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A Study on Awareness and Consumption of Millets in Urban Area of Guntur City of Andhra Pradesh

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ABSTRACT: The current study found that although most respondents were aware of millets, the majority of them only included sorghum, finger millet, and pearl millet in their daily diets, usually as part of roti or other traditional treats for breakfast. Large amounts of nourishment may be found in millets, and eating millets regularly can have a number of positive effects on a person's health. Thus, they can aid in minimizing various life style disorders. Farmers' prices should be subsidized in order to increase output, guarantee supply, and make the product cheaper for consumers. This is a result of other products becoming more appealing due to the high price of rice and wheat. Another desirable strategy to boost consumption is to include influencers such as chefs, physicians, fitness instructors, and bloggers to discuss the health benefits.

Keywords: Millets, consumptions, awareness, lifestyle disorders, nutritious, health benefits.

INTRODUCTION

Seven Indians out of ten who live in cities seem to follow a diet either on their own or after consulting a specialist. In Indian kitchens, convenience food is becoming increasingly important since it makes life easier for women. According to Business Wire (2019), the Indian cereal market is expected to reach $751 million by 2023, with a compound annual growth rate of over 17% CAGR. India produces more millets than any other country, with a yield of 1239 kg/ha compared to the global average of 1229 kg/ha (FAO Stat, 2021).

A traditional staple in many parts of the world is millet. Millets are frequently described as a healthy diet for both the environment and the person (Kane-Potaka *et al*., 2021). One of the most significant cereal grains, millets are a major component of traditional diets in many areas. Due to their high nutrient content, including calcium, zinc, and iron, millets were formerly known as coarse cereals but are now more commonly known as nutri-cereals (Kulkarni, 2018). Millets are referred to as supergrains, superfoods, and wonder grains since they are among the earliest grains used for domestic use and the oldest foods known to humans (Varshney, 2019). People in many states in India still consume millet as a traditional diet (Padmalini *et al*., 2019).

Pearl millet, sorghum, finger millet, foxtail millet, little millet, and kodo millet are some of the major millets. Of all the millets, pearl millet has the highest concentration of dietary fibers, both soluble and insoluble, and resistant starch. Rich in minerals and B vitamins, sorghum is a major tropical grain crop grown for food, feed, and fodder in semi-arid regions. The best supply of amino acids is finger millet, which also provides high levels of calcium and sulfur and potent antioxidants. Kodo millet, little millet, and foxtail millet are examples of minor millets. The consumption of millets in India has increased over the past ten years due to growing awareness of their health benefits and the availability of millet-based products on the market. "Millets are highly nutritious, non – glutinous and not acid forming foods. Hence they are soothing and easy to digest, and contain a high amount of lecithin and are excellent for strengthening the nervous system" by Michaelraj and Shanmugam (2013).

The world's largest producer of millet, India offers a reservoir of health-promoting phytochemicals along with good sources of complex carbohydrates, dietary fiber, vitamins, and minerals. India is the world's largest producer of millet, with 10.9 million tons produced in 2019 (Das *et al*., 2019). It makes sense to boost millet consumption. Nowadays, ancient grains provide a significantly better nutritional balance, and consumer awareness of this is growing quickly. The growing popularity of millet can be attributed to people's desire for foods that are high in fiber, complex carbohydrates, and protein (Anil Kumar *et al*., 2021). "Consumption of millets reduces hyperlipidemia and hence hypertension, and raises the levels of HDL-C (good cholesterol), which can be beneficial for managing the associated risk of developing hypertension and atherosclerotic

cardiovascular diseases in future" (Anitha *et al*., 2021). "Including millets in a regular diet promotes health by reducing malnutrition and obesity. Thereby solving the two major health constraints of the nations" (Asritha, 2021). Anitha *et al.* (2022) study strengthens the evidence that the consumption of millets contributes to reducing the risks of hyperlipidaemia, and therefore cardiovascular diseases.

