
A COMPARATIVE STUDY OF MAKING BREAD FROM MILLET FLOUR

By: Asst. Prof. Swati Narnaware

Tuli College of Hotel Management, Near Koradi Octroi, Bokhara Road,

Dist. Nagpur – 441123.

Author Email Id: swati.narnaware01@gmail.com

ABSTARCT: Millet bread has gained growing popularity as a nutritious and gluten-free alternative to traditional all-purpose bread. Cereal based food products are supplemented with millets and has become increasingly popular due to nutritional and economic advantages. Value added products from millet have the potential to add value to business and has a large potential for growth as consumers believe that millets and millet based foods contribute directly to their health. By studying and experimenting with millet bread recipes, we can discover new ways to enjoy this ancient grain and its potential positive impact on our overall well-being. Additionally, studying millet bread can also help us develop innovative and delicious gluten-free options for individuals with dietary restrictions or preferences.

INTRODUCTION: Millets, champions of the food system, have been cultivated in Asia and Africa for over 4,000 years. During the Middle Ages, they were major grains in Europe. While primarily used for pasture in the United States and western Europe, millets remain vital food staples in developing countries worldwide. With higher protein, iron, and calcium levels compared to rice and wheat, millets boast polyphenols that aid in reducing fat absorption and a low glycaemic index that regulates blood sugar levels. In the semiarid tropics of Asia and Africa, especially in India, Mali, Nigeria, and Niger, millets are crucial crops, representing 97% of production in developing countries, making them highly favored Millets were cultivated in Asia and Africa more than 4,000 years ago, and they were major grains in Europe during the Middle Ages. Although they are used chiefly for pasture or to produce hay in the United States and western Europe, they remain important food staples in developing countries worldwide.

Compared to rice and wheat, millets have higher protein, iron and calcium levels. They are rich in polyphenols, which help reduce fat absorption and have low glycaemic index which helps regulate blood sugar levels. With so many benefits associated with them, millets are the champions of the food system.

Millets are important crops in the semiarid tropics of Asia and Africa (especially in India, Mali, Nigeria, and Niger, with 97% of millet production in developing countries. This crop is favored due to its productivity and short growing season under dry, high-temperature conditions.

The term millet is sometimes understood to comprise sorghum. The annual harvest of sorghum is twice the amount of other millets. Of these pearl millet is the most common. Pearl millet and sorghum are important crops in India and parts of Africa. Finger millet, proso millet, and foxtail millet are also important crop species.

Millets may have been consumed by humans for about 7,000 years and potentially had "a pivotal role in the rise of multi-crop agriculture and settled farming societies"

Nutritional Benefits: Millet bread is rich in nutrients. It contains essential minerals like magnesium, phosphorus, and iron, as well as B-vitamins and dietary fiber. These nutrients contribute to overall health and well-being.

1. **Gluten-Free:** Millet bread is naturally gluten-free, making it suitable for individuals with gluten sensitivities or celiac disease. It provides a safe and tasty
2. **Digestive Health:** The high fiber content in millet bread promotes healthy digestion and can help prevent constipation. It supports regular bowel movements and contributes to a healthy gut.
3. **Blood Sugar Regulation:** Millet bread has a lower glycemic index compared to wheat bread, meaning it causes a slower and steadier rise in blood sugar levels after consumption. This can be beneficial for individuals managing diabetes or looking to maintain stable blood sugar levels.
4. **Unique Flavor and Texture:** Millet bread has a slightly nutty flavor and a dense texture, which sets it apart from traditional wheat bread. Many people enjoy the unique taste and find it to be a delicious alternative.
5. **Millet bread is a type of bread that's made using millet flour instead of regular wheat flour. It's a great option for people who are looking for a healthier alternative to traditional bread. Millet is a whole grain that's rich in nutrients like fiber, protein, and various vitamins and minerals.**
6. **Millet bread is also gluten-free, which means it's suitable for those with gluten sensitivities or celiac disease. It has a slightly nutty flavor and a dense texture, making it a delicious and nutritious choice.**

Not only is millet bread a tasty option, but it also offers several health benefits. It can help regulate blood sugar levels, support digestion, and promote heart health. Plus, it's a good source of antioxidants, which can help protect against cell damage.

