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DIETARY PATTERN, FOOD HABITS AND PREFERENCES AMONG ADOLESCENT AND ADULT STUDENT GIRLS FROM AN URBAN AREA, SOUTH INDIA

*Shabnam Omidvar[1] and Khyrunnisa Begum[2]
[1]*Department of Nursing-Midwifery, Babol University of Medical Science, Babol- Iran*
[2]*Department of Food Science and Nutrition, University of Mysore, Mysore India*
*Author for Correspondence

ABSTRACT

The prevalence of obesity and underweight has increased in recent years due to changes in eating habits all over the world. On the other hand eating behavior and dietary factors are as a risk factor in several important diseases such as cancer, coronary heart diseases or obesity. Therefore, we assessed the food habits of adolescents and adults girls in Mysore urban area and exploring any relationships between SES, age groups and food preference and behavior. A cross-sectional study conducted on 1000 healthy young female students aged 11-28 years. A self administered questionnaire was used to collect information on socio-demographic indicators, food habits and preferences. Body weight and height was measured and BMI computed. All the statistical analyses were performed using SPSS 16.0. 50.1% of adolescents were underweight. Higher percentage of overweight subjects was adults. Skipping meals was significantly higher among adolescents. Subjects belonged to low SES had higher percentage of underweight and higher proportion of overweight girls belonged to high SES. Adolescents formed highest proportion of meal skippers (53.9% vs 49.1%). 68.7% of subjects consumed fast foods daily or frequently. 53.7% of adolescents and 40.2% of adults had snacks regularly. Adolescents from low SES had higher percentage of daily consuming of fast foods and bakery items. Only 13.7% of subjects use to consume at least one animal product, such as meat or an egg every day. The results of this study could be used as an important baseline for future monitoring of the dietary pattern, nutritional situation of young females especially adolescents.

Keywords: Food Habits, Preferences, Dietary Pattern

INTRODUCTION

Healthy eating is defined as eating practices and behaviors that are consistent with improving, maintaining and /or enhancing health (Raine, 2005).

Meal pattern and food intake are markers for nutrient intakes and diet quality (Kerver *et al.,* 2006). Nutrient intake has an influence on health and development of several chronic diseases. Meal patterns affect resting energy expenditure, body fat, bone density, serum cholesterol and many other situations (Andersson, 2000; Chapelot, 2006; Deutz, 2000).

The key features of the eating patterns include snacking, skipping meal, breakfast skipping, dieting adoption of specific diets (such as vegetarian diet), confectionery, and fast food eating (Chitra, 2007; Jenkins, 2005).

The preference for eating habits or foods in humans is established by the influences from socioeconomic level of household, religion, tradition, regional characteristics, educational level of parents, public media, and long-term education at home, school, and the society.

Musaiger (1992) stated that many factors determine food preferences. Religion, sex, age, physiological changes, psychological factors, symbolic use of foods, taboos, social prestige and economic factors affect food preferences in all cultures (Musaiger and Gregory, 1992).

Recent studies have implicated eating behavior and dietary factors as one risk factor in several important diseases such as cancer, coronary heart diseases and obesity. They further suggest that decreasing total fat, saturated fat and cholesterol intake, and increasing consumption of vegetables and fruits might reduce the prevalence of these health disorders (Lissner and Heitmann, 1995; Tavani, 1995).

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A study reported that high school students with irregular daily meal patterns had poorer health status and lower academic achievements than those who had regular meals. In Korea, increased rate of eating out, fast-food consumption, and over consumption of sweets and carbonated beverages have increased the adolescent obese population, which has led to the incidence of chronic diseases such as diabetes, hypertension, and arteriosclerosis. Adolescents want to become slim and the obese shape can be excluded in the peer group because of great interests in appearance and body weight (Ro, 1998).

The Indian meal pattern is affected by the kinds of foods available. For example, rice is grown in certain parts of the country, and it forms the staple in those regions. Similarly, wheat, jawar (barley), bajra (millet), makka (corn), and ragi (finger millet) are used as staples where they are the major crops. The kinds and amount of food eaten are affected by the money that can be spent for food. The family's meal pattern is dictated by geographic region, religion, and community and family practices that have developed over several generations (1995).

Adolescents and young adults are usually open to new ideas; they show curiosity and interest. Many habits acquired during this time will last a lifetime. Furthermore, with increasing age, youth's personal choices and preferences gain priority over eating habits acquired in the family, and they have progressively more control over what they eat.

Good nutritional status in adolescents and adults is decided by proper nutritional knowledge, eating habits, and food behavior, which plays an important role not only in the improvement of physical development but also in the maintenance of mental and emotional stabilization.