According to Behera (2017) research, wheat and rice were the most popular cereals, with millets being ingested less frequently than other cereals. Studies on "Millets: a solution to agrarian and nutritional challenges" have shown that millets perform better as crops resistant to climate change than other grains like wheat and rice. Shirisha (2018) conducted research on the consumption patterns of millet and goods derived from it and revealed that the nutritional and health implications of millets are being realized by the people of all income groups.

These nutrient-dense cereals include essential fatty acids, vitamins, minerals, phytochemicals, and antioxidants that can help eradicate a range of illnesses brought on by a diet deficient in certain nutrients. With an annual production of 18 million tons, millets make up 10% of India's food grain basket; nevertheless, their consumption is not as high as that of major cereals like wheat and rice. "Millets are amazing in their nutrition content. Each of the millet is three to five times nutritionally superior to the widely promoted rice and wheat in terms of proteins, minerals and vitamins" by Kalaiselvi *et al*. (2016). Prashanthi *et al*. (2022) stated that "Nutrition education on millets needs to be undertaken to create awareness among the students, thus, it may further can help in millet consumption". Therefore, it is essential to research how much Indian urban population knows about millet cereal and its nutritional advantages. Therefore, the study sought to ascertain the motivations behind millet consumption as well as respondents' awareness of and desire to consume millet.

MATERIALS AND METHODS

Research design. The research design used in the study is exploratory. The purpose of the study was to find out how much of a group of urban residents knew about millets and how they were consumed.

Selection of respondents. The majority of the urban respondents for the study were from Guntur, Andhra Pradesh.

Sampling technique. A random sample technique was used for the study. Sample of 120respondents *i.e.,* both male and female respondents equally selected purposively.

Sources of data. The majority of the study's data came from primary sources, and the survey method was used to gather the necessary primary data. A systematic questionnaire approach has been utilized to carry out a survey.

Statistical analysis. Frequency and percentage used for demographic profile of the respondents and calculated correlation between profile and awareness and consumption of respondents and paired t-test was measured for consumption of millets among male and female respondents.

RESULTS AND DISCUSSION

Demographic profile of the respondents was generated based on their age, field of employment, family size, degree of education and income. Respondents are belonged to urban area.

Table 1: Demographic profile of the respondents (n=120).

Demographic profile		Frequency (F)	Percentage (%)
Gender	Male	60	50
	Female	60	50
Age	18-24	35	29.17
	25-34	26	21.67
	35-44	18	15.00
	45-54	21	17.50
	55 and above	20	16.67
Occupation	House wife	24	20
	Govt. Employee	4	3.33
	Private employee	26	21.67
	Business	17	14.17
	Agriculture	8	6.67
	Any other	41	34.17
Education	Primary schooling -	25	20.83
	Secondary -8th 10	28	23.33
	Senior secondary –inter	18	15.00
	Degree	36	30.00
	Pg	13	10.83
Income	10,000- 20000	77	64.17
	21000-30000	14	11.67
	31000- 40000	18	15.00
	41000-50000	4	3.33
	Above 51000	7	5.83
Place or address	Urban	120	100

According to the information in Table 1, the proportion of male and female respondents was 50%, and the bulk of them (29.17%) were in the 18–24 age range. Then came 21.67% of respondents who were between the ages of 25 and 34, and 17.50% of respondents who were between the ages of 45 and 54.The possible reason for this is due to young age group had less awareness about millets consumption so the study was mostly concentrated on young people and had different occupations like tailoring, dairy and vendors came for business to cities from village.

With regard to family occupation, table 1 showed that in selected respondents 34.17% of them having different occupations instead of business (14.17%), agriculture (6.67%) and 21.67 % were private employees and house wives (20%). The results discussed that in urban area majority of them are working for their livelihood and most of them were tailors, vendors and small business holders, workers and house wives were selected.

A person's social standing and way of life are greatly influenced by their level of education. Based on the information provided on the respondents' educational backgrounds, thirty percent of the respondents had a degree or were graduates, and twenty-three percent had completed secondary school. Primary school (20.83%) and senior secondary (15.00%) followed. This explains why the young age group that was chosen consisted of graduates who work in cities and manage small businesses to support their families. The majority of them are retailers, vendors, tailors, etc.