Whether you're looking for a gluten-free alternative or simply want to try something new, millet bread is definitely worth a try!

Millet bread has gained growing popularity as a nutritious and gluten-free alternative to traditional all-purpose bread. Millets, which are small-seeded grains, offer a range of health benefits and unique flavors that set them apart from other grains. This research aims to explore the differences between millet bread and all-purpose bread, including their taste, texture, nutritional profiles, and potential culinary applications. By understanding these distinctions, we can gain insights into the potential benefits and considerations of incorporating millet bread into our diets. So, let's dive in and discover the wonderful world of millet bread

Millets are a highly varied group of small-seeded grasses, widely grown around the world as cereal crops or grains for fodder and human food. Most species generally referred to as millets belong to the tribe Paniceae, but some millets also belong to various other taxa

AIM: A comparative study on making bread from millet flour.

OBJECTIVES:

- To experiment with different types of millet
- To create healthy version of bread
- To evaluate the healthier version of bread from millet flour
- To analyze the difference of millet bread and regular bread

PURPOSE OF STUDY: The purpose of studying about making bread with millet flour is to explore and understand the nutritional benefits and potential health advantages of incorporating millet into our diets. By studying and experimenting with millet bread recipes, we can discover new ways to enjoy this ancient grain and its potential positive impact on our overall well-being. Additionally, studying millet bread can also help us develop innovative and delicious gluten-free options for individuals with dietary restrictions or preferences. So, whether it's for personal interest, health reasons, or culinary exploration, studying millet bread can open up a world of possibilities!

REVIEW OF LITERATURE: A round 80% of human diseases are caused by wrong eating style and wrong diet. Millets are coarse grains like sorghum, bajri, ragi, which contain a lot of nutrients. This year, celebrating the International Year of Millets, the world has also realized the importance of traditional food. India has a hidden treasure of nutritional food in the form of millets Compared to rice and wheat, millets have higher protein, iron and calcium levels. They are rich in polyphenols, which help reduce fat absorption and have low glycemic index which helps regulate blood sugar levels. With so many benefits associated with them, millets are the champions of the food system. Millets are hardy plants capable of growing where most other grain cereals would fail. They are mostly grown in areas with low rainfall, poor irrigation facilities and low fertility. These are well suited for "dry farming." In developing countries, with the current rate of increase in population and with less than adequate irrigational facilities, millets can adequately meet the demand for additional food supply. The name "millet" is applied to numerous small-seeded grasses which originated in Asia or Africa. Apart from maize and sorghum, the major millet crops of India are pearl millet (*Per Africa aploideum*) called "bajra" and finger millet (*Eleusine coracana*) known as "ragi". A number of other minor millets are grown and they are: the common millet or proso millet (*Panicum miliacetum*), foxtail millet (*Setaria italica*) and kodo millet (*Paspalum scrobiculatum*). These millets, along with maize and sorghum, are considered "coarse grains" and constitute the food of the economically weaker sections of the population in India. In China, foxtail millet is the most common millet and one of the main food crops, especially among the poor in the dry northern part of that country. Millets are hardy plants capable of growing where most other grain cereals would fail. They are mostly grown in areas with low rainfall, poor irrigation facilities and low fertility. These are well suited for "dry farming." In developing countries, with the current rate of increase in population and with less than adequate irrigational facilities, millets can adequately meet the demand for additional food supply. The world area occupied by millet has steadily decreased from 68.4 million hectares in 1974 to 43.4 million hectares in 1980 and to 36 million hectares in 2004-05. During these periods, the production also came down from 46.2 million tonnes in 1974 to 28.9 million tonnes in 1980 and is now only 29 million tonnes (2005). During 2004-05, the area under millet cultivation in India was 12.2 million hectares with a production of 9.4 million tonnes. The yield of millets tends to be low because the crop is often grown in areas of limited rainfall and in marginal (low fertility) lands. The world average yield of millets now is 8.0 quintals per hectare while that of India is 9.6 quintals per hectare. Pearl millet is a native of Africa and is successfully cultivated in India. Among millets, bajra is the predominant crop in India, occupying, during 2004 an area of 7.5 million hectares with a

