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Millets Consumption Behaviour of Urban Adult Population and Its Linkages: Evidence from Community Based Study

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ABSTRACT

Introduction: With the passage of time, the glory of millet based traditional food products have diminished, perhaps due to fascination for refined grains. In academic world millets are called "orphan crop". However, recently, with the realization of nutritional and health benefits of millets, Government of India is emphasizing on the more cultivation and consumption of millets to tackle malnutrition and food crises. **Objectives:** [a] To assess the awareness and consumption behaviour of subjects of millets. [b] To find out factors influencing knowledge and consumption of millets. **Methodology:** This community based cross sectional study was done on urban adult subjects of Prayagraj. Multistage sampling procedure was adopted for selection of subjects. Information about awareness and consumption of millets were obtained by interviewing subjects using pre designed and pretested proforma. **Data analysis:** Data analysis was done through Statistical Package for Social Sciences; χ^2 test was used for statistical significance. **Results:** Majority (94.4%) of subjects had heard about millets. Of these 67.4% and 45.4% were aware of nutritional and health benefits of millets, respectively. In all 26.0% and 26.8% subjects were aware of International Year of millets and initiative of Government of India to promote consumption of millet, respectively. The extent of consumption of millets by subjects was 66.2%. Gender, caste, education, occupation and social class were significantly linked with nutritional and health benefit knowledge of subjects. **Conclusion:** Knowledge consumption gap regarding millet was evident in subjects. Gender, caste, education, occupation and social class significantly influenced nutritional and health related information of millets

Key words: Adult subjects, Consumption Behaviour, Millets, Urban area

Introduction

Millets are the world's sixth utmost important grain, grown in more than 100 countries in the world. They are mainly grown in dry and semiarid areas of developing countries of Asia and Africa particularly in India, Mali and Nigeria (97% of production). India was the prominent producer of millets in the world with 10.9 million tons in the year 2019.[1, 2] Millets (Pearl, Finger, Kodo, Proso, Foxtail, Little and Barnyard) are the principal staple food to millions of people worldwide. Millet crops are native of India; 20% of the global and 80% of Asia's millet is grown in India[1]. Millets are well known as Nutri Cereals. In prevention of non-communicable diseases millets are evolving as a super-food. They are good source of macro and micro nutrients including phytochemicals. They are a low glycaemic index food which helps to maintain blood glucose level. Antioxidant present in the millets remove foreign and toxic substances from the body[3]. With the realization of nutritional and health benefits of millets and development of standardized processing techniques, they are used to tackle all forms of malnutrition and food crises worldwide. Besides superior nutritional qualities millets have emerged as a vital contributor to achieving multiple Sustainable Development Goals (SDGs).The unique characteristics of millets have potential to curb the adverse consequences of climate change, food insecurity, poverty and malnutrition.

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Before the Green Revolution (1960), millets were the main food of a considerable population of Central and Southern India. Although the great Green Revolution ensured the food security through increased production of wheat and rice but, pushed out the availability of millets[4]. Thus millets become a poor man's diet and their presence in the Indian food basket declined. Government policies promoting cultivation of wheat and rice squeezed the land area of cultivation of millets from 1961 to 2017 resulting in the decline of the production of millets.[5, 6, 7]

In order to revive millets, Government of India has taken many efforts. The year 2018 declared as a National Year of Millet, followed on with preparing a National Millet Mission. United Nations General Assembly declared year 2023 as International Year of Millets[8]. Although through concerted efforts of Government millets are regaining their place but it has been observed that the production and consumption of millets is still stagnated. In the existing scenario, where perception of millets are changing it is pertinent to understand the factors influencing nutrition and health related knowledge and consumption pattern of millets of the population living in urban areas. The findings of the present study will help to bring out groups requiring more attention and providing action points and thus to lay the foundation for targeted intervention to promote the production, product development and consumption of millet as staple diet. Knowledge and consumption of millets by the consumer has been attempted by the researchers. These studies are from South India[1, 9, 10, 11]. To best of our knowledge no study has done in North India on urban adult population to investigate factors influencing knowledge and consumption of millets. With this background this study was conducted with the aim of knowing awareness, consumption pattern and their associates in urban adult population of Prayagraj.

Materials and Methods

This community-based cross-sectional study was conducted in urban areas of Prayagraj District. The population of Prayagraj is 5,954,391 of which male and female are 3,131,807 and 2,822,584, respectively.[12] The reference population for this study was urban adults (30-59 years) residing in Prayagraj.