Family income is the total amount of money the family has made over a specific time period. The findings revealed that the majority of respondents (64.17%) earned between Rs. 10,000 and Rs. 20,000 per month, with 15% earning between Rs. 31,000 and Rs. 40,000 per month. These results revealed that most of the respondents are doing small works and daily labour works so they getting income max Rs.15000 as their family income. Young age and graduation education influences the experience of the people so the earnings also less among respondents.

Awareness on millets. Selected sample response with regarding to millets majority (96.67%) of the respondents were heard about all millets *i.e* .Sorghum (Jowar or Jonnalu), Proso millet (Varigulu),Barnyard millet (Udalu), Little millet (Samalu),Kodo millet (Arikelu), Foxtail millet (Korralu), Finger millet (Ragi) and Pearl millet (Bajra) (sajjalu).The potential explanation for this could be that younger people have become aware of millets and their health benefits, which include lowering cancer risk, improving digestive health, enhancing immune system function, boosting heart health, reducing migraine effects, protecting against diabetes, detoxifying the body, enhancing respiratory health, enhancing immune system function, boosting energy levels, and improving muscle and nerve health.

Among all the respondents 92.5 % of them seen all types of millets which mentioned in the questionnaire were Sorghum (Jowar or Jonnalu), Proso millet (Varigulu), Barnyard millet (Udalu), Little millet (Samalu), Kodo millet (Arikelu), Foxtail millet (Korralu), Finger millet (Ragi) and Pearl millet (Bajra) (sajjalu). This showed that young age graduates expressed more interest towards consuming major millets due to their nutritional richness, high mineral and fibre content than rice and wheat. Many research findings reported that finger millet is a rich source of calcium which is 30 times more than the rice and even the iron content is much more higher in foxtail as well as little millet and is nowhere in comparison to rice.

Table 2: Distribution of respondents according to their hearing response and seeing response about millets (n=120).

Heared	Score	Frequency (F)	Percentage (%)
Yes	1	116	96.67
No	0	4	3.33
Seen			
Yes	1	111	92.5
No	0	9	7.5

Table 3: Distribution of respondents regarding awareness of millets (n=120).

Sr. No.	Millet	Yes	%	No	%
1.	Sorghum (Jowar or Jonnalu)	95	79.17	25	20.83
2.	Pearl millet (Bajra) (sajjalu)	86	71.67	34	28.33
3.	Finger millet (Ragi)	75	62.50	45	37.50
4.	Foxtail millet (Korralu)	72	60.00	48	40.00
5.	Kodo millet (Arikelu)	47	39.17	73	60.83
6.	Little millet (Samalu)	23	19.17	97	80.83
7.	Barnyard millet (Udalu)	70	58.33	50	41.67
8.	Proso millet (Varigulu)	61	50.83	59	49.17
9.	Any other	31	25.83	89	74.17

Table 3 revealed that the majority of respondents (79.17%) were aware of sorghum, followed by finger millet (62.50%), foxtail millet (60%), barnyard millet (58.33%), proso millet (50.83%), and kodo millet (39.17%), based on the frequency of daily usage and nutritive values of millets.

This table discussed that majority of them aware about sorghum, pearl millet and finger millet with nutritive values and health benefits as they are young age and

had graduates. According to certain substantiated research, millet is among the earliest food items that humans have ever consumed. They are abundant in plant-based nutrients, or phytonutrients, and are nutrient-dense. Millet contains the phytonutrient lignans, which may help lower the risk of heart disease. However, sorghum is a gluten-free substitute that is good for those who have celiac disease. All things considered, millets are low-energy, healthy foods. Millet foods are classified as potential prebiotics and increase the viability or activity of probiotics with significant health benefits (Amadou *et al*., 2013). Phytates and polyphenols are present in pearl millet, which is an excellent source of bioactive chemicals. In addition to having a high magnesium content that lowers blood pressure, foxtail millets also have significant calcium and iron contents that strengthen the immune system.

