8% to 12.5%. Positive millet grains are effect on human health in positive manner. Those millets cured human health diseases and disorders. Neutral grains are named as Sorghum Millet, Pearl Millet, Finger Millet and Proso Millet

those have the dietary fiber range 3% to 6% %. Neutral grains neither cure the new diseases nor help to cure the health disorders. Others are the two neutral millet grains as Paddy rice and Wheat from and the dietary fiber less than 2%, those help to causes the new diseases.

A millet grains are the good source of nutrition and offers a number of health benefits to consumers. Nowadays food culture has changed in the regular lifecycle. People are now more acquainted about their diet and they believe that nutrition compounds are more important than stomach feeding. It is documented that millets are helpful to procure many bacterial diseases. Millets are very cheap at an agricultural cost and very less water is required to grow it and organic cultivation pliability.

(ICAR, 2017) Pennisetum Glaucum is grown in many of the areas of Asian and African continents also few of the states of Europe continent. As in Asia continent India is major millet agricultural country and fifth biggest millet exporter followed by USA, Russia, Ukraine and China. Twenty one states in India grown the millet, many if the area belongs to the southern part of the country such as Karnataka, Andhra, Tamil, Kerala, Telangana. Millets are one of the staple foods of millions of people around the earth.

Millets are used for many body syndromes such as it reduces weight loss, works on prevention from heart problems, it reduces the risk of colon cancer, controls diabetes, and also it works on breast milk production. Instead millets are used in food and beverage industries for the purpose of production of beer and other alcoholic products. Millet is the base product for the condensed alcoholic beverage Rakshi, produced in Nepal and that is the indigenous drink of Sherpa, Tamang, and Limbu people.
(Dayakar Rao B., 2013)Finger millet or ragi and kodo millets are the frequently cultivated millets around the globe. It is cultivated in tropical and subtropical regions. This plant entails the humid climate for cultivation, a climate range between26-29C.

(IIMR Research, 2017)According to the Ministry of Agriculture, the government of India is separated into three categories for organic farming. Jharkhand, Uttrakhand, Rajasthan and northern States are in one of the categories where fertilisers are less used. Now the government has decided to turn those states into organic agriculture farming. And the quality millets can give a boost to human health if it's grown through organic farming. All the above first categories of states are the hub of tourism and with the help of that, tourism can be also enhanced. Few of the famous millets are grown in India such as Bajara (pearl millet), Ragi (finger millet), Jhangora (Barnyard Millet),Jowar (sorghum), Barri (Proso or Common Millet), Kangni (Foxtail/ Italian Millet), Kodra (Kodo Millet) and many more.

BACKGROUND OF THE STUDY

There are total twelve millet grains available around the globe out of it five are positive , five are negative millets and two are neutral. several millets grains in the world. Conferring to few scholars, scientist, researcher, doctors, they were developed from the consistent wild plants as the result of continuous harvesting for the need of food. Some others believe that the before spread of the idea of agriculture was needed in most cases before domestication could begin. Certainly, the Alyawara community of central Australia region failed to develop domesticated crops, even though some of the wild grasses (Panicum spp.) were morphologically and taxonomically similar to those domesticated elsewhere, and seeds were important in their traditional diet (James F. O'Connell, 1983).

The millets considered here are those being cultivated in the subtropical and tropical areas of the Old World. Small millets are also known as minor millets, but they are not insignificant. Japanese

barnyard millet, proso and foxtail millets have all been important in the past, and are still important today, especially in Asia. Finger millet is an old tropical cereal still extensively grown in eastern African region and south Asia. Kodo and little millets continue to be important in Asian countries in times of famine or difficulty.

