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Original Research Article

Exploring dietary habits: a study of food consumption patterns among school children aged 10-16 in Mysuru

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ABSTRACT

Background: Diet plays an important role in the growth and development of children. Poor diet in children in Mysuru is linked to future health risks. This study examines the eating habits of children aged 10-16 years to create better food recommendations for children in preventing future consequences.
Methods: A cross-sectional study was conducted in the Mysuru district. Data from 126 students aged 10-16 years from 2 schools were collected using A semi-structured food frequency questionnaire (FFQ) on dietary intake developed based on a 24-hour recall method and included items on demographic data, frequency of meal consumption in different food categories, and food frequency data. Anthropometric measurements were done. Descriptive statistics were used to analyze the data.
Results: Among the students, most consume rice and idli daily; dosa and khichdi frequently. Pasta, puffed rice, and legumes are less common. Milk and milk products vary, with coffee/tea and paneer often consumed once a month. Fruits like apples, bananas, and grapes are consumed twice a week, while sweet lime, mango, and orange are mostly monthly. Boiled eggs and chicken are often bi-weekly; fish, beef, red meat, and prawns/crab are mostly consumed once a month or less. Biscuits and gobi are frequently consumed weekly; cakes, French fries, samosas, pizza, and chocolates are mainly consumed monthly.
Conclusions: This study observes the dietary habits of Mysuru students (aged 10-16), to understand nutritional status and frequency of food consumption aiding targeted interventions to promote healthier eating and reduce chronic disease risk.

Keywords: Dietary habits, Adolescents, Nutritional status, Food frequency, Childhood health

INTRODUCTION

Nutritional status is the most important component playing a vital role in the health of individuals. Among children, nutritional status is directly related to the growth, and development of the children. The abnormal dietary practices in children have its effects on the occurrence of health issues related to nutrition. Immediate effects of unhealthy eating patterns among children may lead to underweight, overweight, and obesity.[1] The Asian Countries have been affected by the increased obesity epidemics in recent years and obesity-related diseases have become of predominant concern.[2] Adolescence is a critical period for development. There will be a sudden increase in physical development including changes in the body's physique as well as the restructuring of adiposity associated with the psycho-emotional variations.[3] Consumption of food items rich in carbohydrates, fat, salt, and calorie content in children can also lead to hypertension, dyslipidemia, and impaired glucose tolerance.[4] The foods children usually consume are rich in sugar or fat like sweet beverages, desserts,

processed food items, and meat associated with high body weight.[5] Conversely, higher consumption of legumes, whole grain foods (including cereals), non-starchy vegetables, fruits (which have relatively low-energy density), and nuts (with high-energy density) has been associated with a lower risk for obesity and weight gain. This approach to diet analysis is referred to as dietary pattern analysis. It is said that a healthy dietary pattern is closely allied with lower weight gain.[6] There is evidence of the role of dietary patterns in the development of overweight/obesity.[7] However, there is a need to study the dietary patterns and food consumption among adolescents and school children of Mysuru to understand how dietary patterns influence weight status in adolescents and to develop evidence-based recommendations for healthy nutritional patterns for adolescents which will be useful in developing effective strategies for preventing the health consequences among adolescents which can help adolescents reach their full potential and reduce their risk of developing chronic diseases later in life.

Objectives

Objectives were to assess the dietary habits and consumption patterns of children aged 10-16 years among school students in Mysuru and to determine the frequency of consumption of food items among children aged 10-16 years in Mysuru.

METHODS

The cross-sectional study was conducted between August 2023 to November 2023 and data was collected from 126 students aged between 10 and 16 years from 2 schools in the Mysuru district. The children were selected using a lottery method simple random sampling technique. A semi-structured FFQ was developed based on the 24-hour recall method performed on alternate days thrice a week. The FFQ consists of items related to demographic data, anthropometric data, frequency of meal consumption, and food frequency data.

Demographic data

Includes age, gender, class, and school grades.

Anthropometric data

Includes weight and height. Weight was assessed on a weighing scale while height was measured using a stadiometer. The BMI of children was calculated based on the BMI for age classification by WHO.

