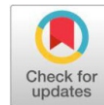


## Original Research Article

## Open Access

# Conceptual approach and empirical evidence on millet awareness among Nutrition students of Hyderabad after IYOM-An exploratory study



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## ABSTRACT

*International Year of Millets (IYOM) 2023 is a global campaign initiated to foster the millets value chain providing intuitive solutions to global food security. The present study meant to evaluate the exposure towards millets and perception of millet based products among post-graduate students having nutrition as one of the subjects from different colleges of Hyderabad city(120 no.) through a structured interview schedule. The study focused on concepts related to awareness about millets, health benefits, consumption patterns and millet processing. As part of the survey, participants identified three major millets (bajra, ragi and jowar) predominantly, 70% identified IYOM year as 2023 correctly, 59% of the participants were unable to list out traditional recipes based on millets, 89% had awareness about value-added products on millets, 75% started preferring millets in various food outlets, 68% regimented millets in their regular diet and 94% believed millet good for diabetics. Regarding the processing of millets 81% of the participants reported flour milling as major processing component and other methods they were not aware off. Millets have been a staple food for centuries, had more health benefits other than good for diabetics, and had more value addition options in millets other than flour making are some of the revelations explicitly and precisely need to be conscious of by these upcoming health professionals.*

**Keywords:** Millets, awareness, nutrition students, IYOM, processing.

## Introduction

Recent years have seen a rise in the popularity of millets because of their high nutritional content, capacity to be gluten-free, flexibility, water efficiency, support for sustainable farming, and possible economic benefits for small-scale farmers. Millets are also vital for the environment, human health, and livelihoods[1]. Millets were India's staple food for centuries, but after the Green Revolution, they were gradually pushed to the sidelines and marginalized as the focus of agriculture shifted to higher food grain production and productivity using high-yielding varieties of wheat and rice in the designated Green Revolution geographies[2].

However, millet consumption has decreased because of the modernization, urbanization, and globalization of food systems. This drop can be attributed to a number of factors, such as shifting lifestyles, the prevalence of convenience and processed foods, and the influence of Western dietary trends[3]. Millet-based food products are gaining significant acceptance, and there has been a dramatic increase in the number of millet entrepreneurs in recent years. Customers are increasingly asking for snacks and restaurant meals that are nutritious, with no chemicals, and made from locally sourced ingredients[4], such as traditionally grown millet.

In order to emphasize the importance of millets in accomplishing sustainable development objectives including ending hunger, promoting sustainable agriculture, and enhancing nutrition, the United Nations has proclaimed 2023 to be the International Year of Millets. This international accreditation offers a special chance to spread knowledge about millets' nutritional worth, ability to withstand climatic change, and cultural significance on a worldwide basis. The 2023 International Year of Millets (IYOM) acted as a timely reminder of the importance of millets and their innate ability to improve the efficiency, inclusivity, resilience, and sustainability of agrifood systems. It assisted in relearning the numerous benefits of having these crops in farms, markets, and on food tables. However, the year also highlighted the difficulties the millet industry faces. To enhance harvesting and processing and lower losses, the right technology, innovation, and mechanization are required [5].

The belief that millets are healthier than their traditional counterparts, such as wheat and rice, is one factor contributing to the rise in millets' consumption. However, the nutritional content of millets decreases significantly when they are consumed in their value-added forms, such as millet snacks or millet-based desserts [6]. There was a consensus that the biggest challenge in the current Indian market was the creation of customer demand for millets. Most of the customers are unaware of millets and their nutritional, environmental, and economic benefits. India is geographically and culturally very diverse, and while customers are aware of limited types of millets, they only recognize these in the regional languages[7]. Additionally, the range of millet-based foods on the market was not well known, even among dieticians and nutritionists.