production of 4.6 million tones and a yield of 6.1 quintals per hectare. The coarse grain contains 8-10 per cent husk. The average chemical composition of bajra grain is as follows: moisture, 12.4; protein, 11.6; fat 5.0, carbohydrate, 67.1; fiber, 1.2; and mineral matter, 2.7 per cent. The mineral matter is rich in calcium, phosphorus and iron. More than 50 per cent of the phosphorus is as phytin which is a major factor for the poor digestibility of the bajra grain. The protein content of bajra varies from 8.8 to 16.1 per cent. The protein contains a high proportion of prolamin, followed by globulin and albumins. Among the amino acids tryptophan content is high and lysine content average to low. The carbohydrates consist mostly of starch with smaller amounts of sugars (1.2 per cent), peniosans and hemicelluloses. The starch is composed of 32.1 per cent amylose and 67.9 per cent amylopectin. The grains are rich in thiamine, riboflavin and niacin. About 85 per cent of bajra produced in the country is used as food. It constitutes the staple diet of nearly 10 per cent of the Indian population. It is consumed after dehusking and cooked in the same way as rice. More commonly, it is ground into flour and made into chapatis. It is also made into thin porridge. The grain is sometimes eaten after it is parched, the product being similar to pop com. The grain is suitable for the preparation of malt. An intoxicating drink is obtained from its malted seeds 1) A Babatunde Obajana's 2002 book Pseudocereals and Less Common Cereals Even though millets and sorghum make up only 4.7% of the world's grain production they are crucial as food staples and ethnobotanical crops in the semi-arid and sub-humid regions.

Millions of people in Asia and Africa rely heavily on these crops as a source of protein and energy. By 1994, the world's average annual millets production was 28.1-30.5 million tonnes, with an area of 38-54 million has Babatunde Obilana, 2002)] (Obajana's, 2002) 2) Cereal Chemistry (C.C. LAL, 1964) Pearl millets' lipid content and fatty acid composition of free and bound lipids Pearl millets' lipid content and fatty acid composition were investigated. 5.55 to 7.08% of the total lipids were free, while bound lipid content was higher. Different processing treatments brought about relevant changes in the composition and content of certain phenolic acids and flavonoids in processed millets. Phenolic extracts of raw and processed millets exhibited multiple antioxidant activities and are also potent inhibitors of α -amylase and α -glucosidase. In general, germinated millets showed highest phenolic content as well as superior antioxidant and enzyme inhibitory activities. These results suggest that germinated millet grains are potential source of phenolic antioxidants and also great sources of strong natural inhibitors for amylase and α -glucosidase. (Pradeep, 2015) 5) Trends in Food Science & Technology Sorghum and millets: protein sources for Africa (Peter S

Belton, 2004) Sorghum and millets: protein sources for Africa Sorghum and millets are vitally important cereals for the maintenance of food security in Africa. (<http://bioinfo.tnau.ac.in/Tenai/index.ph>, n.d.)

They represent about half the total cereal production on the continent and as such are a major source of protein for the population. They are still under researched compared to other cereals. This paper reports on a conference recently held in Africa to explore the current state of knowledge on the proteins of these cereals and to suggest routes to the better exploitation for enhanced nutritional and functional properties Related articles All 8 versions Content of insoluble bound phenolics in millets and their contribution to antioxidant capacity Anoma Chandrasekara, Fereidoon Shahidi Journal of agricultural and food chemistry 58 (11), 6706-6714, 2010 Soluble and insoluble- bound phenolic extracts of millet (kodo, finger, foxtail, proso, pearl, and little millets) whole grains were several varieties evaluated for their phenolic contents and antioxidative efficacy using trolox equivalent antioxidant capacity (TEAC), reducing power (RP), and B- carotene-linoleate model system as well as ferrous chelating activity. In addition, ferulic and p-coumaric acids were present in soluble and bound phenolic fractions of millets, and their contents were determined using high-performance liquid chromatography (HPLC) and HPLC-mass spectrometry (MS). Kudo millet had the highest total phenolic content, whereas proso millet possessed the least.

