

Original Research Article

Effects of Nutrition Education on the Knowledge, Attitudes, and Practices (KAP) Towards Millet Consumption in School-Aged Children (10-15 Years) in Virudhunagar District, Tamil Nadu, India

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Abstract

India, a prominent millet producer, recognizes these grains for their exceptional nutritional benefits and resilience. Millets, are source of many vital nutrients including antioxidants and phytonutrients that support heart health, diabetes management and cancer prevention. Present study investigates the knowledge, attitudes, and practices (KAP) related to millet consumption among school children aged 10-15 years in Sivakasi and Thiruthangal, Virudhunagar district, Tamil Nadu. The study sampled 600 children from grade 5 to 9 from four schools—two private and two government. Data was collected through a questionnaire assessing demographics, millet consumption frequency, preferred millet dishes, and KAP before and after a nutrition education program. The responses were binary (yes/no), and KAP scores were analyzed using descriptive statistics and percentages via Microsoft Excel and SPSS, with significance set at $p < 0.05$. Results indicated a general lack of preference for Kodo, proso and foxtail millets compared to other varieties. However, the nutrition education program positively influenced the frequency of millet consumption, with significant improvements observed in attitude scores towards millet. The study highlights the effectiveness of nutrition education in improving dietary practices among school children. Government has also shown interest in this matter by millet distribution through the Public Distribution System (PDS) and incorporation of millets into school meal programs.

Keywords: Millets, Nutritional Benefits, Knowledge Attitudes Practices (KAP), Nutrition Education, School Children, Dietary Habits.

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Introduction

India is a major producer of various types of millet, known as coarse grains, which are recognized for their resilience in challenging agricultural conditions and their role in food security. In recent years, millets have gained recognition for their nutritional benefits and are now considered healthy cereals. They are among the least allergenic and most digestible grains. Compared to polished paddy rice, millets release glucose at a slower rate and in smaller quantities. Rich in calcium, dietary fiber, polyphenols, and protein, millets stand out for their nutritional content. Amino acid profile and fat content of millets is better than other cereals. With their nutraceutical properties, millets offer antioxidants that support wellbeing by managing many lifestyle related disorders.^[1]

Millets are one of the oldest known foods, valued for their nutrient density and high content of Phytonutrients. The lignans are soluble fiber which are heart friendly. Pearl millet is especially rich in bioactive compounds such as phytates and polyphenols. Foxtail millet is magnesium rich, which aids in regulating hypertension, and is also rich in iron and calcium, which help boost immunity. Sorghum is beneficial in celiac disease as it is gluten free. Millets are low in energy but highly nutritious, classified as potential prebiotics that enhance probiotic activity and provide significant health benefits. It has a lower glycemic index and 8-15 times more amylase activity than wheat. Millets are also good sources of polyphenolic compounds, which are strong antioxidants. With high fiber and non-starchy polysaccharides, millet helps regulate blood sugar levels, lower cholesterol, and increase adiponectin levels-a heart friendly hormone. It is also helpful in celiac disease. Additionally, finger millet is associated with lower cancer incidences.^[2]

Despite their nutritional advantages, millets remain underutilized outside traditional communities and lower-income populations. In many parts of Asia and Africa, millet is a staple food, used to prepare various traditional dishes like idli, dosa, porridge, and snacks. In developed nations, a number of millet-based products are made by organic farmers and food companies. Millets can be easily incorporated into diets due to their health-promoting properties, particularly their antioxidant effects. Advances in millet processing technology have also facilitated its use in food production, with millet oil being a rich source of antioxidants and essential fatty acids.^[3]

Given the numerous health promotive features, millets are increasingly incorporated into the diets of Indians. However, despite the growing recognition of their nutritional value, there has been limited research on the knowledge, attitudes, and practices (KAP) with regards to millet consumption. This study planned to investigate the KAP regarding millet consumption among selected participants.

Objectives

- Study of millet consumption pattern among school-going children (10-15 years) in private and government schools
- Assessment of millet intake through diet survey
- Conducting nutrition education about millet consumption and health benefits among school-going children
- Assessing the millet consumption pattern dietary pattern and Knowledge, attitude and practice (KAP) before and after nutrition education

Research Methodology

Sample selection

The study was carried out among school going children in Virudhunagar district, Tamil Nadu. Schools from Sivakasi town and Thiruthangal were chosen for the study, with two private and two government schools selected from each area. Total 600 children, between the age of 10-15 years, were taken for the study. Of the 600 children, 154 boys and 146 girls attended government schools, while 145 boys and 155 girls were enrolled in private schools. The participants, all in grades five through nine, were chosen through purposive sampling for the study.