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DOI: <https://doi.org/10.21276/AATCCReview.2024.12.04.522>

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Their clientele are discouraged from consuming millets as a result of their restricted millet recipe recommendations. The taste of millets is unknown to younger generations, and over time, rice and wheat have taken precedence. The current phase of transition, characterized by shifting perceptions of millets and increased health consciousness, presents an opportune moment to evaluate existing knowledge, attitudes, and practices surrounding millets. This will serve as the basis for developing an effective plan to promote millets as a staple grain.

Hence the present study was designed to explore the global outreach of IYOM 2023 and the impact it has outpaced among the upcoming health professionals.

**Methodology**

The study aimed to investigate awareness and consumption patterns of millets and millet-based products among postgraduate students with having nutrition background from Hyderabad City, Telangana. A convenience sampling method was used and 120 postgraduate students having nutrition as one of subjects from different colleges of Hyderabad city. Data was collected through a structured questionnaire that included predefined questions related to demographic profile, awareness of millet and millet products consumption patterns, and processing of millet. The survey was anonymous and voluntary to complete. The goal of the study and how the data will be used were explained to the participants up front, with a focus on how the data would only be utilized for statistical analysis, which would ensure participant confidentiality. The data was compiled and percentages and graphs were illustrated.

**Results and Discussion**

The study focused on concepts related to awareness about millets, health benefits, consumption pattern and millet processing.

**General information of participants**

This survey was conducted among women group of age 20-25 years pursuing post-graduate degree having Nutrition as one of the courses in various PG colleges of Hyderabad. As per survey schedule, general information of the respondents was taken. Among the participants 54% were Hindus, 41% were Muslim and 5% were Christians whereas OBC percentage was dominant (64%) followed by the General category (17%), SC (16%) and ST(3%) (Figure 1).

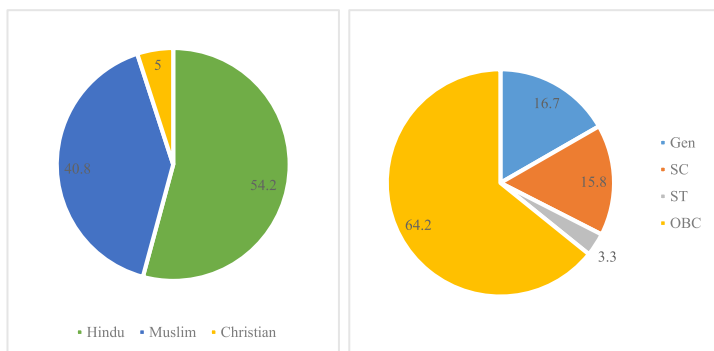


Figure 1: General information of participants

**Awareness about millets**

As the participants were postgraduate students having nutrition background questions were framed to evaluate their basic knowledge on millets. In this component, certain aspects like millet names, the country's world-wide place in millet

production, governing body of millet production in India, International Year of Millets (IYOM) 2023 identification, government initiation in promoting millets, validating their shift in food choices and acclimatization to millet culinary practices were asked. Initially participants were asked to list out names of different millets grown in India and other countries that they are aware of and it was an open-ended question. This helps us to substantiate student's familiarity with millets available. Bajra(92%), Ragi(90%) and Jowar(86%) were the three millet grains acknowledged predominantly by the participants followed by kodo millet(54%), foxtail(38%) and barnyard millet(35%). Certain minor millets has got marginal acquaintance like browntopmillet, mentioned by only 3% of the participants followed by Little millet (9%) and proso millet(10%) (Figure 2). As per the present survey report majority (above 80%) of the participants identified three major millets, three minor millets (30 to 50%) and failed to remember other minor millets. As per the study minor millets are truly trivial compared to major millets.

Similarly, a study conducted in Udaipur regarding the consumption pattern of millets participants (age above 40 years) had awareness about primarily major millets, 50% of the participants were aware of part of minor millets, and proso (17.5%), little(15%) and kodo(6.67%) millet got least importance when compared to others[8]. Similar results were obtained in a study in Prakasam District by [9] in which 65% adolescent group were aware of only three millets, followed by 28%(awareness on 5 millets) and 7%(identified 8 millets). Similar findings were reported by [10] also.