Frequency of meal consumption

Frequency of meal consumption was given in seven different categories i.e. never, once a month, once in fifteen days, twice in fifteen days, once per week, two times per week, once daily, more than thrice a day.

FFQ

Foods were divided into seven groups: cereals, pulses, vegetables, milk and milk products, fruits, snacks, and beverages. Food frequency based on the above seven categories of consumption was recorded. A total of sixty-six food items were listed and an option to enter any other food item that was missed out in the listed items was given in the FFQ.

Data analysis

The data collected was entered into MS excel and then analyzed using IBM statistics SPSS V.26 licensed to JSSAHER. Descriptive statistics like frequency and percentages were used to calculate the frequency of the food items consumed to find out the dietary intake patterns among school children.

RESULTS

The majority of study participants were 13-15 years. Most of them were between 151.1 cm to 165 cm (51.6%) and between 55.1 kg and 70 kg (36.5%) and the mean BMI among 22.53±5.3. The majority of them were overweight (39.7%) according to BMI for age classification of WHO (Table 1).

Frequently consumed cereals

The majority (71.4%) of study participants consumed rice once daily, and 17.5% consumed it twice per week. Idli was consumed once daily by 66.7% of respondents and twice per week by 10.3%. The 54.8% reported consuming dosa once daily, and 22.2% consumed it twice a week. Khichdi was predominantly consumed once daily by 84.1% of respondents.

Less frequently consumed cereals

The majority (71.4%) consumed pasta once a month, with 16.7% consuming it once in fifteen days. Most respondents (57.9%) consumed puffed rice once a month, and 5.6% consumed it once in fifteen days. The 63.5% of respondents consumed porridge once a month, and 4.8% once in fifteen days.

Other notable consumption patterns of cereals

Bread was consumed once a month by 34.9% and once in fifteen days by 23%. The 40.5% consumed chapati once in fifteen days, and 21.4% twice in fifteen days. Paratha was most commonly consumed once in fifteen days by 65.1%, and twice in fifteen days by 13.5%. The consumption of Puri was evenly spread with 40.5% once in fifteen days and 27.8% twice in fifteen days. The 38.9% consumed roti twice in fifteen days and 25.4% once in fifteen days. Ragi ball was consumption with 31% once in fifteen days and 19% twice in fifteen days. The 66.7% consumed vermicelli once in fifteen days, and

17.5% twice in fifteen days. 49.2% consumed Rava items once in fifteen days, and 21.4% once daily.

Legumes were frequently consumed twice in fifteen days (43.7%), while 34.1% consumed them once a month. Lentils were also frequently consumed twice in fifteen days (49.2%), with 25.4% consuming them once a month. Only 2.4% and 1.6% consumed legumes and lentils daily, respectively.

Green leafy vegetables were frequently consumed two times per week (57.9%), with 14.3% consuming them once a month. Vegetables were also commonly consumed two times per week (53.2%), while 23.8% consumed them once a month. Daily consumption was reported by 3.2% and 4.8%, respectively.

consumption patterns of Milk and milk products varied among respondents. Coffee/tea was predominantly consumed monthly (48.4%) and daily (41.3%), with minimal bi-weekly consumption. Milk consumption was widespread, with 42.1% consuming it monthly and 49.2% consuming it daily. Lassi/curd consumption was prominent twice in fifteen days (29.4%) and once daily (16.7%). Paneer was primarily consumed monthly (51.6%) and twice in fifteen days (38.1%). Ghee consumption showed a different trend, with 34.1% consuming it daily and 26.2% weekly, while monthly consumption was relatively low (10.3%) (Table 2).

The consumption patterns of various fruits varied among respondents. Apples were most commonly consumed monthly (39.7%), with a notable portion consuming them twice a week (23%). Similarly, bananas were frequently consumed twice a week (39.7%) and monthly (27%). Grapes also showed a similar trend, with 34.1% consuming them twice a week and 32.5% monthly. In contrast, sweet lime, mango, and orange were predominantly consumed monthly, with 65.1%, 77%, and 69.8% of respondents, respectively, reporting monthly consumption. Fruit juice was mainly consumed monthly (59.5%), though 15.9% reported bi-weekly consumption (Table 3).