Data collection

Information regarding demographic details, age, educational level, gender, socioeconomic level, and family type was collected with the help of a well-structured questionnaire. It also aimed data collection on the frequency of millet consumption, the types of millet dishes prepared at home, and their preferences. Additionally, the questionnaire assessed their knowledge of millets, attitudes towards millet consumption,

and the practices before and after a nutrition education program focused on incorporating millet into daily life. Each section of the questionnaire contained five closed-ended questions with yes or no responses.

Knowledge, Attitude and Practices for millets consumption

These types of questionnaires are generally used for public health programs.

- Knowledge questionnaire included questions for awareness of millets, daily consumption of millet, whether millets are nutritious, whether wheat is more nutritious than millet, and whether millets are better than different varieties of rice
- Attitude questionnaire is made to assess the attitude of consumers towards millets. These included questions such as whether daily consumption of balanced diet is good for immunity, whether family members consume millets daily, whether consuming fast food every day is good for health, whether healthy foods are expensive, and whether the respondent is interested in learning more about healthy foods
- Practices questionnaire included questions such as whether the respondent consumes millets regularly, whether millets help with weight loss, whether millets are part of traditional recipes only, whether the respondent ensures that their daily diet includes all basic food groups, and whether they would like to suggest millets to their family members or friends

Statistical analysis

The data was represented as KAP scores on a binary scale, where 1 represented correct response and incorrect responses were designated as 0. Descriptive statistics was used to analyze data collected on age, gender, literacy, family structure, socioeconomic level and millet consumption. Microsoft Excel was used to calculate frequencies and percentages and statistical analysis was conducted using SPSS software. A significance threshold of $p < 0.05$ was applied for all analyses.

Ethical consideration

Ethical approval for this study (IHEC/22-23/FSN-9) Approval was obtained from the ethics committee of the Avinashilingam Institute for Home Science and Higher Education for Women.

Results & Discussion

Distribution of children on the basis of age and class: Table 1 provides an analysis of the age and grade levels of children taken from selected schools both government and private. In the group of 300 children from government schools, 20% were in each of the age groups of 10, 11, 12, 13, and 14 years, corresponding to students in the fifth, sixth, seventh, eighth, and ninth grades, respectively. Similarly, among the 300 children from private schools, 20% fell within the same age groups (10, 11, 12, 13, and 14 years) and were enrolled in the fifth, sixth, seventh, eighth, and ninth standards, respectively.

Age in years	STD	Types of school				Total (N=600)	
		Government school (N=300)		Private school (N=300)			
		N	%	N	%	N	%
10	5 th	60	20	60	20	120	20
11	6 th	60	20	60	20	120	20
12	7 th	60	20	60	20	120	20
13	8 th	60	20	60	20	120	20
14	9 th	60	20	60	20	120	20
Total		300	100	300	100	600	100

Table 1: Distribution of children based on their age and class

Distribution of children based on gender

Gender differences in academic performance and behavior can impact participation in extracurricular activities. To foster well-rounded development, schools should promote gender-inclusive involvement in sports, arts, and other extracurricular programs. Table 2 shows a nearly balanced gender distribution in both government and private schools. In government schools, 51% of the students were boys, and 49% were girls, while in private schools, 48% were boys and 52% were girls. This data suggests that education is equally available to both genders, with comparable enrolment rates across the two types of schools.

Gender	Types of school		Total (N=600)
	Government school (N=300)	Private school (N=300)	
	%	%	%
Girls	49	52	50
Boys	51	48	50
Total	100	100	100

Table 2: Distribution of children based on gender

Socio-economic status of students

Socioeconomic status remarkably affects children's exposure, as affluent families were able to afford private schooling, coaching and extracurricular activities, while children from lower-income backgrounds got fewer academic enrichment opportunities. Children's social and emotional well-being is also greatly influenced by their socio economic status, which can, in turn, impact their academic performance and engagement with school. Factors such as poverty, housing uncertainty, family clashes and exposure to violence can hinder learning. As shown in Table 3, children were divided into the categories of lower middle, middle, and upper middle income groups. (Tiwari & Kumar: Updating of Socio-Economic Scale, 2010).^[4] This scale considers factors like land area, house type, household appliances, computer access, property, average per capita monthly income, and social aspects. It was found that 30% of children belonged to lower middle-income families in government schools compared to only 5% in private schools, highlighting that affordability is a critical factor in accessing

private education. Majority of children were from middle-income group (65% in government and 77% in private schools). A smaller proportion, 5% in government schools and 18% in private schools, belong to the upper middle class. These findings make it evident that socioeconomic status is a key deciding factor for type of schooling.