Hence, educational institutions need to be more assiduous in promoting minor millets as well because minor millets have a fabulous micronutrient and nutraceutical profile and these are the grains in vogue for diabetic and celiac patients.

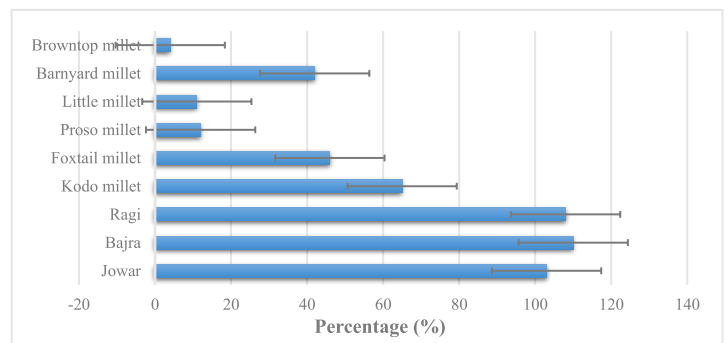


Figure 2: Identification of millet names by participants

When asked to identify the highest millet-producing country, 98% of the participants were able to identify India's leading position in the world as a millet producer and 78% of the participants opted correct governing body of India responsible for millet production as the the Ministry of Agriculture, whereas, 22% slipped to MoFPI.

The next question related to awareness of millets and millet products in general was asked and the report revealed that all the participants(100%) were aware of millet and millet products. In answer to a question, 83% of the participants have knowledge about the government's initiative to promote millets through Public Distribution System (PDS) whereas remaining participants (17%) were not aware of that.

IYoM 2023 is our country's recommendation to United Nations to contribute to global food and nutritional security. It is imperative to reinstate sustainable millet value chain and

accommodate it for better nutrition and health. Despite global initiative by UN in promoting millets as International year of Millets (IYOM 2023) and Nation's wide publicity only 70% of the participants identified IYOM year correctly as 2023 (Figure 3).

A question regarding traditional recipes prepared with millets was included in survey schedule. It was an open-ended question and participants were asked to list out millet-based traditional recipes they were aware of and 59% of the participants (71 participants out of 120) did not refer to any traditional recipe whereas 23% mentioned porridge followed by millet upma (21%) and khichdi (18%). On the other hand, 89% of the participant's awareness towards value-added products with millets was favourable while 11% have no idea about value-added products with millets (Table 1).

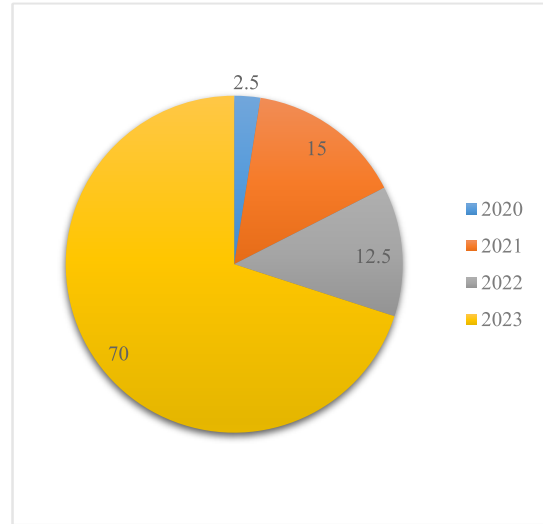


Figure 3 Identification of IYOM year by participants

Table 1. Awareness of millets among participants

S.No	Particulars	Yes		No	
		No.	%	No.	%
1	Are you aware of millets and millet products	120	100	-	-
2	Do you know that millet products are promoted by government through PDS	99	82.5	21	17.5
3	Do you know that you can prepare value added products with millets	107	89	13	11
4	Do you tasted any millet-based recipes in restaurant/food outlet?	91	75.8	29	24.2
5	Are you consuming millets in regular diet?	82	68.3	38	32
6	Do you have knowledge about availability of millet-based products in the local market?	111	93	9	8

To crosscheck the product awareness and perspective towards food preferences question regarding their food choices in food eateries/outlets were given to participants and 75% of the participants responded positively stating that they prefer millet-based rotifollowed by other items (Figure 4).