Table 4: Distribution of respondents according to reasons for consumption of millets (n=120).

Sr. No.	Reasons	Agree		Undecided		Disagree	
		F	%	F	%	F	%
1.	Health benefits	0	0	8	6.67	112	93.33
2.	Reduce blood sugar levels	20	20	29	24.17	71	59.17
3.	Reduce weight/ weight management	5	5	21	17.50	94	78.33
4.	Taste preference	15	15	71	59.17	34	28.33
5.	To avoid allergies	16	16	50	41.67	54	45
6.	Environmental sustainability	20	20	57	47.50	43	35.83
7.	Cultural / traditional reasons	35	35	58	48.33	27	22.5

Table 4 showed that majority (93.33%) of the respondents disagreed that they are consuming not for health benefits. Above 75 percent of the respondents consumed millets for reducing their weight due to their health risks *i.e.,* diabetes, heart problem and obesity. Soluble fiber from millet creates a viscous material in your stomach. Thus, it traps lipids and aids in lowering cholesterol. Adiponectin is a hormone that promotes fatty acid oxidation and has an anti-inflammatory effect, supporting heart health. Nearly 60 percent of the respondents expressed that they consumed millets to reduce blood sugar levels because Most of them prefer millet, especially sorghum, to control or lower blood sugar levels since it is high in fiber and non-starchy polysaccharides, two forms of digestible carbohydrates. Forty five percent of the respondents were felt that millets may avoid allergies followed by other reasons for consuming millets by the respondents were environmental sustainability (35.83%), taste preference (28.33%) and cultural/ traditional reasons (22.50%).This could be because millets have a number of health benefits, such as lowering the risk of cancer, protecting the heart, reducing the effects of migraines, protecting against diabetes, improving the digestive system, detoxifying the body, enhancing immune system function, boosting energy levels, and improving the health of muscles and nerves.

Table 5: Distribution of respondents according to their frequency of Millet consumption pattern (n=120).

Sr. No.	Millet	Daily			Weekly			Monthly			Occasionally	Never
		1	2	>2	1	2	>2	1	2	>2		
1.	Sorghum (Jowar or Jonnalu)	22	1	1	15	1	1	12	0	0	3	33
2.	Pearl millet (Bajra) (sajjalu)	4	3	0	20	3	0	17	0	0	3	50
3.	Finger millet (Ragi)	47	0	3	10	0	3	17	0	0	4	29
4.	Foxtail millet (Korralu)	9	4	0	12	4	0	17	0	0	12	39
5.	Kodo millet (Arikelu)	17	1	2	14	1	2	18	0	0	8	43
6.	Little millet (Samalu)	7	3	0	8	3	0	7	0	1	5	78
7.	Barnyard millet (Udalu)	5	2	0	11	2	0	8	0	1	7	77
8.	Proso millet (Varigulu)	26	2	1	18	2	1	10	0	1	3	58

Table 5 results showed that 47 respondent's daily consuming one time finger millet (Ragi) in their diet followed by 26 respondent's proso millet (varigulu), 22 respondents consumed sorghum (Jowar) and kodo millet (arikelu) 17 members consumed daily one time. Weekly consumption of millets by the respondents revealed that pearl millet (bajra) consumed 20 members followed by proso millet (18) and sorghum (jowar) 15 members. Meager members (18) consumed kodo millet (arikelu) monthly one time followed by equal members of 17 consumed pearl millet, finger millet and foxtail millet. Only 12 respondents consumed foxtail millets monthly followed by kodo millet (8).

The findings corroborated by the further research Millets contain antioxidants, which are nutraceutical qualities that stop human health from declining. These benefits include decreasing blood pressure, heart disease risk, cancer and cardiovascular disease prevention, diabetes prevention, tumor case reduction, and more (Bhat *et al.,* 2018). Pearl Millets: Packed with phytates and polyphenols, pearl millet is an excellent source of bioactive substances (Punia *et al*., 2020). In addition to having high nutritional value, pearl millet is

a rich source of phytochemicals such antioxidants (Rathore *et al.,* 2016). In addition to having a high magnesium content that lowers blood pressure, foxtail millets also have significant calcium and iron contents that strengthen the immune system. Conversely, sorghum is a gluten-free kind that is advantageous to those who suffer from celiac disease. In general, millets are low-energy, nutrient-dense diets (Smita Verma, 2019).