Socio economic status	Type of School		Total (N=600)
	Government School (N=300)	Private School (N=300)	
	%	%	
Lower middle class	30	5	18
Middle class	65	77	71
Upper middleclass	5	18	11
Total	100.0	100.0	100.0

Table 3: Socio-economic status of the children

Frequency of millet consumption by school children

Table 4 provides data on the frequency of millet consumption, categorized as daily, alternate days, weekly, or occasionally. The study compares millet consumption patterns before and after nutrition education among children from government and private schools. Before the nutrition education program, government school children mainly consumed pearl millet occasionally (94%) and once a week (6%), with sorghum and finger millet following similar patterns-96% consumed them occasionally, and 4% weekly. Kodo millet, foxtail millet, and proso millets were consumed primarily on an occasional basis (100%), while little millet was mainly eaten occasionally (96%) and once a week (4%). Barnyard millet was consumed occasionally by 92% and weekly by 8%, suggesting that these millets were not regularly included in the diets of children from government schools. Similar trend was seen for children from private schools also.

In private schools, pearl millet, sorghum, and finger millet were mostly consumed occasionally (89%) and once a week (11%). Kodo millet, foxtail millet, and proso millet followed a similar consumption pattern, with 100% of children eating them occasionally. Little millet was primarily consumed occasionally (98%) and weekly (2%), while barnyard millet was consumed occasionally by 97% and once a week by 3%.

After the nutrition education program, observations of millet consumption frequency in government schools revealed the following: Pearl millet was mostly consumed once a week (84%), followed by alternative days (6%) and occasionally (10%). Sorghum was consumed weekly by 86%, on alternate days by 4%, and occasionally by 10%. Finger millet was consumed daily by 3%, on alternate days by 5%, weekly once by 82%, and occasionally by 10%. Kodo millet was consumed weekly by 39% and occasionally by 61%. Foxtail millet was consumed weekly by 21% and occasionally by 79%. Proso millet was consumed weekly by 21% and occasionally by 76%. Little millet was mostly consumed occasionally (67%), followed by once a week (32%) and on alternate days (1%). Barnyard millet was consumed weekly by 77%, on alternate days by 6%, and occasionally by 17%.

In private schools, the consumption patterns were similar: Pearl millet was consumed weekly by 82%, on alternate days by 11%, and occasionally by 7%. Sorghum was consumed weekly by 82%, on alternate days by 5%, and occasionally by 13%. Finger millet was consumed weekly by 83%, on alternate days by 8%, daily by 2%, and occasionally by 7%. Kodo millet was consumed weekly by 31% and occasionally by 69%. Foxtail millet was consumed mostly occasionally (99%) with only 1% consuming it weekly. Proso millet was consumed weekly by 33% and occasionally by 67%. Little millet was mostly consumed occasionally (83%), followed by once a week (7%) and on alternate days (10%). Barnyard millet was consumed weekly by 71%, on alternate days by 5%, and occasionally by 27%.

The results indicate that children tend to have less preference for the taste of Kodo millet, proso millet, and foxtail millet compared to other types of millet. However, following the nutrition education program, there was an increase in the frequency of millet consumption, suggesting that the intervention positively influenced children's dietary habits. These findings highlight the effectiveness of the nutrition education program in promoting millet consumption among schoolchildren.