Millet grain is highly nutritious with good quality protein, rich in minerals, dietary fibre, phyto-chemicals and vitamins. The nutritional composition of the millets is compared with that of rice and wheat. The protein content of foxtail millet, proso millet and pearl millet are comparatively higher than the protein content in wheat. The fibre content of kodo, little, foxtail and barnyard millet is higher. Finger millet has a remarkable amount of calcium 344.00mg / 100g. Cereal based food products are supplemented with millets and have become increasingly popular due to nutritional and economic advantages. Value added products from millet have the potential to add value to business and has a large potential for growth as consumers believe that millets and millet based foods contribute directly to their health Overview on Millets P. KARUPPASAMY Food Science and Nutrition, Don Bosco Agricultural College

Addition Millets are one of the oldest foods known to humans & possibly the first cereal grain to be used for domestic purposes. It is a cereal crop plant belonging to the grass family Graminae. The term millet refers to several types of small seeded annual grasses that belong to the species under five genera namely, Panicum, Setaria, Echinochloa, Pennisetum and Paspalum in the tribe Paniceae and genus Eleusine, in the tribe Chlorideae. The origin of millet is diverse with varieties coming from both Asia and Africa. Millets have been main staples of the people of semi-arid tropics of Asia and Africa for centuries where other crops do

not grow well. They have been cultivated since time immemorial. There are around 6,000 varieties of millet grown throughout the world. Millets are underutilized in many developed countries. There is an immense potential to process millet grains into value added foods. (Chandrasekara and shahidi, 2010). Innovative approaches in millet production, processing and food technology can create new market opportunities, appealing to both those who produce millets and to a diverse consumer base The United Nations General Assembly declared 2023 as the International Year of Millets (IYM 2023). Through their high diversity and ability to thrive in arid conditions, millets have always been a valuable asset in promoting healthy diets and in strengthening food and nutrition security worldwide. Each millet variety brings its own set of essential nutrients, making millets a perfect solution for countries aiming to boost self-sufficiency and reduce dependence on imported cereals. IYM 2023 provides a unique opportunity to raise awareness about the numerous advantages of millets, from nutrition and health to environmental sustainability as well as economic and social sustainable development. The International Year aims to foster stronger collaboration between science and policy, facilitate meaningful partnerships, mobilize stakeholders to take action on promoting and producing millets, and encourage the general public to embrace Better production Millets offer numerous advantages for those who produce them. With their high yield potential, even in unfavourable growing conditions, their short growth cycles and their resilience to pests and diseases, they are a sustainable and economically viable choice. Multiple harvests in a year provide flexibility, while lower reliance on pesticides and synthetic fertilizers promotes environmentally friendly practices. Enhancing the production of millets can support the transformation to more efficient, inclusive, resilient and sustainable agrifood systems. Better environment The sustainable cultivation of millets supports climate-resilient food production. Millets withstand drought, heat and poor soil conditions, and require minimal inputs and maintenance. Millets are tolerant or resistant to diseases and pests, and are more resilient to climate shocks and stresses than other cereals. Millets require less water compared to other grains, making them suitable for territories facing water scarcity.

They also contribute to soil conservation and biodiversity preservation. By covering arid areas, they contribute to soil restoration and reduce degradation. Better nutrition In their diversity, millets provide various essential nutrients and can contribute to healthy diets with the vitamins, dietary fibre, antioxidants,