In order to compute sample size a pilot study was done in non-study areas. Taking prevalence of consumption of millets as 10%, design effect of 1.5, permissible level of error 5% (absolute) and non-response rate of 10%, the sample size worked out to be 231.

Multistage sampling technique was employed for the selection of study subjects. Zone, wards, family and subjects were the different stages of sampling procedures. The following steps were taken in selecting the subjects of the study:

(i) Out of five zones two were selected randomly.

(ii) Households in the selected zones were designated following probability proportion to size adopting systematic random sampling method;

(iii) One family in the taken households was selected randomly using lottery method; and

(iv) One study subjects in the chosen family was selected randomly using lottery method.

The study was approved by the Ethical Committee, University of Allahabad, Prayagraj and consent was obtained from the participants of the study.

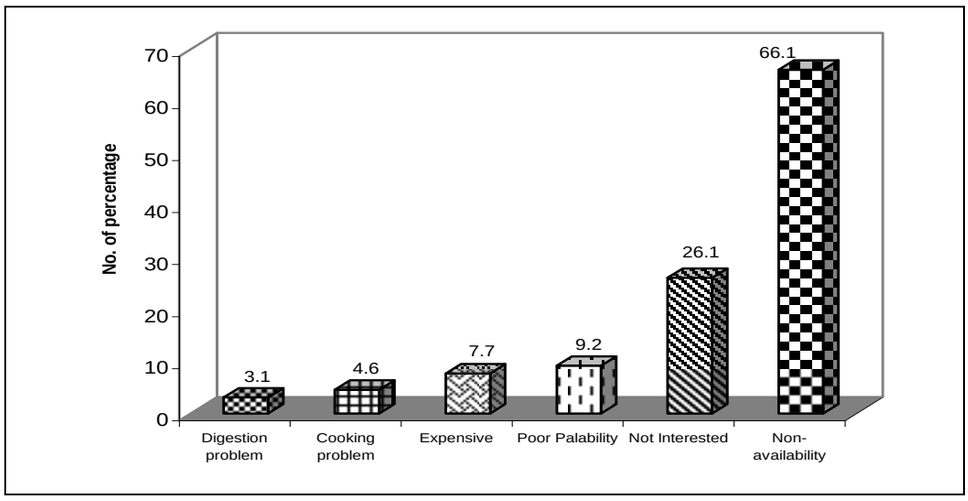
Information about socio demographic characteristics (viz., age, gender, marital status, religion, caste, type of family, socio economic status) and awareness as well as consumption of millets were obtained by interviewing subjects using pre designed and pretested proforma. In order to find out socio economic class of subjects modified BG Prasad classification was used. On the basis of per capita income subjects were classified into social class I, II, III, IV and V[13]. Data thus obtained were entered into a personal computer and analyzed using SPSS software (SPSS version 21.0, IBM Corp., Armonk, NY.); to test for statistical significance Chi-square test was used.

Results

Of the 231 subjects 64.9% were from the age group30–40 years. As much as 57.6% were male. In all 81.8% subjects were married. Majority (97.4%) of them belonged to Hindu religion. As much as 50.2% and 40.7% subjects were from Other Backward Class and other caste category, respectively. Educational status of 12.6%, 49.8% and 10.4%, was intermediate, graduation and post-graduation and above, respectively. As much as 29.0% subjects were homemaker whereas 38.6% and 22.6% subjects were engaged in service and business, respectively. In case of 40.7% subjects, family size was 2-4. Maximum (81.8%) of the subjects were from nuclear family. Based on Modified BG Prasad classification as much as 28.1%, 33.3% and 13.9% subjects were from social class I, II, III, respectively, whereas 24.7% subjects belonged to social class IV and V.

Result of this study revealed that 218 (94.4%) subjects were aware of millets. Of these 193(88.53%) subjects were aware of millet products, whereas, 147 (67.43 %) and 99 (45.41%) subjects were aware of nutritional and health related benefits of millets, respectively. In all 60 (26.0%) subjects were aware of International year of millets 2023. As much as 62 (26.8%) subjects were aware about that Government of India emphasizing on consumption of millets. Out of 231 subjects 153 (66.2%) consumed millets. Of those who were aware of millets 153 (70.1%) subjects consumed any type of millets; of these 50 (32.7%) observed any health benefits. Out of 153 subjects, 19 (12.4%), 2 (1.3%) and 33 (21.6%) consumed millets daily, weekly/fortnightly, and on monthly basis, respectively. In the remaining 99 (64.7%) consumption of millet was seasonal. Of these 80 (80.8%) and 99 (100.0%) consumed *jowar* and pearl millets, respectively. All subjects consumed millets on daily and monthly basis had consumed pearl millet daily. In case of 43 (66.1%) subjects non availability was the reason for not consuming millets, whereas, 6 (9.2%) and 5 (7.7%) subjects did not consume millet due to poor palatability and expensive price of millets. Only 2 (3.1%) subjects stated digestion problem as the reason for not consuming millets, whereas, 3 (4.6%) mentioned cooking problem as constraint of not consuming millets. Seventeen (26.1%) subjects were not interested in consuming millets (Figure 1).