Types of millets	Before Nutrition Education								After Nutrition Education							
	Types of school								Types of school							
	Government school (N=300)				Private school (N=300)				Government school (N=300)				Private school (N=300)			
	D	A.D	W.O	O	D	A.D	W.O	O	D	A.D	W.O	O	D	A.D	W.O	O
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Pearl millet	-	-	6	94	-	-	11	89	-	6	84	10	-	11	82	7
Sorghum	-	-	4	96	-	-	11	89	-	4	86	10	-	5	82	13
Finger millet	-	-	6	94	-	-	11	89	3	5	82	10	2	8	83	7
Kodo millet	-	-	-	100	-	-	-	100	-	-	39	61	-	-	31	69
Foxtail millet	-	-	-	100	-	-	-	100	-	-	21	79	-	-	1	99
Proso millet	-	-	-	100	-	-	-	100	-	-	24	76	-	-	33	67
Little millet	-	-	4	96	-	-	2	98	-	1	32	67	-	10	7	83
Barnyard millet	-	-	8	92	-	-	3	97	-	6	77	17	-	5	71	24
D-Daily, A.D-Alternative Days, W.O-Weekly Once, O- Occasionally																

Table 4: Frequency of millet consumption by school children

Frequency of millet-based recipes consumption by school children

Table 5 presents data on the frequency of millet-based recipe consumption, including daily, alternate days, weekly, or occasional intake. It shows that both government and private school children consume millet-based foods both before and after the nutrition education program.

Before Nutrition Education

In government schools, only 2% of children consumed millet cookies, millet pasta, millet nutribar, millet porridge, and millet upma once a week, while over 98% consumed these items occasionally. Four percent of children had millet dosai, millet health mix, millet idiyappam, millet idly, millet kozukattai, millet noodles, millet roti, millet traditional sweets and savory dishes, and millet pongal once a week, with more than 96% consuming these items occasionally. Eight percent of children consumed millet puttu

and millet kali (mudde) weekly, while over 92% had them occasionally. Millet bread, millet cake, millet khichadi, millet muesli, and millet variety rice were predominantly consumed occasionally.

In private schools, 8% of children consumed millet bread, millet cookies, millet khichidi, millet kozukattai, millet nutribar, millet muesli, millet pasta, millet porridge, millet puttu, millet roti, millet kali, millet traditional sweets, and millet upma once a week, while more than 92% consumed these items occasionally. Ten percent of children had millet noodles, millet traditional savories, and millet pongal weekly, with 90% consuming these items occasionally. Eleven percent consumed millet health mix and millet idiyappam weekly, with 90% having them occasionally. Twelve percent of children consumed millet dosai and millet idly weekly, while 88% consumed these items occasionally. Millet cake and millet variety rice were consumed occasionally by 100% of children.

The data clearly indicates that there is a dire need to make children aware of the nutritional health benefits of millets and to promote inclusion of millet-based recipes in regular diet. These findings align with the study by Anitha et al. (2019)^[5], which revealed that the millets were mainly considered to be consumed by elderly population and they were less popular among school children.

Observation After Nutrition Education:

In government schools, the consumption of millet-based foods was as follows: 2% of children consumed millet bread on alternate days, 6% weekly, and 92% occasionally. Millet cake was consumed by 2% weekly and 98% occasionally. Millet cookies were eaten by 4% on alternate days, 7% weekly, and 29% occasionally. Millet dosai was consumed by 37% on alternate days, 53% weekly, and 10% occasionally. Millet health mix was consumed by 3% daily, 21% on alternate days, 37% weekly, and 39% occasionally. Millet idiyappam was consumed by 4% on alternate days, 52% weekly, and 44% occasionally. Millet idly was eaten by 26% weekly and 71% occasionally. Millet khichdi was consumed by 6% weekly and 94% occasionally. Millet kozukattai was consumed by 37% weekly and 63% occasionally. Millet nutribar was eaten by 3% weekly and 97% occasionally. Millet noodles were consumed by 15% on alternate days, 51% weekly, and 34% occasionally. Millet pasta was consumed by 5% weekly and 95%

occasionally. Millet porridge was eaten by 2% weekly and 98% occasionally. Millet puttu was consumed by 4% on alternate days, 13% weekly, and 83% occasionally. Millet roti was eaten by 4% weekly and 96% occasionally. Millet kali (mudde) was consumed by 8% weekly and 92% occasionally. Millet traditional sweets were eaten by 13% weekly and 87% occasionally. Millet traditional savories were consumed by 5% weekly and 95% occasionally. Millet upma was eaten by 3% weekly and 97% occasionally. Millet pongal was consumed by 5% weekly and 95% occasionally. Millet muesli and millet variety rice were consumed only occasionally.