(Hulse, 1980) There have always been crops for situations where there is a risk of famine, as well as offering a low but more reliable harvest-relative to other crops-in low rainfall regions. Kodo millet was traditionally stored in the temples, so that seed would be available in times of food crisis. Food and seed reserves in the village are important, and should not be overlooked. They have good potential for livestock feed in the dry zones. (Amir Gull., 2014) The millets should be developed both for their potential as good grain producers with modest water needs, and also as producers of forage. They can make good use of any irrigation water available after the main crops have been harvested, and so may be fitted into more productive cropping patterns

OBSERVATIONS FROM INDIA

Presently India is the 5th largest exporter of millets globally. Nearly 41% of total global production was met by India in 2020. In 2020-21, it exported millets worth US $26.97 million.

India's major export destinations are Nepal, UAE, Saudi Arabia, Libya, Tunisia, Morocco, the UK, Yemen, Oman, and Algeria. Nepal (US$ 6.09 million), the UAE (US$ 4.84 million), and Saudi Arabia (US$ 3.84 million) were the top three importers of millets from India in 2020-21. The Indian government notified millets as nutri-cereals in April 2018. Then to facilitate the movement of the millets, it revised guidelines for the movement of surplus production of millets to other states. A provision of inter-state transportation of surplus millets has been incorporated via the Food Corporation of India (FCI) to cater for advance demand placed by the consuming state before the start of procurement.

In the year of 1978, ICAR (Indian Agricultural Research Institute) obtained the research on small millets, and invited IDRC (International Development Research Centre) to contribute towards this. Five small millets were chosen, namely foxtail, barnyard, proso, kodo, and little millets. Work was strengthened at appropriate sites, and multilocational testing was available at these sites, as well as at other locations where AICMIP (All India Coordinated Maize Improvement Project) conducted its trials. Direct comparisons between the different millets were not made, but it is of interest to look at the data now available, from this project and to make tentative assessments.

3. SIGNIFICANCE OF THE STUDY

Millet represents a unique biodiversity component in the agriculture and food security systems of millions of poor farmers in regions such as the Indian subcontinent. (Bhattacharjee et al., 2007). Millets are mostly ground into flour, rolled into large balls, parboiled, and then consumed as porridge with milk; sometimes millets are prepared as beverages. Roti, made from pearl millet, has been the primary food of farmers in Gujarat India (Jeneva, 2009). There is an emerging need for the world to feed its growing population, therefore, it is important to explore plants such as millets that are grown locally and consumed by low income households in places like India and neighbouring countries (Obiana, 2003). Cereals, in particular, millet based foods and beverages are known worldwide and are still part of the major diet in most African countries (Obilana, 2002.) The present study summarises the nutritional composition of millets, some health benefits, and the use of millets in the food industry.

Millets are unique among the cereals because of their richness in calcium, dietary fibre, polyphenols and protein (Devi, 2014)Millets generally contain significant amounts of essential amino acids

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particularly the sulphur containing amino acids (methionine and cysteine); they are also higher in fat content than maize, rice, and sorghum (Obilana, 2002.) In general, cereal proteins including millets are limited in lysine and tryptophan content and vary with cultivar. However, most cereals contain the essential amino acids as well as vitamins and minerals (Lindseth, 2015).

SOME POTENTIAL HEALTH BENEFITS OF MILLETS

Millet is more than just an interesting alternative to the more regular grains. The grain is also rich in phytochemicals, including phytic acid, which is believed to lower cholesterol, and phytate, which is associated with reduced cancer risk (Coulibaly, (2011)). These health benefits have been partly attributed to the wide variety of potential chemo preventive substances, called phytochemicals, including antioxidants present in high amounts in foods such as millets (Izadi, 2012) . Millet is gluten-free, therefore an excellent option for people suffering from celiac diseases often irritated by the gluten content of wheat and other more common cereal grains. It is also useful for people who are suffering from atherosclerosis and diabetic heart disease (Gélinas, 2008.). (Park, 2008) and (Choi, 2005) reported that protein concentrate of Korean foxtail millet and proso millet significantly elevated plasma adiponectin and HDL cholesterol levels and caused major decreases in insulin levels relative to a casein diet in type 2 diabetic mice. Furthermore, proso millet also improved glycemic responses and plasma levels (Park, 2008). In addition, proso millet protein concentrate has protective effects against D-galactosamine-induced liver injury in rats (Ito, 2008). (Choi, 2005)and (Park, 2008) concluded that proso millet protein could be a potential therapeutic intervention in type 2 diabetes (Devi, 2014)review the nature of polyphenols and dietary fibre of finger millet and their role with respect to the health benefits associated with millet.