Figure -1: Constraints in Consuming Millets (N= 65)



There existed significant ($p<0.05$) association of awareness of millets products with religion, education, occupation and social class of study subjects. As much as 84.9% subjects from Hindu religion, 89.9% graduate and above, 92.1% subjects from service class were aware of millet products, corresponding value for subjects from social class I and IV were 95.4% and 66.7%, respectively (Table -1).

Table-1: Linkages of awareness of millet products (N= 231)

Socio-demographic status		Yes		No		Total		Test of Significance
Religion	Hindu	191	84.9	34	15.1	225	100	χ^2=11.3; df= 1; p=0.001
	Muslim	2	33.3	4	66.7	6	100	
Education	Illiterate	17	70.8	7	29.2	24	100	χ^2=14.5; df= 7; p=0.04
	Primary + Secondary	9	60.0	6	40.0	15	100	
	High School	19	79.2	5	20.8	24	100	
	Intermediate	23	79.3	6	20.7	29	100	
	Graduation	102	88.7	13	11.3	115	100	
	Post Graduation + Ph.D	23	95.8	1	4.16	24	100	
Occupation	Service	82	92.1	7	7.86	89	100	χ^2=17.8; df= 8; p=0.02
	Business	39	75.0	13	25.0	52	100	
	Homemaker	53	79.1	14	20.9	67	100	
	Skilled + Non skilled	17	80.9	4	19.0	21	100	
	Unemployed	2	100	0	0.0	2	100	
Social Class	I	62	95.4	3	4.6	65	100	χ^2=14.3; df= 4; p=0.006
	II	62	80.5	15	19.5	77	100	
	III	28	87.5	4	12.5	32	100	
	IV	20	66.7	10	33.3	30	100	
	V	21	77.8	6	22.2	27	100	

Out of 218 subjects 147 (67.4%) were aware of nutritional benefits of millets. There existed significant ($p<0.05$) association of nutritional benefits of millets with gender, caste, education and social class of study subjects. As much as 69.2% male subjects were aware of nutritional benefits of millets. In all 73.4% subjects from other caste category were aware of nutritional benefits of millets. Nutritional benefits of millets were more (75.0%) in post graduate and above subjects. Subjects from social class I (78.5%) and III (75.0%) were more aware of nutritional benefits of millets (Table 2).

Table-2: Linkages of nutritional benefits of millet products (N= 231)

Socio-demographic status		Yes		No		Total		Test of Significance
		No.	**%**	**No.**	**%**	**No.**	**%**	
Gender	Male	92	69.2	41	30.8	133	100	χ^2= 4.153; df= 1; p= 0.042
	Female	55	56.1	43	43.9	98	100	
Caste	SC/ST	12	57.1	9	42.9	21	100	χ^2=6.536; df= 3; p=0.038
	OBC	66	56.9	50	43.1	116	100	
	Others	69	73.4	25	26.6	94	100	
Education	Illiterate	8	33.3	16	66.7	24	100	χ^2=18.149; df= 4; p=0.001
	Primary + Secondary+ High School	20	51.3	19	48.7	39	100	
	Intermediate	17	58.6	12	41.4	29	100	
	Graduation	84	73.0	31	27.0	115	100	
	Post Graduation+ Ph.D.	18	75.0	6	25.0	24	100	
Social Class	I	51	78.5	14	21.5	65	100	χ^2=16.99; df= 4; p=0.002
	II	46	59.7	31	40.3	77	100	
	III	24	75.0	8	25.0	32	100	
	IV	15	50.0	15	50.0	30	100	
	V	11	40.7	16	59.3	27	100	

Of 218 subjects 99 (45.4%) were aware of health related benefits of millets. Gender, caste, education, occupation and socio economic status of the study subjects were the associates ($p<0.05$) of health benefits of millets. Sixty (50.4%) male and 55.3% subjects from other caste category were aware of health benefits of millets. Subjects with higher educational status were more aware of health benefits of millets. As much as 26.6%, 20.8%, 34.5%, 53.0% and 66.6% subjects with educational status as primary + secondary, high school, intermediate, graduation and post-graduation and above were aware of health benefits of millets ($p<0.000$). Nearly 22.4% homemakers were aware of health benefits of millets; corresponding value was 57.3% in subjects from service class, 46.1% in business class and 38.0% in skilled + non skilled workers ($p<0.000$). Sixty three percent subjects from social class I were aware of health benefits of millets; corresponding value for subjects from social class II and III were 40.3% and 40.6%, respectively, whereas, 26.7% and 22.2% subjects from social class IV and V were aware of health benefits of millets (Table-3).There existed no significant ($p>0.05$) association of consumption of millets with socio demographic (age, gender, religion, caste, marital status, education, occupation, type and size of family and social class) characteristics of study subjects.