protein and minerals, including iron, they offer. As whole grains, their dietary fibre can help regulate bowel function, blood sugar and lipids, and promote satiation. Their diverse flavours and textures add variety to our meals and enhance culinary experiences. Better life Millets can play a vital role in ensuring food security and nutrition. Millets are deeply rooted in Indigenous Peoples' cultures and traditions and, for centuries, they have been a traditional staple crop for hundreds of millions of people in sub-Saharan Africa, South Asia and East Asia. In arid areas, millets are often the only crops that can be harvested in the dry season and are a crucial part of the household food basket. By overcoming food scarcity in difficult periods, they can contribute to the food security and nutrition of vulnerable populations. Promoting sustainable consumption of millets, leveraging market opportunities and creating additional revenue sources, millets can support the livelihoods of different actors involved across the value chain, including smallholder farmers, young people, women and Indigenous Peoples. Millets need very little water for their production. Compared to irrigated commodity crops currently promoted by policy measures, millets require just around 25% of the rainfall regime demanded by crops such as sugarcane and banana. Thus, they do not burden the state with demands for irrigation or power. Millets are often growing on skeletal soils that are less than 15 cm deep. It does not demand rich soils for their survival and growth. Hence, for the vast dryland area, they are a boon. Millet production is not dependent on the use of synthetic fertilizers. Most millet farmers therefore use farmyard manures and in recent times, household produced bio fertilisers. Therefore, they can significantly reduce the huge burden of fertilizer subsidy borne by the government. Grown under traditional methods, no millet attracts any pest. They can be termed as crops. A majority of them are not affected by storage pests either. Therefore, their need for pesticides is close to nil. Thus, they are a great boon to the agricultural environment.

RESEARCH METHODOLOGY:**TITLE OF RESEARCH:** A Comparative Study of Making A Bread From Millet Flour

Selection of sample: questionnaires direct communicating with staff and discussion method are used purposive random sampling technique used for sample taken from all the directions

Sample Unit: Around 57 Questionnaires were collected from staff to collect data purposive random technique for samples

Sample Size: 57

Sample Unit is limited to 57.

PRIMARY DATA

The primary data consist of information collected through the questionnaires consist of basic information about topic and survey done on it.

SECONDARY DATA

The secondary data consists of individual information gathered by the researcher through text book, internet, and magazines.

ANALYSIS OF DATA

Data collected from the questionnaire is presented in the form of tables and graphs and is presented in the result and discussion chapter.

RESULT AND DISCUSSION

Table 1

Consumption of millet bread into your diet

Sr.no	Particulars	Respondents	Percentage
1.	Times a week	30	32.1
2.	Once a month	15	28.3
3.	3-4 times	23	22.6
4.	Everyday	8	7.5

From the above table it has been observed that 30.8% respondents says that they consume bread twice a week, 8.7% eat everyday &23.1 eats 3-4 times

consumption of millet bread into your diet

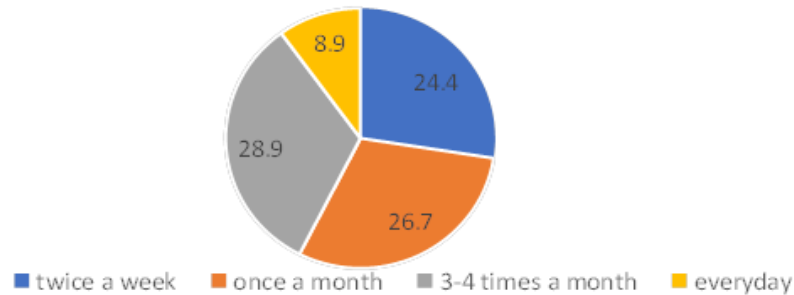


Fig 1

Table 2

Taste satisfaction of millet bread

Sr. No	Particulars	Respondents	Percentage
1.	Most likely	8	15.1
2.	Likely	27	50.9
3.	Surely	12	22.6
4.	Not likely	6	11.3
5.	Total	53	99.9

From the above table it has been observed that 22.2% respondents say that they are most likely satisfied with taste, whereas 48.9% say likely 15.4% say surely &13.6% say not likely.