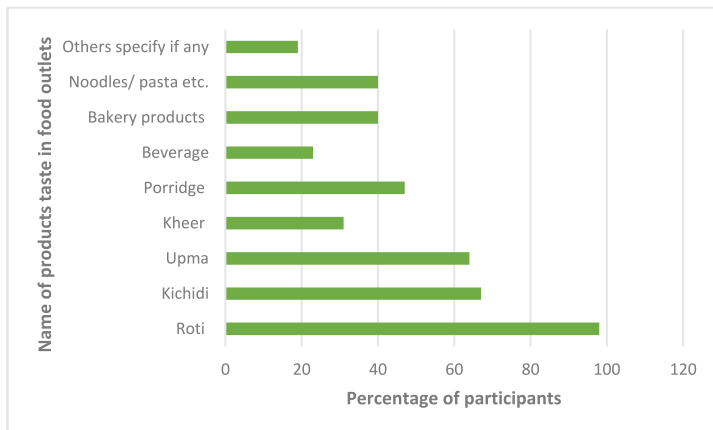


Figure 4: Percent of millet based products tasted in food outlets

**Consumption pattern of millets**

Consumption of millets can be attributable to certain features such as conventional household practices, family members suffering from metabolic disorders, maintaining healthy lifestyle, urban choices, taste, local crops, recommended by health professionals / Doctors and shift of food preferences / healthy choices suggested by family/ friends/colleagues and publicity in electronic/social media. In this component millets consumption patterns by participants were evaluated by inquiring them about certain questions like inclusion in regular diet, reasons for consuming/not consuming millets, and exposure assessment by asking them to list out market available millet based products.

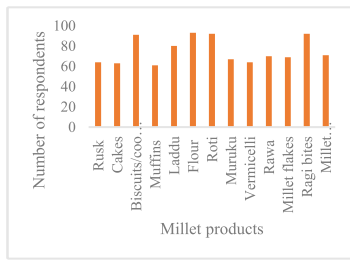
Income and consumption were two unaffiliated features in consuming millets [11].

To begin with, participants inquired about the frequency of consuming millets in their diet being done on regular basis or not. About 68% of the respondents have regimented millets in their regular diet whereas the remaining percent were not. Among 68% of the participants preferred roti (80%) followed by porridge and rice form (49% & 43% respectively). A study report- concluded that 79% of the participants preferred roti over dosa/idli/upma [12]. As per the other study conducted in various cities of Tamilnadu, millet consumption percentage was 78% among different age groups and consumption form is mainly roti (50%) [13].

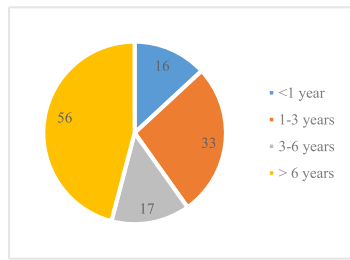
Out of 32% who were not interested in gulping down the millets, had mentioned the reasons for not consuming as not tasty (47%) > other reasons (45%) > heavy on stomach (35%) > more expensive (34%). The majority of the respondents did not like the taste of millets. Similar study stated findings over not consuming millets as longer cooking time (53.5%), donot like the taste (42.5%), not a family custom (33%) and high price (29.5%) [12]. As per another study, participants revealed that they had not heard about millets (34.43%) and did not like the taste of millets (23.69%) as reasons for not consuming millets [14]. There might be a few reasons for not consuming millets such as disturbances in gastro intestinal tract due to its high fibre content, metabolism related diseases like thyroid, hypersensitivity to certain foods and the most specified reason was not palatable to mouth and longer time for cooking. Consumption patterns was studied extensively across the board with different approaches and the outcome has varied inferences. As per a report minor millets were hardly consumed once a year by respondents whereas Jowar was consumed frequently claiming it as a local crop [15]; frequency of millets consumption was very often i.e. 52% [8];