COMMON HEALTH DISEASES AND ROLE OF MILLET

1. Millets-Diabetes

Millets showed the results by reducing the α-glucosidase and pancreatic amylase thereby reducing the postprandial hyperglycaemia by reducing the enzymatic hydrolysis of complex carbohydrates. The enzymes like aldose reductase which helps in prevention of accumulation of sorbitol and reduces the risk of diabetes induced cataract diseases. Hence consuming millets helps control the blood glucose level and also helps in the dermal wound healing process with the help of antioxidants (Rajasekaran, 2004)

2. Millets - Obesity

Obesity is the biggest emerging problem in India and it is associated with several chronic diseases including diabetes and CVD. Recent studies show that intake of high dietary fibre
decreases the incidence of obesity (Alfieri, 1995). Foods rich in dietary fibre improves bowel function and slows the process of digestion and absorption, thereby reducing the risk of chronic diseases (Ali, 1982)

3. Millets-CVD

Millets showed the results that by consuming the proso-millet protein concentrate, it has the effect on plasma lipid levels and clearly showed that the plasma high-density lipoprotein cholesterol and adiponectin levels are elevated (Ambati, 2019). Millets are also a good source of magnesium which is known for the reduction of heart attack. Millets which are known to be rich in phyto-chemicals which contains photic acid helping in lowering cholesterol and preventing cardiovascular disease by reducing plasma triglycerides (Lee, 2010.). Studies suggested that regular consumption of whole millet grains reduces the risk of CVD.

4. Millets and Cancer

Millets showed results that they are rich in phenolic acids, phytates and tannins which are the antinutrients which help in reducing the risk for colon and breast cancer. It is shown that phenolics in millets are effective in preventing the cancer initiation and progression in vitro (Chandrasekara, 2011). Millet have linoleic acid which contains anti-tumour activity (Ambati, Millets-review on nutritional profiles and health benefits., 2019). Anti-carcinogenic properties of sorghum have been well documented. The polyphenols and tannins present in sorghum have anti-mutagenic and anti-carcinogenic properties (Grimmer, 1992) and can act against human melanoma cells, as well as positive melanogenic activity. China and in different parts of the world (van Rensburg, 1981) showed that Incidence of oesophageal cancer was low with sorghum consumption. In each country, the authors studied 21 communities over a period of 6 years and found consumption of sorghum showed lower mortality from oesophageal cancer than wheat and corn Many of the antioxidants found in millets, in addition to their beneficial impact on neutralising free radicals, which can cause cancer, they can also clean up other toxins from your body, such as those in your kidney and liver. Quercetin, curcumin, ellagic acid, and various other beneficial catechins can help to rid your system of any foreign agents and toxins by promoting proper excretion and neutralising enzymatic activity in those organs. (Reddy, 2017)

5. Millets and Celiac Disease

Celiac disease is a genetically susceptible problem triggered by the consumption of gluten. As the millets are gluten free, they help in reducing celiac disease by reducing the irritation caused by the common cereal grains which contain gluten. (Saleh, 2013)

Regulating the digestive process can increase nutrient retention and reduce chances of more serious gastrointestinal conditions like gastric ulcers or colon cancer. Fibre content in millets helps in eliminating disorders like constipation, excess gas, bloating and cramping. An immune mediated enteropathic disease called celiac disease which is usually triggered by the ingestion of gluten in susceptible individuals (Catassi, 2022)