Taste satisfaction of millet bread

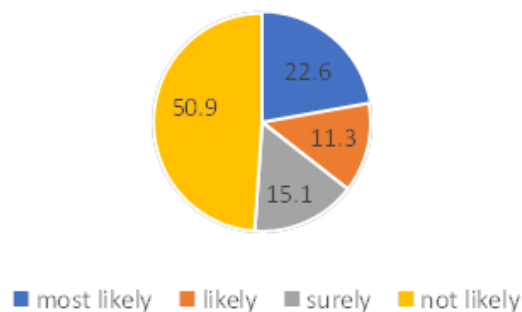


Fig 2

Table 3

Making a bread from healthy flour

Sr.no	Particulars	Respondents	Percentage
1.	Not surely	9	15.1
2.	Would like to try	22	41.5
3.	Surely	9	17
4.	Yes tried before	13	24.5

From the above table it has been observed that 15.1% respondents not surely tried bread making from healthy flour, whereas 41.7% respondents would like to try, 17% respondents say surely & 24.5% say yes I tried before.

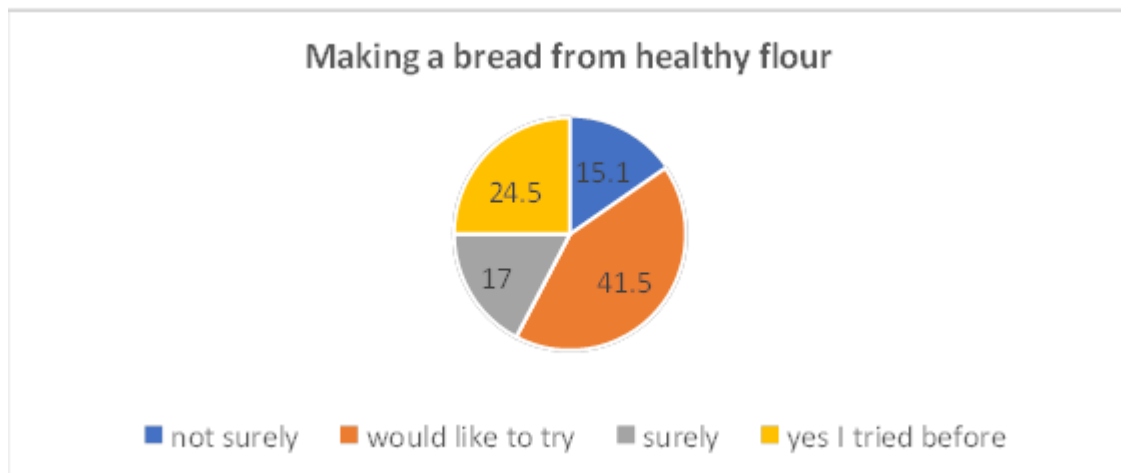


Fig 3

Table 4

Taste preference of bread

Sr. No	Particulars	Respondents	Percentage
1.	Regular bread	15	27.8
2.	Millet bread	18	33.3
3.	Wheat bread	11	20.4
4.	All-purpose bread	8	14.8
5.	Total	52	96.6

From the above table it has been observed that 27.8% respondents say they prefer regular bread in terms of taste whereas 33.3% respondents says millet bread 20.4% respondents says wheat bread and 14.8% respondents says all-purpose flour.

Taste preference of bread

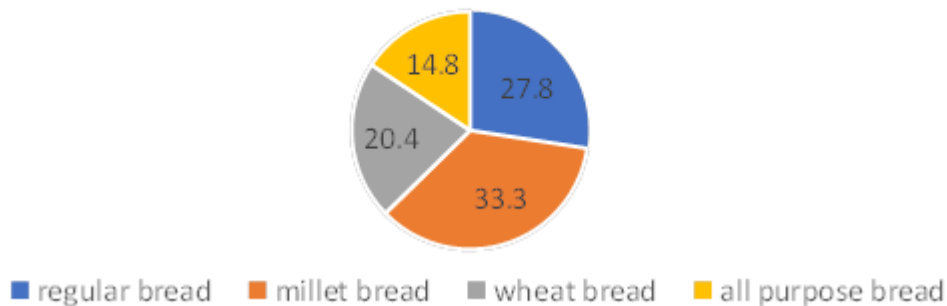


Fig 4

Table 5

Comparison of texture of millet bread and regular bread

Sr. No	Particulars	Respondents	Percentage
1.	Dense and soft	21	38.9
2.	Crispy texture	11	20.4
3.	Nutty and grainy	19	35.2

From the above table it has been observed that 38.9% respondents says bread has dense and soft texture whereas, 20.4% says crispy texture, and 35.2% says nutty and grainy texture.