The consumption patterns of non-vegetarian foods exhibited diverse trends among respondents. Boiled eggs were frequently consumed, with 36.5% consuming them twice in fifteen days and 30.2% once per week. Egg dishes were also popular, with 42.1% consuming them monthly and 42.1% twice in fifteen days. Chicken consumption was notable, with 46.8% consuming it monthly and 31.7% twice in fifteen days. Fish was predominantly consumed monthly (79.4%), while other non-vegetarian options like beef, red meat, and prawns/crab were consumed less frequently or not at all (Table 4).

Snack consumption patterns among the surveyed population varied significantly. Biscuits were commonly consumed twice a week (46.8%) and once a week (27.8%). Monthly consumption was prevalent for cake (52.4%), French fries (59.5%), pav bhaji (82.5%), samosa (73.8%), and pizza (89.7%). Gobi was typically consumed twice a week (51.6%), while pani puri (42.1%) and veg roll (73.8%) were mainly consumed once a month. Egg rolls (65.9%) and momos (66.7%) were primarily consumed every month. Savory snacks were consumed twice a week (41.3%) and monthly (31.7%). Chocolates were commonly consumed monthly (59.5%). Custard (82.5%) and jelly (87.3%) were predominantly consumed monthly. Cakes were mostly consumed monthly (34.1%) (Table 5).

Table 1: Socio-demographic characteristics of study participants.

Variables	N	Percentage (%)	Mean±SD
Age (in years)			
10	18	14.3	12.64±1.75
11	19	15.1	
12	25	19.8	
13	20	15.9	
14	20	15.9	
15	20	15.9	
16	4	3.2	
Height (cm)			
<135	9	7.1	151.95±10.29
135-150	43	34.1	
151-165	65	51.6	
>166	9	7.1	
Weight (kg)			
<25	3	2.4	53.02±16.41
25.1-40	28	22.2	
40.1-55	32	25.4	
55.1-70	46	36.5	
>70	17	13.5	

Continued.

Variables	N	Percentage (%)	Mean±SD
BMI (kg/m^2)			
<15	11	8.7	22.53±5.3
15.1-20	29	23.0	
20.1-25	38	30.2	
25.1-30	37	29.4	
>30	11	8.7	
BMI for age			
Overweight	50	39.7	-
Obese	43	34.1	
Non-obese	33	26.2	

Table 2: Consumption pattern of cereals, pulses, vegetables and milk products among children aged 10-16 years (n=126).