Table 6: Distribution of respondents according to major forms of millet consumption.

Form of intake	Sorghum (Jowar or Jonnalu)		Pearl millet (Bajra) (sajjalu)		Finger millet (Ragi)		Foxtail millet (Korralu)		Kodo millet (Arikelu)		Little millet (Samalu)		Barnyard millet (Udalu)		Proso millet (Varigulu)	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
Rice	74	61.67	18	15	40	33.33	13	10.83	8	6.67	4	3.33	4	3.33	6	5
Malts /pooridge	46	38.33	35	29.17	59	49.17	15	12.50	8	6.67	6	5.00	5	4.17	9	8
Dosa	67	55.83	17	14.17	50	41.67	9	7.50	3	2.50	2	1.67	2	1.67	1	1
Chapathi/roti	70	58.33	36	30.00	48	40.00	7	5.83	3	2.50	3	2.50	1	0.83	2	2
Traditional sweets (MurukuluLaddu, Mixers)	65	54.17	26	21.67	70	58.33	8	6.67	5	4.17	3	2.50	4	3.33	2	2
Any other	37	30.83	20	16.67	68	56.67	9	7.50	3	2.50	2	1.67	4	3.33	6	5

According to table 6 above, the majority of respondents (61.67%) ate sorghum as rice, with roti (58.33%), dosas (55.83%), traditional sweets (54.17%), and pooridge/malts (38.33%) coming in second and third, respectively. Following sorghum millet, the majority of respondents (58.33%), sangati (56.67%), and malt/porridge (49.17%) ate finger millet (ragi) in the shape of traditional sweets. Thirty percent of the participants ate sajjalu or pearl millet (bajra) as roti, with malts/pooridge coming in second (29.575) and traditional desserts coming in third (21.67%). mostly korralu, which is eaten as rice (10.83%) and malts/pooridge (12.50%).

The table included the fact that millets are a staple food in many parts of the world and are nutrient-dense. Despite having more nutrients than cereals, millets are still mostly used as food by traditional consumers and members of lower socioeconomic classes. Nonetheless, millet is the main diet of the people living in millet-producing regions in many Asian and African nations. It is used to make a variety of traditional dishes and drinks, including idli, dosa, papad, chukli, porridge, breads, and baby and snack foods (Chandrasekara and Shahidi 2011).

Table 7 revealed that majorly children (57.50%) happily expressed their willingness to transform to millets followed by adolescents (55%), elderly (31.67%) and adults (23.33%). Malathi *et al.* (2016) stated that this improvement is related to the recent addition of millets to the public distribution system following the enactment of the 2013 Food Security Bill.

Table 7: Distribution of respondents according to their willingness of family members to transform to millets (n=120).

Family members	Yes		No	
	F	%	F	%
Children	69	57.5	41	34.17
Adolescents /youth	66	55	54	45.00
Adults	28	23.33	92	76.67
Elderly	38	31.67	82	68.33

Table 8: Distribution of respondents according to their millet consumption preference (n=120).

Preference	Form of	
	Frequency (F)	Percentage (%)
a. Breakfast	94	78.33
b. Lunch such as rice	20	16.67
c. Snacks	17	14.17
d. Dinner (roti, dosaetc)	8	6.67

The data showed that majority (78.33%) of the respondents preferred millets consumption during breakfast period followed by lunch (16.67%), snacks (14.17%) and dinner (6.67%).