6. Millets and Phytochemicals

Millets are a good source of phytochemicals and micronutrients. Phytochemicals like phenolics, sterols, lignans, inulin, resistant starch, β-glucan, phytates, tocopherol, dietary fiber and carotenoids are present in millets. The polyphenols are the phenolic acids and tannins, flavonoids are present in small quantities; which act as antioxidants and play a role in the body's immune system (Chandrasekara A & F Shahidi, 2010). Many of the antioxidants found in millet have a beneficial impact on neutralising the free radicals, which can cause cancer and clean up other toxins from the body such as those in the kidney and liver. Quercetin, curcumin, ellagic acid and various other beneficial catechins can help to clear the system on any foreign agents and toxins by promoting proper excretion and neutralising enzymatic activity in those organs. Therefore, tremendous attention has been given to polyphenol due to their roles in human health (Tsao, 2010)

Table: Health benefits of Millets

Millet properties and their health benefits

High fibre content	Sugars are slowly released	Helps in diabetes Helps in constipation, Intestinal cancer	Veenu Verma., et al, (2012)
Gluten free	Complex carbohydrate	Helps in Celiac disease	Dayakar Rao., et al, (2013)
Phytochemicals	Phenolic acids and flavonoids	Overall health management	FereidoonShahidi., et al, (2013)
Nutraceuticals	Antioxidant activity	Prevent disease risk, Helps as	Palanisamy Bruntha

	Anti-microbial	prebiotic and probiotic Antidiabetic Antitumorigenic	devi., et Anti microbial al (2014)

MILLET IN THE INDUSTRY

Millets have good grain qualities suitable for processing. Processing of the grain for many end uses involves primary (wetting, dehulling and milling) and secondary use (fermentation, malting, extrusion, glaking, popping and roasting) operations. Being a staple and consumed at household levels, processing must be considered at both traditional and industrial levels, involving small, medium and large-scale entrepreneurs (Obilana, 2002.). Dehulling is not favourable to millets due to their small grains sizes. In addition, dehulling causes nutrient loss. (Amadou, 2013.) All the Millets can be milled by hand grinding (household level) or machine milling (cottage, small-to-medium scale service and large scale industrial). Millet and sorghum malt production is a traditional practice in Africa, where malt is used in lactic acid- and alcoholic-fermented beverages and infant food production (Amadou, Millets: Nutritional composition, some health benefits and processing-A review., 2013). Traditional malting processes in many developing countries involve three main operations: soaking, germination, and drying. The duration and conditions of each operation are highly variable, resulting in highly variable malt and derived product quality. (Devisetti, 2015) Burukutu and Pito are traditional African beers differ from Western beer types in several ways: they are often sour less carbonated and have no hops; these beer are products of both at traditional and industrial level (Thapliyal, 2015). The emerging principal uses of millets as an industrial raw material include production of biscuits and confectionery, beverages, weaning foods and beer Grits, flour, and meals from cereals such as millet, sorghum, and corn are now common items in the market. Soft biscuits and cookies are being made using sorghum, maize and wheat composites, while cakes and non-wheat breads have become a subject of increasing scientific and technological enquiry, showing encouraging results (Amadou I. L.-W.-H., 2011)

METHODOLOGY

Content analysis was the research tool used to analyse the role of millets in human health. A summative approach to qualitative content analysis was utilized to identify the use of millets and their potential benefits with the intent of identifying core Impact on common health diseases indicating of Millet's nutritional compound and other values for human health care (Choi, 2005). Most of the African and Asian Countries are conducting the research on Millet production and their medicinal values as well as introducing millet as the alternative regular grains. As the water level is decreasing many of the studies said millets plant consumes less water compare to other grain (ICAR, 2017). More than sixty research paper, Newspaper article, web links and other secondary data of government research institute related to the agriculture such as ICAR (Indian Council Of Agricultural Research India), IFPRI (International Food Policy Research Institute USA), IITA(International Institute of Tropical Agriculture Nigeria), ILRI (International Live Stock Institute, Kenya) were included in the study. A two-step methodology was implemented in the analysis of the data. Firstly, the research of the Millet production and its potential beneficial factors sourced via their respective organisational bodies or website till July 2022, which was then compared across all research available on data base to determine the core uses available.