In private schools, the consumption of millet-based foods was as follows: 16% of children consumed millet bread on alternate days, 24% weekly, and 60% occasionally. Millet cake was eaten by 5% weekly and 95% occasionally. Millet cookies were consumed by 21% on alternate days, 26% weekly, and 53% occasionally. Millet dosai was consumed by 32% on alternate days, 60% weekly, and 8% occasionally. Millet health mix was eaten by 3% daily, 21% on alternate days, 37% weekly, and 39% occasionally. Millet idiyappam was consumed by 7% on alternate days, 66% weekly, and 27% occasionally. Millet idly was eaten by 22% weekly and 78% occasionally. Millet khichdi was consumed by 3% weekly and 97% occasionally. Millet kozukattai was eaten by 61% weekly and 39% occasionally. Millet nutribar was consumed by 8% weekly and 92% occasionally. Millet muesli was eaten by 8% weekly and 92% occasionally. Millet noodles were consumed by 31% on alternate days, 54% weekly, and 15% occasionally. Millet pasta was eaten by 11% weekly and 89% occasionally. Millet porridge was consumed by 10% weekly and 80% occasionally. Millet puttu was consumed by 5% on alternate days, 14% weekly, and 81% occasionally. Millet roti was eaten by 8% weekly and 92% occasionally. Millet kali (mudde) was consumed by 9% weekly and 91% occasionally. Millet traditional sweets were eaten by 11% weekly and 89% occasionally. Millet traditional savories were consumed by 11% weekly and 89% occasionally. Millet upma was eaten by 8% weekly and 92% occasionally. Millet pongal was consumed by 10% weekly and 90% occasionally. Only millet variety rice was consumed occasionally. Overall, nutrition education seems to have had a positive impact on the frequency of millet-based recipe consumption, leading to more consistent weekly consumption in both government and private schools.

Types of millets	Before Nutrition Education								After Nutrition Education							
	Types of school								Types of school							
	Government school (N=300)				Private school (N=300)				Government school (N=300)				Private school (N=300)			
	D	A.	W.	O	D	A.	W.	O	D	A.	W.	O	D	A.	W.	O
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Millet Bread	-	-	-	100	-	-	8	92	-	2	6	92	-	16	24	60
Millet Cake	-	-	-	100	-	-	-	100	-	-	2	98	-	-	5	95
Millet Cookies	-	-	2	98	-	-	8	92	-	4	7	89	-	21	26	53
Millet Dosai	-	-	4	96	-	-	12	88	-	37	53	10	-	32	60	8
Millet Health mix	-	-	4	96	-	-	11	89	3	21	37	39	2	18	54	26
Millet Idiyappa m	-	-	4	96	-	-	11	89	-	4	52	44	-	7	66	27
Millet Idly	-	-	4	96	-	-	12	88	-	-	26	71	-	-	22	78
Millet Khichdi	-	-	-	100	-	-	8	92	-	-	6	94	-	-	3	97
Millet Kozukatta i	-	-	4	96	-	-	8	92	-	-	37	63	-	-	61	39
Millet Nutri bar	-	-	2	98	-	-	8	92	-	-	3	97	-	-	8	92
Millet Muesli	-	-	-	100	-	-	8	92	-	-	-	100	-	-	8	92
Millet Noodles	-	-	4	96	-	-	10	90	-	15	51	34	-	31	54	15
Millet Pasta	-	-	2	98	-	-	8	92	-	-	5	95	-	-	11	89
Millet	-	-	2	98	-	-	8	92	-	-	2	98	-	-	10	90

Porridge																
Millet Puttu	-	-	8	92	-	-	8	92	-	4	13	83	-	5	14	81
Millet Roti	-	-	4	96	-	-	8	92	-	-	4	96	-	-	8	92
Millet Kali (Mudde)	-	-	8	92	-	-	8	92	-	-	8	92	-	-	9	91
Millet Traditiona l sweets	-	-	4	96	-	-	8	92	-	-	13	87	-	-	11	89
Millet Traditiona l savouries	-	-	4	96	-	-	10	90	-	-	5	95	-		11	89
Millet Upma	-	-	2	98	-	-	8	92	-	-	3	97	-	-	8	92
Millet Variety rice	-	-	0	100	-	-	0	100	-	-	0	100	-	-	0	100
Millet pongal	-	-	4	96	-	-	10	90	-	-	5	95	-	-	10	90
D-Daily, A.D-Alternative Days, W.O-Weekly Once, O- Occasionally																

Table 5: Frequency of millet based recipes consumption by school children

Knowledge of Millet Consumption Before and After Nutrition Education Among School -going Children (10-15 Years)

Table 6 displays the knowledge scores on millet consumption before and after the nutrition education program among school children in both government and private schools. Prior to the program, 28% of government school children and 31% of the private schools children were familiar with millets. Furthermore, 8% of government school children and 10% of private school children had consumed some form of millet. Regarding the nutritional benefits of millets, 21% of government school children and 25% of private school children recognized them as nutritious. When asked whether wheat is more nutritious than millet, 23% of government school children and 24% of private school children answered correctly. Additionally, 31% of government school

children and 21% of private school children understood that millets are much better than any variety of rice.