Cereals	Never, N (%)	Once a month, N (%)	Once in fifteen days, N (%)	Twice in fifteen days, N (%)	Once per week, N (%)	Two times per week, N (%)	Once daily, N (%)	>3 times/ day, N (%)
Bread	0	44 (34.9)	29 (23)	34 (27)	11 (8.7)	8 (6.3)	0	0
Chapati	0	7 (5.6)	14 (11.1)	51 (40.5)	27 (21.4)	22 (17.5)	5 (4)	0
Paratha	0	82 (65.1)	17 (13.5)	9 (7.1)	17 (13.5)	1 (0.8)	0	0
Puri	0	33 (26.2)	51 (40.5)	35 (27.8)	6 (4.8)	1 (0.8)	0	0
Rotti	0	25 (19.8)	32 (25.4)	49 (38.9)	7 (5.6)	9 (7.1)	4 (3.2)	0
Ragi ball	0	38 (30.2)	39 (31)	14 (11.1)	10 (7.9)	24 (19)	1 (0.8)	0
Pasta	0	90 (71.4)	21 (16.7)	6 (4.8)	5 (4.0)	2 (1.6)	1 (0.8)	1 (0.8)
Rice	0	7 (5.6)	2 (1.6)	2 (1.6)	2 (1.6)	90 (71.4)	22 (17.5)	1 (0.8)
Idli	0	9 (7.1)	13 (10.3)	84 (66.7)	13 (10.3)	5 (4.0)	2 (1.6)	0
Dosa	0	8 (6.3)	28 (22.2)	69 (54.8)	13 (10.3)	8 (6.3)	0	0
Vermicelli	0	84 (66.7)	22 (17.5)	18 (14.3)	2 (1.6)	0	0	0
Rava	0	62 (49.2)	27 (21.4)	25 (19.8)	9 (7.1)	3 (2.4)	0	0
Puffed rice	0	73 (57.9)	7 (5.6)	43 (34.1)	2 (1.6)	1 (0.8)	0	0
Porridge	0	80 (63.5)	6 (4.8)	36 (28.6)	3 (2.4)	1 (0.8)	0	0
Khichdi	0	106 (84.1)	5 (4)	8 (6.3)	5 (4)	2 (1.6)	0	0
Legumes	0	43 (34.1)	6 (4.8)	55 (43.7)	6 (4.8)	13 (10.3)	3 (2.4)	0
Lentils	0	32 (25.4)	11 (8.7)	62 (49.2)	10 (7.9)	9 (7.1)	2 (1.6)	0
Green leafy vegetables	0	18 (14.3)	3 (2.4)	14 (11.1)	12 (9.5)	73 (57.9)	4 (3.2)	2 (1.6)
Vegetables	0	30 (23.8)	5 (4)	7 (5.6)	10 (7.9)	67 (53.2)	6 (4.8)	1 (0.8)
Coffee/tea	0	61 (48.4)	3 (2.4)	3 (2.4)	4 (3.2)	52 (41.3)	3 (2.4)	0
Milk	0	53 (42.1)	2 (1.6)	5 (4)	2 (1.6)	62 (49.2)	2 (1.6)	0
Lassi/curd	0	49 (38.9)	8 (6.3)	37 (29.4)	8 (6.3)	21 (16.7)	2 (1.6)	1 (0.8)
Paneer	0	65 (51.6)	6 (4.8)	48 (38.1)	3 (2.4)	4 (3.2)	0	0
Ghee	0	13 (10.3)	14 (11.1)	18 (14.3)	33 (26.2)	43 (34.1)	5 (4)	0

Table 3: Consumption pattern of fruits among children aged 10-16 years (n=126).

Fruits	Never, N (%)	Once a month, N (%)	Once in fifteen days, N (%)	Twice in fifteen days, N (%)	Once per week, N (%)	Two times per week, N (%)	Once daily, N (%)	>3 times/ day, N (%)
Apple	0	50 (39.7)	9 (7.1)	27 (21.4)	10 (7.9)	29 (23)	1 (0.8)	0
Banana	0	34 (27)	9 (7.1)	24 (19)	6 (4.8)	50 (39.7)	3 (2.4)	0
Sweet lime	0	82 (65.1)	7 (5.6)	12 (9.5)	5 (4)	20 (15.9)	0	0
Grapes	0	41 (32.5)	18 (14.3)	43 (34.1)	22 (17.5)	2 (1.6)	0	0
Mango	0	97 (77)	8 (6.3)	7 (5.6)	4 (3.2)	7 (5.6)	2 (1.6)	0
Orange	0	88 (69.8)	8 (6.3)	18 (14.3)	6 (4.8)	6 (4.8)	0	0
Fruit juice	0	75 (59.5)	10 (7.9)	11 (8.7)	20 (15.9)	9 (7.1)	1 (0.8)	0

Table 4: Consumption pattern of non-vegetarian food items among children aged 10-16 years (n=126).

Non-vegetarian food	Never, N (%)	Once a month, N (%)	Once in fifteen days, N (%)	Twice in fifteen days, N (%)	Once per week, N (%)	Two times per week, N (%)	Once daily, N (%)	>3 times/ day, N (%)
Boiled egg	0	29 (23)	7 (5.6)	46 (36.5)	38 (30.2)	6 (4.8)	0	0
Egg dish	0	53 (42.1)	7 (5.6)	53 (42.1)	11 (8.1)	2 (1.6)	0	0
Chicken	0	59 (46.8)	11 (8.7)	40 (31.7)	14 (11.1)	2 (1.6)	0	0
Fish	0	100 (79.4)	6 (4.8)	17 (13.5)	3 (2.4)	0	0	0
Beef	120 (95.2)	0	0	4 (3.2)	1 (0.8)	1 (0.8)	0	0
Red meat	0	106 (84.1)	5 (4)	11 (8.7)	3 (2.4)	1 (0.8)	0	0
Prawns/crab	0	117 (92.9)	3 (2.4)	3 (2.4)	3 (2.4)	0	0	0

Table 5: Consumption pattern of snacks and beverages among children aged 10-16 years (n=126).