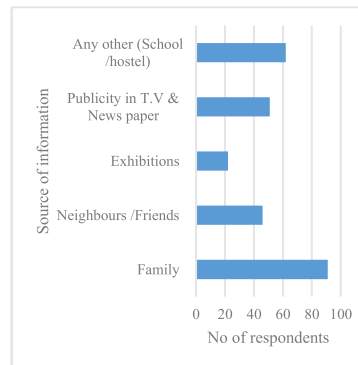
consumption was moderate(once in ten days/fortnight) in a study conducted at Chattisgarh[1]; and 48.61% consume millets on daily basis [16].



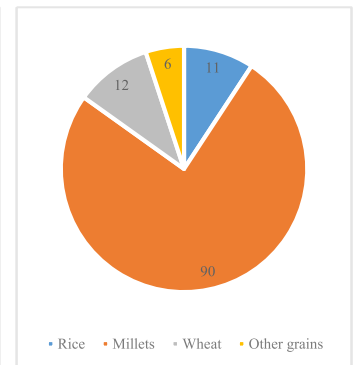
**Figure 5: Demographs of Percentile consumption of Market available millet products**



**Figure 6: Duration of millet consumption by participants**



**Figure 7: Source of information prioritized by participants**



**Figure 8: Tagline of healthy grain**

Among the respondents, 93% of them have knowledge about the availability of millet products in local market and they were completely conscious about most of the products available(Figure 5). Among the participants who devour the millets 47% started consuming millets since six years whereas 28% from less than 3 years only(Figure 6). Similar results were observed in a study conducted at Mumbai where 45% consumed millets more than six years and 16% started consuming it less than two years [12].

Prioritizing millets of a huge demand by participants could be associated with the identification of millet names as nobody stated minor millets in both elements. Ragi(63%) and Jowar(50%) are the millets that have huge demand as per the participants and 20% did not answer the question. Consumption of millet can be enhanced by providing insights about nutritional benefits whereas price hike acts as an impediment[17].

**Health benefits of millets**

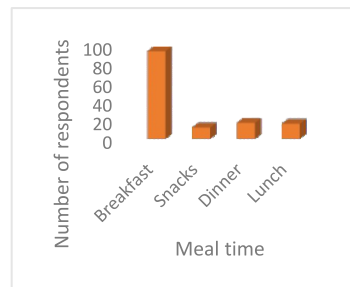
Millets have made a comeback and are being called Nutri cereals [18], superfoods [19], and immunity-boosting foods [20]. Millets, multi-taskers of nature, power-house of nutrients also possess anti-cancer properties, manage diabetes, helps in combating metabolism-related disorders, prevent obesity, and provide wholesome nutrition to body. In this particular component, participants were inquired about awareness regarding benefits, health benefits they are conscious of, source of information they have acquainted about millets, preferable time of eating millets, and factors influencing consuming /not consuming these grains.

About 95% of the participants were aware of the health benefits of the millets and the majority of them chosen millets as grains rich in nutrients(95%)and good for diabetics(94%) followed by further succors. Another study regarding the perception of respondents was as follows-controls diabetes(71%), rich in nutrients(68%) and so on[10].