Table 9 showed that age, income and occupation of the respondents have positive impact on awareness but gender and education has non-significant relation with awareness this might be due to though the respondents had graduation education and equal male, female respondents. The drudgery of agricultural operations and the absence of alternative farm gate prices, the ease with which rice and wheat can be obtained through public distribution systems, the scarcity of small millets in local markets and their high prices, the lack of policy support for small millets relative to crops like rice and wheat, and a number of other factors can be attributed to the decline of millets and low awareness of them. Respondents age, gender, education, income and occupation had significant relation with consumption pattern of millets as they prefer millets in breakfast and

most of them willing to shift to millets due to reduce health risks like heart problems, obesity, blood sugar due to their urbanization lifestyle and working habits may influence the food habits.

Table 9: Correlation between profile characters and awareness and consumption.

Sr. No.	Profile characters	Awareness	Consumption
1.	Age	0.15	0.17
2.	Gender	-0.138	0.050
3.	Education	-0.039	0.036
4.	Income	0.19	0.02
5.	Occupation	0.0198	0.0657

Table 10: Paired t-test among respondents regarding consumption.

Sr. No.	Respondents	Average	SD
1.	Male	16.55	2.66
2.	Female	16.85	2.59

Two sample t-test (pooled variance), using T distribution (df=118) (two-tailed) (validation)

1. H_0 hypothesis. Since p-value > α, H_0 cannot be rejected. The average of **Group-1's** population is assumed to be **equal to** the average of **Group-2's** population. In other words, the difference between the sample average of **Group-1** and **Group-2** is not big enough to be statistically significant.

2. P-value. The p-value equals **0.5329**, ($p(x \leq T)$ = 0.2665). It means that the chance of type I error, rejecting a correct H_0, is too high: 0.5329 (53.29%). The larger the p-value the more it supports H_0.

3. The statistics. The test statistic T equals **-0.6254**, which is in the 95% region of acceptance: [-1.9803 : 1.9803].

x_1-x_2=-0.3, is in the 95% region of acceptance: [-0.95 : 0.95]. The standard deviation of the difference, S' equals 0.48, is used to calculate the statistic.

4. Effect size. The observed effect size d is **small**, **0.11**. This indicates that the magnitude of the difference between the average and average is small.

CONCLUSIONS

The present study concluded that majority respondents had awareness about millets but majority of them consumed only sorghum, pearl millet and finger millet in their daily diet as in breakfast in the form of roti or traditional sweets. The younger respondents ought to become more knowledgeable about millets because they are higher in fiber than wheat and rice, and finger millet has thirty times the calcium content of rice, while all other millets have at least twice the calcium content of rice.

Millets have several benefits, including the protection of food, nutrition, fodder, fiber, health, livelihood, and the environment, all while promoting the growth of those who are most vulnerable. Large amounts of nourishment may be found in millets, and eating millets regularly can have a number of positive effects on a person's health. Thus, they can aid in preventing malnourishment.

On many fronts, communication continues to be the key barrier, affecting both producers and consumers. Farmers have been compelled to decrease millet production due to low market demand, while consumers' awareness of and desire in adopting it as a staple are low since they lack the information and drive to eat millets for every meal. Social media is becoming a more important medium for disseminating information and raising awareness of millet. To create the incentive to consume millet, it is necessary to select the appropriate social media tools, personalized communication messages, and influencers, such as opinion leaders, celebrities, chefs, and peers.

Farmers' prices should be subsidized in order to increase output, guarantee supply, and make the product cheaper for consumers. This is because the high cost of rice and wheat makes other products more desirable. Incorporating influencers such as chefs, bloggers, doctors, and fitness instructors to promote millet's health benefits and disseminate new recipes is another desirable way to increase its consumption.

FUTURE SCOPE

The nutritional value of millets is astounding, and each variety has unique characteristics. These millets help lower blood pressure, manage diabetes, prevent malnutrition, and control weight, among other things. Therefore, the government should implement strategies to raise consumer awareness of and consumption of millets. For example, the government might offer farmers financial incentives to produce more millet at a reduced cost, as well as assistance with procurement and storage. The government can promote millet production research and development as well as open up new markets for the grain. The lowest ration shop has millets available. Every media outlet has the ability to disseminate and highlight the significance of utilizing millet as a means of mitigating infant malnourishment. Attending must have made people aware of how to use millet.

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Conflict of Interest. None.

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