Researches' Results generally demonstrate that, among women in developed societies, socioeconomic status is strongly inversely related to body weight and risk for overweight and obesity (Crow, 2006; Duncan *et al.*, 2006; Mirza, 2005; Newman, 2006; Ricciardelli, 2003; Robinson, 2001; Yates, 2004). Information about developing countries are still less therefore, This study was undertaken to assess the food habits of adolescents and adults girls in Mysore urban area and exploring any relationships between SES, age groups and food preference and behavior.

MATERIALS AND METHODS
The present study was a cross-sectional design conducted in urban areas from a major city in South India. 1000 healthy young female students aged 11-28 years formed the study population. We developed a food frequency questionnaire that included 50 food items. Portion sizes were not included. A self administered questionnaire was used to collect information on socio-demographic indicators, food habits and preferences. The students filled in the questionnaire in the classroom within a 40-min period in the presence of researcher whom could ask if they had problems. Instructions on filling in the questionnaire were given. Written consent form was obtained from the students. The aim of the study and the contents of the questionnaire were explained to each subject, and voluntary participation was requested. The questionnaire included data regarding demographic features like chronological age, family details relating to family size and type, parent's education and occupation. Information about the possession of costly goods like vehicles, computer, TV, DVD, refrigerator and phones as well as house type were obtained, and considered for classifying SES along with parents' education and occupation. Each of these variables were designated a score and the sum of total score were equally distributed into 3 divisions, the lowest to highest divisions were labeled as low and highest is high and in between was designated as middle SES

All the participants were measured for linear height and body weight. Height measuring scale was used to measure height to the nearest of 0.1 cm. Body weight was measured using a battery operated digital balance (Glan Electronic Scale) the balance was checked for its accuracy each time before use, measurements were made to the nearest of 0.1 kg . This information was used to compute BMI.

The food frequency assessment question was 'How often do you eat/drink the following foods?' The response categories were (recoded frequencies in times/week in parentheses). The meal pattern assessment question was 'During an ordinary week, how often do you usually eat the following meals?' The response categories for the questions were every day, 4–6 times per week, 1–3 times per week,

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seldom/never. Food preferences were assessed by offering the list of the same 50 food items as in the FFQ to mention which one is their favorite and which one is not.

All the statistical analyses were performed using SPSS 16.0. Statistical significance was set at $P<0.05$ χ^2 tests were used to compare the frequencies.

RESULTS

Subjective information is presented in Table 1. The average age of the sample was 18.2±3.2 years. Majority of subjects practiced Hinduism (83.9%). More than 85% were from nuclear family with family member less than 5. A higher proportion of the participants belonged to middle level of SES (52.9%) and only 10.4% were from high SES. 57.3% females mentioned to practiced mixed type of diets.

Table 1: Socio demographic characteristics of the selected population

Variables		N (%)
Age	11-19	537 (53.7)
	20-28	463 (46.3)
Religion	Hindu	836 (83.9)
	Muslim	123 (12.3)
	Christian	24 (2.4)
	Other	13 (1.3)
Education	Up to 10th Std	469 (47.0)
	Pre university	332 (33.2)
	Graduation	194 (19.4)
	Post graduation	4 (0.4)
Family size	≥4	538 (53.9)
	5-8	442 (44.3)
	>8	18 (1.8)
Type of family	Joint	64 (6.4)
	Nuclear	852 (85.7)
	extended	78 (7.8)
SES	Low	367 (36.7)
	Middle	529 (52.9)
	high	104 (10.4)
Type of diet	Vegetarian	332 (33.7)
	Non vegetarian	88 (8.9)
	Mixed	564 (57.3)

The sample was about equally divided between adolescents and adults. Results revealed that higher percentage of underweight subjects belonged to low SES and higher proportion of overweight girls belonged to high SES. 50.1% of adolescents were underweight. Higher percentage of overweight subjects was adults. We found strong significant association between SES, age and BMI (P=0.000).

Highest percentage of vegetarians belonged to higher SES level and in lower socio economic group highest percentage of mixed diet can be seen. Higher proportion of vegetarians was related to adults and higher percentage of mixed diet was related to adolescent group. We found association between SES, age and type of diet.

85.8%, 98.2% and 97% of students reported having breakfast, lunch and dinner every day. There was a trend towards skipping breakfast with 14.2% as highest percentage as skipped meal and among meal skippers highest frequency of skipped meal was for lunch, breakfast and dinner respectively (not shown in the Table). Highest percentage of meal skipping was related to low SES and mild differences were found. Among meal skippers highest proportion was related to adolescents (53.9% vs 49.1%) (It has not shown in the Table). Skipping meals was more frequent among adolescents as statistically it was significant as well.