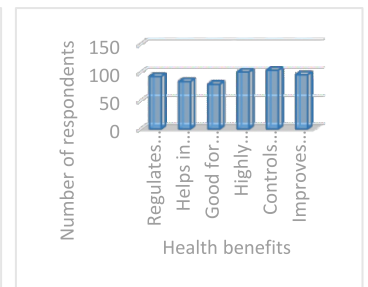
When asked about how they gained knowledge of health benefits three-fourths of the participants acknowledged family role (76%), more than half of the respondents came to know by educational institutions(52%) and 43% came to know through publicity (press/media). Similar millet consumption-based study stated that social media(38%) and word of mouth(36.5%) are the sources of information they had[10].

Among the respondents, 90% of them stated that millets is good for health compared to other grains such as rice, wheat or other grains (Figure 7). In response to a question regarding the preferable time of consuming millet, 78% like to consume it for breakfast whereas other gave least preference for lunch or dinner (Figure 8). Similar findings observed in a study conducted by [9].

In response to a question about benefits experienced by one's family consuming millet products 87% of the respondents stated it controlled diabetes, 84% told highly nutritious grain and 80% reported improvement in immunity when asked about any health issues or discomfort imputed to consumption of millets-35% responded positively and 65% did not have any health issues. Among 35% of the respondents, 40% were unable to express their uneasiness and 37% experienced indigestion problems.



**Figure 9: Preferable mealtime of millets**



**Fig10: Opinion on health benefits of millets**

When inquired about factors influencing consumers for the consumption of millet products 95% referred its health benefits under high priority and to testify the reasons for their contentedness 95% attributed to its wholesome nutrition. Primary data revealed that health benefits played a major role(66.09%) followed by price (48.99%)and taste(47.36%).

**Millet processing**

The lack of suitable processing technologies has limited millet consumption and utilization is the very known fact. Traditional processing techniques like threshing, winnowing, dehulling, soaking, germination, blanching, roasting and popping were the methods used in the effective utilization of millets. Advanced processing techniques like baking, cold and hot extrusion methods were employed to develop innovative and convenient products from millets[21].

Questions related to processing, type of processing and their interest in becoming millet-based entrepreneur, and kind of support they are looking for were asked.

In response to the questions regarding insights about millet processing 82% of the respondents are familiar however 18% had no idea to find out more participants were asked to mark type of processing they were aware off, 81% optioned flour making accompanied with drying(63%), dehulling (58%) and flaking(24%). Grits making operation got the lowest scoring (7%) which is of equally important in millet processing.

When asked about entering millet value chain they have responded variably. Among 120 respondents 45% of them were unsure about becoming an entrepreneur but 61% of the participants would come forward to run the setup if provided with the facility as more than 90% of them thought millet processing could foster additional income. But 67% of the participants were interested in taking training and 67% interested establishing their own millet based food enterprise. When asked about kind of support required- to establish enterprise they gave their opinion as looking for technical support(55%), financial(53%), marketing help(46%) and equipment(42%). The participants were asked to mention millet based brand name of their choice 28% were unable to answer whereas 13% of them mentioned Slurrp Farm and the other firms that were mentioned are millet-based firms but just trending brands.

### Conclusion

The present study on postgraduate students of nutrition background related to millet awareness, consumption patterns, health benefits and processing in Hyderabad city has got varied inferences to draw. The study revealed the fact that students need to be illuminated explicitly about minor millets, their nutritional importance and their health benefits. Students should be aware of traditional recipes prepared with millets, other health benefits of millets rather than good for diabetes. Students should be exposed to both traditional and modern processing technologies of millets, the potential of each millet grain and its nutritional and anti-nutrient profiles they are upcoming researchers/scientists/academic consultants/health professionals.

**Future scope of the study:** The results of the study show that even many awareness programmes were conducted under IYOM the impact was very less. So in future some awareness programmes can be conducted and also some more surveys can be conducted in different stakeholders.

**Acknowledgement:** The authors of this study would like to thank Professor Jayashankar Telangana State Agricultural University and Millet Processing and Incubation Centre, Rajendranagar, Hyderabad for providing funds and facilities for the accomplishment of the present work.

### Conflict of interest

The authors declare no conflicts of interest relevant to this article.

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