Snacks	Never, N (%)	Once a month, N (%)	Once in fifteen days, N (%)	Twice in fifteen days, N (%)	Once per week, N (%)	Two times per week, N (%)	Once daily, N (%)	>3 times/ day, N (%)
Biscuits	0	14 (11.1)	5 (4)	35 (27.8)	11 (8.7)	59 (46.8)	2 (1.6)	0
Bhajji	0	78 (61.9)	8 (6.3)	29 (23)	10 (7.9)	0	0	1 (0.8)
Cake	0	66 (52.4)	9 (7.1)	14 (11.1)	33 (26.2)	4 (3.2)	0	0
French-fries	0	75 (59.5)	32 (25.4)	8 (6.3)	9 (7.1)	2 (1.6)	0	0
Pav bhaji	0	104 (82.5)	16 (12.7)	2 (1.6)	2 (1.6)	1 (0.8)	1 (0.8)	0
Samosa	0	93 (73.8)	17 (13.5)	12 (9.5)	3 (2.4)	1 (0.8)	0	0
Pizza	0	113 (89.7)	11 (8.7)	1 (0.8)	1 (0.8)	0	0	0
Sandwich	0	112 (88.9)	11 (8.7)	1 (0.8)	2 (1.6)	0	0	0
Burger	0	109 (86.5)	12 (9.5)	1 (0.8)	3 (2.4)	1 (0.8)	0	0
Gobi	0	27 (21.4)	12 (9.5)	65 (51.6)	20 (15.9)	2 (1.6)	0	0
Pani puri	0	31 (24.6)	14 (11.1)	53 (42.1)	26 (20.6)	2 (1.6)	0	0
Veg roll	0	93 (73.8)	7 (5.6)	21 (16.7)	4 (3.2)	1 (0.8)	0	0
Chic roll	0	108 (85.7)	8 (6.3)	9 (7.1)	1 (0.8)	0	0	0
Eggroll	0	83 (65.9)	6 (4.8)	33 (26.2)	4 (3.2)	0	0	0
Momos	0	84 (66.7)	33 (26.2)	5 (4)	3 (2.4)	1 (0.8)	0	0
Savoury	0	52 (41.3)	11 (8.7)	19 (15.1)	4 (3.2)	40 (31.7)	0	0
Popcorn	0	89 (70.6)	12 (9.5)	20 (15.9)	5 (4)	0	0	0
Noodles	0	63 (50)	22 (17.5)	33 (26.2)	7 (5.6)	1 (0.8)	0	0
Ice-cream	0	59 (46.8)	13 (10.3)	18 (14.3)	8 (6.3)	28 (22.2)	0	0
Sugar candy	0	82 (65.1)	7 (5.6)	29 (23)	2 (1.6)	4 (2)	2 (1.6)	0
Chocolates	0	75 (59.5)	11 (8.7)	16 (12.7)	10 (7.9)	11 (8.7)	2 (1.6)	1 (0.8)
Custard	0	104 (82.5)	9 (7.1)	6 (4.8)	4 (3.2)	3 (2.4)	0	0
Jelly	0	110 (87.3)	6 (4.8)	6 (4.8)	4 (3.2)	0	0	0
Cakes	0	37 (29.4)	12 (9.5)	43 (34.1)	31 (24.6)	2 (1.6)	1 (0.8)	0
Soft drink	0	94 (74.6)	7 (5.6)	13 (10.3)	10 (7.9)	2 (1.6)	0	0
Energy drink	0	108 (85.7)	7 (5.6)	3 (2.4)	5 (4)	3 (2.4)	0	0