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Subjects from higher SES had highest percentage of having snacks (55.3%) and highest percentage was related to adolescents (53.8%).

Majority of participants had fast foods. Table 2 shows that higher proportion of students in high socio economic status had more fast foods, however statistically was not significant.

Frequency of having fast foods was high among adolescents and adults. Using of nutrient supplements was higher in high SES and in subjects with higher age.

Table 2: Nutritional status and food behavior according to SES and age

Variables		SES			Chi sq	Age group		Chi sq
		low	Medium	High		11-19	≥20	
BMI	Underweight	183 (49.9)	201 (38.0)	17 (16.3)	42.535***	269 (50.1)	132 (28.5)	51.083***
	Normal weight	162 (44.1)	283 (53.5)	71 (68.3)		238 (44.3)	278 (60.1)	
	Overweight and obese	22 (6.0)	45 (8.5)	16 (15.4)		30 (5.6)	53 (11.4)	
Type of diet	Veg	97 (27.2)	188 (35.7)	48 (46.2)	18.683**	151 (29.0)	180 (38.9)	19.258***
	Non veg	27 (7.6)	54 (10.2)	7 (6.7)		37 (7.1)	51 (11.0)	
	mixed	230 (65.2)	285 (54.1)	49 (47.1)		332 (63.8)	232 (50.1)	
Skipping meal	Yes	106 (30.0)	136 (26.0)	29 (28.2)	12.656*	146 (28.1)	125 (27.1)	10.331**
	No	151 (42.8)	185 (35.3)	40 (38.8)		219 (42.2)	157 (34.1)	
	sometimes	96 (21.2)	203 (38.7)	34 (47.4)		154 (29.7)	179 (38.8)	
Having snacks	Yes	153 (43.3)	256 (48.6)	57 (55.3)	13.157*	281 (53.8)	185 (40.2)	22.980***
	No	48 (13.6)	38 (7.2)	9 (8.7)		54 (10.3)	41 (8.9)	
	sometimes	152 (43.1)	233 (44.2)	37 (36.0)		187 (35.8)	234 (50.9)	
Consuming fast food	Yes	299 (88.7)	454 (89.2)	93 (90.3)	0.203Ns	444 (89.0)	402 (89.3)	0.031Ns
	No	38 (11.3)	55 (10.8)	10 (9.7)		55 (11.0)	48 (10.7)	
Using of nutrients supplements	Yes	27 (7.8)	55 (10.7)	14 (13.7)	3.748Ns	44 (8.7)	52 (11.4)	1.986Ns
	No	320 (92.2)	460 (89.3)	88 (86.3)		463 (91.3)	404 (88.6)	

The predominant food item for subjects was rice. Among cereals rice was much preferred followed by wheat (95.4%, 81.2%). 39.8% of subjects mentioned that consuming pulses and legumes every day (Figure 1). Green gram and black gram dhal were most and least preferred items of pulse and legume, respectively.
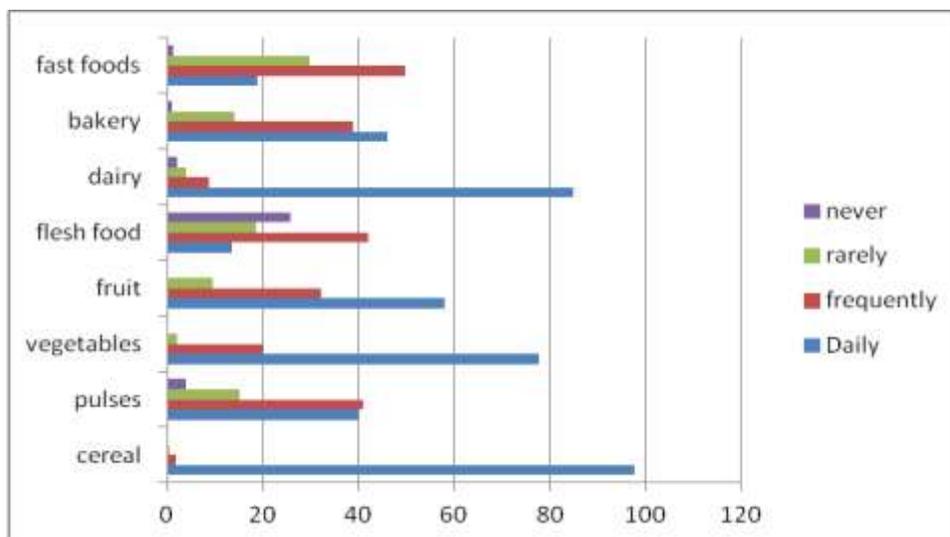
Figure 1: Frequency of food consuming by selected subjects (%)