Table-3: Linkages of Health benefits of millet (N= 231)

Socio-demographic status		**Yes**		**No**		**Total**		**Test of Significance**
		No.	**%**	**No.**	**%**	**No.**	**%**	
Gender	Male	67	50.4	66	49.6	133	100	χ^2=7.23; df= 1; p= 0.007
	Female	32	32.7	66	57.3	98	100	
Caste	SC/ST	7	33.3	14	66.6	21	100	χ^2=10.0; df= 3; p=0.018
	OBC	40	34.5	76	65.5	116	100	
	Others	52	55.3	42	44.7	94	100	
Education	Illiterate	3	12.5	21	87.5	24	100	χ^2=27.7; df= 7; p=0.000
	Primary + Secondary	4	26.6	11	73.3	15	100	
	High School	5	20.8	19	79.2	24	100	
	Intermediate	10	34.5	19	65.5	29	100	
	Graduation	61	53.0	54	47.0	115	100	
	PG+Ph.D.	16	66.6	8	33.3	24	100	
Occupation	Service	51	57.3	38	42.6	89	100	χ^2=29.4; df= 8; p=0.000
	Business	24	46.1	28	53.8	52	100	
	Homemaker	15	22.4	52	77.6	67	100	
	Skilled + Non skilled	8	38.0	13	61.9	21	100	
	Unemployed	1	50.0	1	50.0	2	100	
	PG + Ph.D.	16	66.6	8	33.3	24	100	
Social Class	I	41	63.1	24	36.9	65	100	χ^2=19.0; df=4; p=0.001
	II	31	40.3	46	59.7	77	100	
	III	13	40.6	19	59.4	32	100	
	IV	8	26.7	22	73.3	30	100	
	V	6	22.2	21	77.8	27	87	

Discussion

Nearly 13 out of 20 subjects were from the age group 30-40 years, whereas nearly 3 out of 5 subjects were male. Majority (19 out of 20) of the subjects were Hindu. There was preponderance (2 out of 5) of other Backward Caste followed by other (3 out of 10) caste category. Four out of 5 subjects were married. Nearly 1 out of 8 and 1 out of 10 subjects had education status as intermediate and post-graduation and above, respectively. Two out of 5 and 1 out of 5 subjects were engaged in service and business, respectively, whereas 3 out of 10 subjects were homemaker. In case of 2 out of 5 subjects family size was 2-4 and 4 out of 5 were from nuclear family. A study done in Coimbatore also reported nearly 6 out of 10 subjects were from nuclear family[14]. Nearly 7 out of 25 subjects were from social class I and 1 out of 4 subjects belonged to social class IV and V. Studies from south India also reported nearly 3 out of 10 (Tirupati) and 2 out of 5 (Coimbatore) subjects belonged to lower socio economic class[14, 15].