Notwithstanding, the summative approach allowed for basic exploration and discovery of the types of millet and its meaning which allowed population to be made healthy and procuring them from many of the diseases as well as help to saving the water consumption.). Secondly, the offerings were then compared against the health institute research in order to ascertain its impact on common health diseases related to the modern food habits. Also it gives a brief about the millet impact on particular human organ.

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BENEFIT FOR SOCIETY

Millets are still the staple food for millions of poor people in Africa and Asia. Like many other cereals, millets are high carbohydrate energy content and nutritious, making them useful components of dietary and nutritional balance in foods. Combination of millets with other sources of protein would compensate for the deficiency of certain amino acids such as lysine. Successful improvement of these attributes would be a crucial key to expand the spectrum of applications of millet grains. There are many possible health benefits for society. It gives a good digestive system. millets have probiotics, as well as being useful for celiac disease or gluten intolerance.

(Gélinas, Gluten contamination of cereal foods in Canada. , 2008) Proved in their study that millets improves the human mood due to high concentration of Amino acid. Nowadays work pressure is very high on the job which results in high blood pressure and high glucose in human health. Many studies prove millets can reduce or control all these problems. Many doctors are there who use the millets for patients' prescription sheets, and they gave the millers to their patient as a medicine which is no harmful for human health as many of the allopathic medicine Future trends should focus on the millet consumption in the developed countries that could help its industrial revolution.

CONCLUSION

After reviewing the many of the researcher's articles the fact was found that the entire world is facing lots of health issues due to the fiber less or zero fiber food. This is also identified that thousands of patient's diseases due to their lifestyles made to be cured by eating millets at their regular food habits instead of other grains wheat, rice, processed meat, palm oils, packed food as well as ready to eat products: cup noodles, soups and many types of processed milk at breakfast, lunch, and dinner. Millets are having several health benefits for humans to include these primordial various grains: kodo millet, finger millet, proso millet etc. in our consistent diet. Due to the unawareness in people many of the peoples are even not aware about the health benefits and their nutritional compound. Also it would not be an exaggeration to say various types of millets are one of the best kept secrets of our ancient ancestors. If we look back to the history millets are originated in china but used by all the generations entire the globe throughout various eras. After going through the religious text like Mahabharata and Bible it was found that Millets are mentioned as precious crops. After the successful completion of this study it will help many of the people to recognize and identified the value of millet grains and the availability of nutrients in it also it will defined where all it can be used for curing the various diseases. Also this study helps to people about the required agricultural need for this crop which also can use for reducing the starvation from the earth. Due to the starvation millions of the African and Asian Countries children are facing the malnutrition and other health problems. After the detailed study about millet grains it can say those are having the substantial health benefits that can cure the health disorders with rich content of nutrients and fibers. It also help to metabolic disorders few of those are diabetes, obesity, colon cancer etc. Millet grains also helps in the child growth and development of mind as well as fulfilling the need of calcium and nutrient content. It help to make bones in children and senior citizen. Millet grains have a good iron content this helps in ailing of anaemia and cured by it. Millet grains also have the gluten free characteristics that helps to prevent and cured the celiac diseases also a good source or an alternate of gluten free food. Both Phytosterols and policosanols are cardio-protective composites existing in the waxy layers of the millet. Also if that millet has broken down into flour without dehulling one have the multiple benefits. Millet grains also act as the antioxidants, that protact human body's cells alongside the belongings of free radicals.

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