As figure 1 shows 77.6% consuming vegetables daily and in vegetables group carrot (92.2%) and bitter ground (44.8%) was most and least preferred, respectively. 58% consuming fruit daily and 90.9%

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mentioned that they like banana. 13.7% of subjects use to consume at least one animal product, such as meat or an egg every day. 62.1% reported egg as their preferred non vegetarian item. 85% mentioned that using dairy product daily, the highest percentage of preferred among dairy items related to milk (76.5%). However, preference for dairy items was less and as dairy products are very important for health especially for women it needs more attention.

45.9% answered using bakery items daily and 82.5% liked sweets, 81.8% biscuits, and 87.9% cakes. Generally 68.7% of subjects consumed fast foods daily or frequently. Almost above 85% liked fast food items and this high frequency of preference shows a negative habit in having sweets, fast foods and high calorie items. 53.7% of adolescents and 40.2% of adults had snacks regularly.

Data showed no difference in the intake of rice/wheat (staple diet), legumes, meat and dairy among economic groups.

Adults had pulses and legumes significantly more than adolescents. Lower SES and adolescents had more vegetables. Based on daily consuming, lower levels of SES and younger subjects had higher frequency of fruit consumption. Food items, such as fish, meat, eggs are the major sources of animal-protein, calcium, and vitamin A. Majority of them could not have meat or eggs in a week. However, daily consuming of meat was significantly higher in adolescents comparing to adults as among adolescents mixed diet was more common and being vegetarian was more common among adults, however, no significant difference between age and SES in frequency of consuming dairy products. Table 3 shows adolescents from low SES had higher percentage of daily consuming of fast foods and bakery items.

Table 3: Food intake on daily basis according to SES and age groups

Food items	SES			Chi sq	Age		Chi sq
	low	Medium	High		11-19 n=536	20-28 n=463	
cereal	98.3	97.3	97.1	2.083^{Ns}	96.6	98.9	5.851^{Ns}
Legumes	45.3	36.6	36.9	10.309^{Ns}	38.6	41.2	41.173***
Vegetables	78.6	79.5	64.4	15.994*	80.7	74.2	8.385*
Fruit	61.7	57.3	49.0	12.986*	64.4	50.9	20.640***
Meat	16.2	13	8.7	12.053^{Ns}	18.7	8.1	24.777***
dairy	82.8	86	87.5	3.632^{Ns}	85.3	84.6	1.674^{Ns}
Bakery items	51.1	43.7	39.4	20.239**	58.2	32.1	70.045***
Fast foods	24.2	17.1	10.7	19.514**	29.6	7.2	84.654***

40.1% of subjects were underweight, 51.6% in normal weight and only small percentage of students were overweight and obese. We found strong significant association between SES, age and BMI.

Table 4 shows 48.3% of overweight and obese adolescents mentioned that they skip meal and we found mild association between BMI and skipping meal as a food habit. However we did not observed such association among adults.

Table 4: Association between BMI and skipping meal according to age group

BMI	Skipping meals							
	11-19			Chi sq	≥20			Chi sq
	Yes n (%)	No n (%)	Sometimes n (%)		Yes n (%)	No n (%)	Sometimes n (%)	
Underweight	67 (25.8)	116 (44.6)	77 (29.6)	9.579*	31 (23.8)	41 (31.5)	58 (55.3)	4.655Ns
Normal weight	65 (28.3)	91 (39.6)	74 (36.1)		80 (28.8)	93 (33.5)	105 (33.8)	
Overweight and Obese	14 (48.3)	12 (41.4)	3 (89.7)		14 (26.4)	23 (43.4)	16 (30.2)	

As Table 5 shows commonly having snacks in comparison with adults were more frequent among adolescents in all BMI categories. Highest frequency of snacking was related to overweight and obese adolescents. However statistically was not significant.