According to this study nearly 19 out of 20 subjects had heard about millets. Similar to the finding of present study a study from urban India also reported that nearly 9 out of 10 subjects knew millets but most of them did not recognize it when shown the picture of millet[16] whereas, other studies revealed that the awareness about millets was maximum among subjects in comparison to the types of millets[17]. Study done in Andhra Pradesh and Telangana states in India also revealed that nearly 9 out of 10 subjects had knowledge of millets [18]. A study from south India also reported that nearly 4 out of 5subjects were aware of at least one form of millet [19]. Nearly 17 out of 25 and 9 out of 20 subjects were aware of nutritional and health benefits of millets, respectively. A large scale survey done in urban India to assess consumption behaviour of millets and sorghum also revealed that 2 out of 5 subjects were aware of nutritional value and health benefits of millets (viz., good for general health of women, high in iron, calcium and good for diabetes)[16]. Nearly 4 out of 5 had knowledge about good nutritional value of millets[18]. Nearly 1 out of 4 subjects were aware of the international millet year and emphasis of Government on the consumption of millets. The changing life style has influenced the food culture of Indian population. Earlier millets were the main food of Indian culture. Although 9 out of 10 subjects were aware of millets, the consumption of millet was less; 7 out of 10 subjects consumed millets. Study from Andhra Pradesh and Telanagna states in India also reported that 4 out 5 subjects consuming millets[18]. According to a study from Kerala nearly 2 out of 5 subjects consumed millet [19]. Three out of 25 subjects consumed millets regularly. In contrast to this nearly half of the subjects from various states of south India consumed millets regularly [20]. As per a study 1 out of 2 subjects consumed millets 1 or more times per week and 7 out of 20 subjects never consumed millets[16]. One out of 2 and nearly 4 out of 5 subjects consumed Pearl and *Jowar* millet in their season, respectively. In consonance with present finding 4 out 5 subjects consumed millets occasionally has been reported by researcher from south India[15, 21]. Despite the efforts made at national level for enhancing production and consumption of millets 3 out of 10 subjects did not consume millets. Non- availability of millets (2 out of 3), no interest (13 out 50), poor palatability (9 out 100) and non-affordability (2 out 25) were the prominent reasons provided by subjects for not consuming millets. Non- availability of millets emerged as main constraint for not consuming millets. It could be due less demand of millets in the urban area. In contrast to this 1 out of 5 subjects from Bengaluru, south India provided reason for not consuming more millets was its taste besides family custom[16]. Nearly 13 out of 100 subjects were not consuming millets because of poor economic status [18].

There existed significant ($p<0.05$) association of awareness of millets products with their religion, education, occupation and social class of study subjects. Nearly 17 out of 20 Hindu, 27 out of 50 graduate and above 9 out of 10 subjects engaged in service were aware of millets products. Nearly 9 out of 10 and 4 out of 5 subjects from social class I and III were aware of millets (Table 1). Awareness regarding nutritional benefits of millets was significantly ($p<0.05$) associated with gender caste, education and social class of the subjects. Nearly 7 out of 10 male subjects were aware of nutritional benefits of millets. Nearly 2 out of 5 subjects from other caste category were aware of nutritional benefits of millets. Three out of 4 post graduate and above subjects were aware of nutritional benefits of millets. Nearly 4 out of 5 and 3 out of 4 subjects from social class I and III were aware of nutritional benefits of millets (Table-2). Of 218 subjects nearly 2 out of 5 subjects were aware of health benefits of millets. Gender, caste, education, occupation and socio economic status of the study subjects were the associates ($p<0.05$) of health benefits of millets. Half of male, 11 out of 20 subjects from other caste category were aware of health benefits of millets. Subjects with higher educational status were more aware of health benefits of millets. As much as 13 out of 50, 1 out of 5, 17 out of 50 and 11 out 20 subjects with educational status as primary + secondary, high school, intermediate, post-graduation and above were aware of health benefits of millets ($p<0.000$). Nearly 11 out of 50 homemakers were aware of health benefits of millets, whereas, nearly 3 out of 5 subjects from service class,9 out of 20 business class and 19 out 50 skilled + non skilled workers were aware of health benefits of millets ($p<0.01$). Sixty three out of 100 subjects from social class I were aware of health benefits of millets; nearly 2 out of 5 subjects from social class II and III were aware of health benefits of millets (Table 3).

There existed no significant ($p<0.05$) association of consumption of millets with socio demographic (age, gender, religion, caste, marital status, education, occupation, type and size of family and social class) characteristics of study subjects. In consonance with the finding of present study age, education, annual income, land holding and size of

family were non-significantly correlated with consumption pattern of millets among non-grower of millets as reported in a study [21]. In view of high level of commitment and initiatives by Government of India awareness of urban adults about millets has increased. However, qualitative gaps prevail as observed in this study that only 9 out of 20 subjects had awareness about health benefits. Although socio economic gradient prevailed in awareness of overall as well as nutritional and health benefits of millets, this has not been reflected in millet consumption behaviour of subjects. This is likely to happen as awareness building initiatives were done in campaign mode. The prevailing awareness consumption gap can be addressed by rigorous implementation of educational efforts fostering potential benefits of millets and overcoming constraints in consumption of millets in general and ensuring its availability in particular.

Conclusion and Recommendations

Knowledge consumption gap regarding millet was evident in urban adult of Prayagraj. Education, occupation and social class significantly influenced nutritional and health related information of millets. For adoption of millet friendly dietary behaviour multipronged attack for its productivity, availability and affordability is needed. Upscaling on going initiatives, ensuring its availability through nutrition safety nets and its inclusion in Mid-Day Meal program can make a difference in this area.

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