Following the nutrition education program, 100% of children in both government and private schools became aware of millets, recognized their nutritional value, and understood that millets are more nutritious than wheat. All children also acknowledged that millets are more nutritious than white and brown rice. The percentage of children who had consumed millet increased considerably, with 90% of government school children and 93% of private school children having tried some form of millet.

Prior to the nutrition education program, the knowledge scores of government school children were (66.4 ± 25.9), which increased to (294.2 ± 12.98) after the program. The t-value for the comparison of knowledge in government schools was -136.5, with $df = 598$, and the p-value was below 0.001, indicating a highly significant difference. In private schools, the knowledge scores before the nutrition education were (66.2 ± 22.9), rising to (295.6 ± 9.8) after the program. The t-value for private schools was -159.6, with $df = 598$, and the p-value was also less than 0.001. These significant changes show that the nutrition education program had a considerable positive impact on enhancing the knowledge of millets among school children.

Questions	Before Nutrition Education		After Nutrition Education	
	Types of school		Types of school	
	Government school (N=300)	Private school (N=300)	Government school (N=300)	Private school (N=300)
	%	%	%	%
Have you heard about millet	28	31	100	100
Have you eat millets	8	10	90	93
Millet are nutritious	21	25	100	100
Is wheat more nutritious than millet	23	24	100	100
Are some millets more nutritious than white and brown rice	31	21	100	100

Table 6: Knowledge of Millet Consumption Before and After Nutrition Education Among School -going Children (10-15 Years)

Attitude of Millet Consumption Before and After Nutrition Education Among School-going Children (10-15 Years)

Table 7 presents the attitude scores related to millet consumption before and after the nutrition education program among schoolchildren. Prior to the program, 15% of government school students and 17% of private school students viewed consuming a balanced diet daily as essential for boosting and maintaining immunity. Additionally, 17% of government school children and 30% of private school children thought healthy foods were expensive. Only 8% of government school children and 7% of private school children reported that their parents and grandparents often ate millets. Moreover, 29% of government school students and 32% of private school students believed that fast food was unhealthy, while 32% of government school children and 27% of private school children expressed interest in learning more about healthy foods.

After completing the nutrition education program, 100% of students from both government and private schools agreed that eating a balanced diet daily is important for immunity, that their parents and grandparents frequently consume millets, that fast food is unhealthy, and that they were eager to learn more about healthy foods. Furthermore, 96% of government school children and 99% of private school children agreed that healthy foods are expensive.

Before the nutrition education program, the attitude scores for government school students were (60.8 ± 24.8) , which increased to (285.8 ± 19.4) afterward. The t-value for the comparison of attitudes in government schools was -123.6, with $df = 598$, and the p-value was less than 0.001, indicating a highly significant change. In private schools, the attitude scores before the program were (67.8 ± 26.8) , which increased to (299.6 ± 0.89) afterward. The t-value for the attitude comparison in private schools was 149.5, with $df = 598$, and the p-value was also less than 0.001. These substantial differences, evidenced by large t-values and very small p-values, highlight the positive effect of the nutrition education program in improving students' attitudes toward millet consumption in both government and private schools.