Comparison of texture of millet bread and regular bread

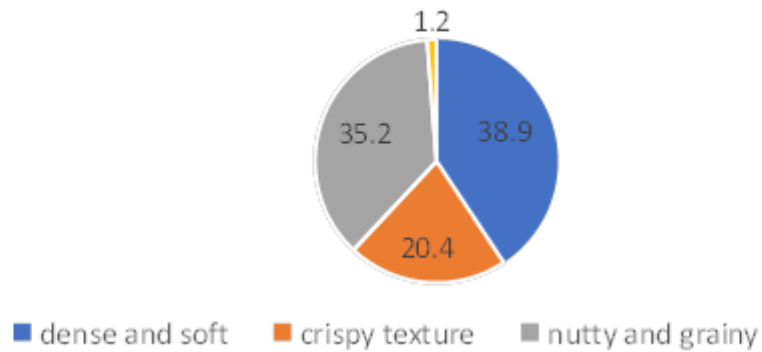


Fig 5

Table 6

Lighter and airier texture of bread

Sr.no	Particulars	Respondents	Percentage
1.	Millet bread	28	48.1
2.	Regular bread	26	51.9
5.	Total	54	100

From the above table it has been observed that 48.1% respondents says millet bread has lighter and airier texture, whereas 51.9% respondents says regular bread has lighter and airier texture.

Lighter and airier texture of bread

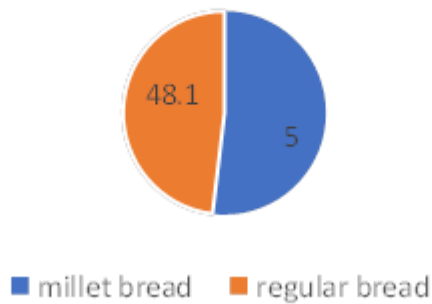


Fig 6

SUMMARY AND CONCLUSION

SUMMARY: “Research on making bread from millet focuses on exploring the use of millet flour as a gluten-free alternative to traditional wheat flour. Studies have shown that millet bread is not only suitable for individuals with gluten sensitivities or celiac disease but also offers various health benefits. It is rich in fiber, vitamins, and minerals, and may have antioxidant and anti-inflammatory properties. Researchers have developed recipes and techniques to enhance the texture and flavor of millet bread while maintaining its nutritional value. Further research is being conducted to optimize the formulation and baking process of millet bread. This research contributes to the growing interest in alternative grains and the development of healthier bread options.”

CONCLUSION: Millet has the potential to be used in baking with the desired characteristics in terms of gluten mimicking substitute and antioxidant compounds. The use of extrusion technology did not reduce the nutritional content of the breads, it also significantly improved their antioxidant capacity and also contributed to a lower hardness and greater specific volume. In addition, this addition contributes to obtaining a food with anti-hypoglycemic activity in vitro superior.

SUGGESTIONS AND RECOMMENDATIONS:

Suggestions

- Millet bread is a type of bread that is made using millet flour as one of the main ingredients. Millet is a nutritional grain that is gluten-free and rich in fiber vitamins and minerals. It has a slightly sweet and nutty flavor, which can add a unique taste to the bread. Millet bread is a great option for those who are gluten- intolerant or looking for alternative grains in their diet.
- Millet is good source of antioxidants and may have anti-inflammatory properties. So choosing millet bread, you can enjoy a nutritious and delicious alternative to traditional wheat bread.

- The choice between millet bread and regular bread and regular bread depends on your personal preference and dietary need. If you are looking for gluten-free option or want to try something different, millet bread can be a great choice.

RECOMMENDATIONS

- You can have your shop especially near the GYM and FITNESS CENTER.
- You can have your own CLOUD KITCHEN.
- We can aware about this bread in local shop as well on social media.
- We can circulate some free sample to aware people about bread.
- Awareness about more millet flour eg Finger millet, Buckwheat etc.

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