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Table 5: Association between BMI and snacking according to age group

BMI		Snacking						
		11-19			Chi sq	≥20			Chi sq
		Yes n (%)	No n (%)	Sometimes n (%)		Yes n (%)	No n (%)	Sometimes n (%)	
Underweight		134 (51.3)	29 (11.1)	98 (37.6)	1.7773[Ns]	57 (43.5)	11 (8.4)	63 (48.1)	6.336 [Ns]
Normal weight		129 (55.4)	23 (9.9)	81 (34.9)		114 (41.3)	22 (8.0)	140 (50.7)	
Overweight and Obese		18 (62.1)	2 (6.9)	9 (31.0)		14 (26.4)	8 (16.0)	31 (58.5)	

DISCUSSION

In our study, percentage of being underweight was considerably high (40.1%). A small percentage of students (8.3%) were overweight. This finding is in line with another study conducted in different city in India which reported, 56.4% of students were found to be underweight, and 2.9% overweight (Wasnik, 2012). Other reports from India also found out that the prevalence of thinness was 41.3 to 56.2% and were essentially similar to the present study (Prajapati, 2011; Saxena and Saxena, 2011). However, it is different from other countries. Studies from Turkey, found this rate to be 9 to 12% for underweight (Akac, 2002; Nazan, 2006).

We found strong significant association between SES, age and BMI. Higher percentages of underweight students were adolescent from low SES. Studies reported that in developing countries, factors associated with under nutrition of adolescents are: poor household economic condition, periodic food-shortage, etc (Kurz, 1994).

However, there are controversies in association between thinness and SES. There are reports of inverse relationship between BMI and SES and they mentioned the reason that girls from higher SES like to look slim to improve body image and it might have lowered differences between SES groups (Alam, 2010).

Majority of underweight subjects were belonged to adolescents while higher percentage of adults were normal weight and obese. In Bangladesh also the prevalence of thinness and stunting among the adolescent girls aged 13-18 years was widespread and persistent (Alam, 2010).

As the preference for thin body shape has been increased in the society, the number of adolescents, while thinking they are obese or overweight, who are skipping meals or practicing irregular meals and unbalanced diet to recklessly reduce their body weights has been increased although the actual body weight is normal, and this situation can induce bad influence on health and lead to nutritional imbalance.

In present study highest percentage of vegetarians belonged to high SES. Higher proportion of vegetarians was related to adults. SES was associated with age and type of diet. It can be due to effect of western diet habit on younger generations.

The nutritional needs of Indians are met when they follow a traditional vegetarian or non vegetarian dietary pattern. The staples in both Indian dietary patterns are cereals (Jayanthi, 2001). It seems that predominant foods in south Indian girls' diet are grains and sweets. Rice remains a dietary staple. Frequent consumption of sweets and cereals was observed. It is consistent with others observation in children and adults diet (LeonGuerrero, 2002; Pobocik *et al.,* 2008).

Food habits might change during maturation; we found higher meal skipping and breakfast skipping in adolescents. Among meal skippers, 52.1%, 49.4% of adolescents and adults respectively were skipping breakfast more than once in a week. Similar trend also reported in a Swedish study as they found a negative age trend in breakfast consumption (Berg-Kelly, 1995)

Regular breakfast eating has been associated with lower blood cholesterol and lower body weight (Ruxton and Kirk, 1997). The importance of energy supply after overnight fast for cognitive function and endurance has been reported (Wyon *et al.,* 1997). A review of the literature shows that omitting breakfast interferes with cognition and learning, Dinner was the main meal most frequently consumed and this was also reported in Swedish and Norwegian study (Frost Andersen, 1995; Sjöberg, 2003).

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The frequency of regular consumption of main meal was rather high in this study (85.8% to 98.2%). To compare frequencies with other studies is difficult because of differences in methodology and definitions, but more frequent breakfast consumption has been reported from some European countries, in a Swiss study as high as 95% (Cavadini, 2000; Ruxton, 1997).

Consumptions of non-staple food items, such as meat, eggs, *dhal (*lentils), fruits, and leafy vegetables, were not frequent. As it can be seen subjects were deprive of major sources of animal-protein, calcium, and vitamin A. similar pattern was observed from other studies from Bangladesh (Ahmed, 1998; Alam, 2010). In this study we found 53.8% of adolescents having snacks regularly which in comparison with adults were significantly higher. Higher prevalence of snacking among adolescents might be linked to increased energy intake. Snacking, usually defined as eating occasions different from main meals (breakfast, lunch, dinner/supper), has been commonly regarded as contributing to excess weight (Berteus, 2005; Piernas, 2010).

There is report of increase in energy intake is markedly higher in obese individuals (Berteus H, 2005).

In present study 68.7% of subjects consumed fast foods daily or frequently and higher proportion of students in high socio economic status had fast foods, more frequent.

Conclusion

Balanced meal through healthy and rational eating habits is very important in the growth, development and health improvement in humans, and this is not accomplished by appetite or food preference but can be accomplished by the practice of proper dietary habits on the basis of proper nutrition knowledge.

Therefore, according to higher snacking in adolescents and high frequency of consuming fast foods consequently higher energy intake higher prevalence of obesity in future population can be expected.

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