Questions	Before Nutrition Education		After Nutrition Education	
	Types of school		Types of school	
	Government school (N=300)	Private school (N=300)	Government school (N=300)	Private school (N=300)
	%	%	%	%
Do you feel that healthy food are expensive?	17	30	96	99
Are you interested to learn more about healthy foods	32	27	100	100
Did your parents/ grandparents eat millets often	8	7	100	100
Do you think it is essential to eat balanced diet every day to improve immunity	15	17	100	100
Is consuming fast food every day good for health	29	32	100	100

Table 7: Attitude of Millet Consumption Before and After Nutrition Education Among School-going Children (10-15 Years)

Practice of Millet Consumption Before and After Nutrition Education Among School-going Children (10-15 Years)

Table 8 presents the responses to questions regarding millet consumption practices among school children before and after the nutrition education program. Before the program, the findings from children in both government and private schools revealed that 8% and 10%, respectively, consumed millets regularly; 5% and 7% were aware of the role millets play in weight loss; and 10% and 11% knew that millets are traditionally included in Indian diets. Additionally, only 21% of government school children and 30% of private school children indicated they would recommend millets to their families and friends. Furthermore, 20% and 27% of children reported consuming all five food groups daily, according to ICMR guidelines.

Following the nutrition education program, a significant improvement was observed: 87% of the government school and 93% of the private school children consumed millets regularly; 89% and 85% understood the weight loss benefits of millets; and 100% were

aware that millets are not exclusive to traditional Indian diets. Every child from both school types stated they would recommend millets to others. However, only a small percentage of children reported including all five food groups in their daily diet, as recommended by the ICMR.

Before the program, the practice scores in government schools were (38.6 ± 21.56) , which increased to (285.8 ± 19.42) after the program. The t-value for comparing practice scores in government schools was 147.0, with $df = 598$, and the p-value was less than 0.001, indicating a highly significant improvement. In private schools, practice scores increased from (50.6 ± 29.50) to (287 ± 19.73) after the program. The t-value for the comparison in private schools was 115.9, with $df = 598$, and the p-value was less than 0.001. These results demonstrate a considerable improvement in millet consumption practices, highlighting the effectiveness of the nutrition education program.

Questions	Before Nutrition Education		After Nutrition Education	
	Types of school		Types of school	
	Government school (N=300)	Private school (N=300)	Government school (N=300)	Private school (N=300)
	%	%	%	%
Do you consume millets regularly?	8	10	87	93
Do millets help in weight loss?	5	7	89	85
Are millets used only in traditional Indian diet	10	11	100	100
Do you ascertain that your every day diet contains basic five food groups?	20	27	100	100
Do you/would you recommend millets to friends and family?	21	30	100	100

Table 8: Practice of Millet Consumption Before and After Nutrition Education Among School- going Children (10-15 Years)

Discussion

The study exploring the relationship between age, class levels and millet consumption among children in government and private schools offers important insights into educational opportunities, socioeconomic factors, and eating habits. The demographic data indicates that children in both school types are similarly distributed across various age groups and grades, suggesting that age and grade level are consistent factors influencing school participation, regardless of whether the school is government-run or private. The gender distribution is also almost equal in both settings, reflecting equal educational access for both boys and girls.

Socioeconomic status is a significant determinant of access to education. The results reveal a clear socioeconomic divide between students in government and private schools. A higher percentage of children from lower-middle-income families attend government schools, while majority of the students in private schools were from middle and upper-middle-income families. This disparity highlights the influence of economic status on the type of schooling children receive, with private education being less accessible to lower-income families.

The study also assesses dietary habits, focusing on millet consumption before and after the nutrition education program. Before the intervention, millet consumption was irregular in both government and private schools, with most children consuming millet only occasionally. However, following the nutrition education program, there was a notable increase in the frequency of millet consumption across both school types, demonstrating that the program effectively encouraged more regular consumption of millet-based foods.

Moreover, the study found a significant improvement in students' knowledge and attitudes toward millet consumption after the intervention. Prior to the program, students had limited awareness about health benefits of millets. After the education, all students recognized the value and important role of millets for human health. Additionally, there was a substantial increase in practice scores, which assess regular millet consumption, further underscoring the positive role of the nutrition education program on children's eating habits and practices.

Conclusion

The study makes it evident that socioeconomic status has a direct impact on educational opportunities and emphasizes the effectiveness of nutrition education in enhancing dietary habits among school children. The results indicate progress in both knowledge and practice of healthy eating; however, continuous efforts are required to ensure equal access to educational resources and to encourage healthier eating habits across all socioeconomic groups.

Recommendations

- The government should intensify its efforts to distribute millets through the Public Distribution System (PDS) and other health-focused initiatives, ensuring that families from all socioeconomic backgrounds have access to these nutritious grains
- Additionally, government schools should include millets in their regular meal programs to encourage a habit of millet consumption
- It is also recommended that schools designate one day each week as 'Millet Day' to promote the consumption of millets

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