DISCUSSION

The study concentrated on assessing dietary habits and consumption patterns by determining the frequency of food consumption among children aged 10-16 years in Mysuru, representing a serious growth and development phase. Dietary habits formed during this time suggestively influence physical health, cognitive function, and risk of chronic diseases in the future.[8] Assessing their current dietary patterns provides valued perceptions of their nutritional status and the potential areas for the improvement. Exploring the frequency of unhealthy food consumption, such as sugary drinks, processed foods, and excessive snacks, is crucial. This data benefits understanding the current dietary landscape and identifying areas where public health initiatives and educational programs are desirable to promote healthier choices. According to our results, among cereals, most respondents consumed rice, idli, dosa, and khichdi daily, while pasta, puffed rice, and porridge were eaten only once a month. Bread, chapati, paratha, puri, roti, ragi ball, vermicelli, and rava were consumed in varying quantities,

from daily to bi-weekly. Similar findings were reported in a study conducted by Blossom et al in Kerala, where all children (100%) had a high consumption of rice, with other cereals or cereal products consumed once to thrice weekly.[9] However, Anwaar et al found contradicting results in their study, which revealed that most of the study children consumed chapati daily.[10] In contrast, cereals such as rice, paratha, and bread were consumed weekly. Legumes and lentils were mainly consumed twice a week (43.7% and 49.2%, respectively) and less than half of them consumed the above foods once a month (34.1% and 25.4%), with only 2.4% and 1.6% consumed daily. Hegde et al conducted a study in Mangalore, where legumes are consumed daily, finding contradictory results.[11] However, Anyiam et al revealed similar results to ours, which showed that most individuals consume legumes less than three times per week (35.4%).[12] Green leafy vegetables and other vegetables are mostly consumed two times per week. Many studies reported contradictory results to ours. Mainly, Golya et al in Jaipur city, and Malagi et al in Dharwad found that the majority consumed vegetables daily.[13,14] Fruit consumption varied, with most fruits consumed monthly or bi-weekly. Similarly, studies by Blossom in Kerala et al found that while, the majority of children had the habit of eating fruits, the frequency of consumption was found low. Milk and milk product consumption varied, mostly consumed once a month and some daily.[9] Most of the studies revealed contradictory results to ours. Studies by Malagi et al where Majority of them consumed milk and milk products daily followed by weekly. Non-vegetarian food consumption varied among the children where boiled eggs were often consumed bi-weekly and weekly, egg dishes monthly and bi-weekly, chicken monthly, fish mostly monthly, and beef, red meat and prawns/crab less frequently.[14] Snack consumption varied: biscuits were eaten weekly, while cakes, French fries, samosas, pizza and chocolates mostly consumed monthly. Similar results were found in a study by Singh et al which showed that children mainly consumed snacks weekly, including pizza (22.5%), burgers (24.5%), noodles (27.25%) and sandwiches (26%).[15]

The study was conducted based on self-report data from children which might be inaccurate due to recall biases. It was a short study period, conducted over four months, which may not capture seasonal dietary variations. The sample size of 126 students from two schools may not represent the wider population. The Meal frequency may not reflect eating patterns accurately. However, the study was conducted using the lottery method of simple random sampling technique ensuring a random selection of participants, The developed semi-structured FFQ allows flexibility in capturing detailed dietary information.

CONCLUSION

In this study, the dietary patterns among the students reveal a predominant daily consumption of traditional staples such as rice, idli, dosa, and khichdi. On the contrary, food items like pasta, puffed rice, and legumes are less frequently consumed in their diet. The intake of milk and milk products shows considerable variation, with items like coffee, tea, and paneer typically consumed monthly. Fruit consumption patterns indicate that apples, bananas, and grapes are eaten twice a week, whereas sweet lime, mango, and orange are mainly of monthly intake. Protein sources such as boiled eggs and chicken are often consumed bi-weekly, while fish, beef, red meat, and prawns/crab are mostly limited to once a month or less. Snacks like biscuits and gobi are regularly eaten weekly, more frequently consumed items are cakes, French fries, samosas. pizza and chocolates are primarily consumed every month. These findings highlight a diet that balances frequent intake of traditional and nutrient-dense foods with occasional consumption of less common and indulgent items, reflecting a mix of dietary habits that are influenced by cultural preferences, availability, and economic factors. Future nutritional interventions and educational programs are required to focus on promoting balanced dietary choices and increasing the frequency of nutrient-rich foods to improve overall health outcomes for the students.

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