Study of current dietary habits of adolescent school students and their effect on their growth in Al-shohadaa District, Menofia governorate, Egypt

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Abstract: Background: During the last few decades, Egypt experienced rapid socio-cultural changes that were associated with major changes in the food choices and eating habits, which becomes more westernized. **Aims:** To investigate the consumption of different food groups among preparatory & secondary school students and its associated socio-demographic factors in Al-shohadaa district, Menofia governorate, Egypt. **Methods:** This is a cross-sectional study conducted on 368 adolescent students. Selected to cover general public schools of both sexes in urban and rural areas. A self-administered questionnaire was used to collect data about socio-demographic features of the students and their families, as well as food patterns and eating habits of students. **Results:** About 89.6%, 58.9% and 71% of students consumed starchy foods, vegetables and plant protein on daily basis; respectively. Fast foods and carbonated drinks were consumed on weekly bases by 64.6% and 19.6% of students; respectively. **Conclusions:** Students practice many faulty dietary habits. School, family and community based interventions are timely needed to promote healthy eating habit in adolescents.

Key words: Dietary habits – Adolescent students – Fast foods

1. Introduction

Diet and nutrition are important factors in the promotion and maintenance of good health throughout the entire life course. Their role as determinants of chronic non- communicable diseases is well established and they, therefore, occupy a prominent position in prevention activities.1 What is apparent at the global level is that great changes have swept the entire world since the second half of the twentieth century, inducing major modifications in diet, first in industrial regions and more recently in developing countries.

Traditional largely plant based diets have been swiftly replaced by high-fat, energy-dense diets with a substantial content of animal-based foods.2 Recent decades have witnessed the progressive erosion of the traditional Egyptian diet and the introduction of new foods and eating habits.3 To prevent diet-related chronic diseases, healthy eating habits should be established in childhood and maintained during adolescence. Some researchers concluded that dietary habits appear to be established in the mid-teens, by the age of 15 years, and are closely associated with lifestyle.4 Understanding adolescent eating habits is the key to evaluate nutritional adequacy and preventing diet- related diseases later in life.5 Specific

timely and accurate nutritional data about levels of consumption of different food items is limited in Egypt. To the best of the authors' knowledge there is very little information about dietary habits and the associated socio-demographic characteristics among adolescents in Egypt.

2. Methods:
Design and sample

This cross-sectional study was carried out during the period from October 2015 to May 2016 in Al-shohadaa District, menofeya governorate, Egypt; Approval of the local directorate of education and school administration was obtained. The study protocol was approved by Research Ethics Committee, College of Medicine; al azhar University. In Egypt parental consent is only required in case of invasive procedures.

a.   Sample size calculation

A sample size of 368 students was obtained by using Epi Info software version 7.1.4.0, with expected frequency 50%, 95% confidence level and 5% marginal error.

b.   Sampling technique
- **Schools, classes and students selection**

A multistage stratified random sampling technique was used to select the sample in this study:

-   At the first stage; selection of schools:

The 36 schools in Al-Shohadaa District were classified into four groups:

a) Rural Preparatory Schools (17 schools; out of them 9 are mixed)

b) Urban Preparatory Schools (6 schools; out of them 3 are mixed)

c) Rural Secondary Schools (9 schools; out of them 5 are mixed)

d) Urban Secondary Schools (4 schools; out of them 2 are mixed)

One mixed school was chosen from each group by simple random sample; so we have a sample of 4 schools (mixed schools were selected because they are the majority and to ensure representing both boys and girls).

The four chosen schools were:

a) Kafr Hegazy Preparatory Public School (Rural)

b) Al-Shohadaa Preparatory Public School (Urban)

c) Gazerat El-Hagar Secondary Public School (Rural)

d) Al-Shohadaa Secondary Public School (Urban)

-   At the second stage; selection of classes

One class was selected by simple random sample from each grade in each of the selected four schools. So, we had 12 classes; 6 of them were preparatory (3 urban and 3 rural) and 6 of them are secondary (3 urban and 3 rural).

-   At the third stage; selection of students

About 30 students were selected from each class; 15 from boys and 15 from girls by simple random sample.

The number of students in the four chosen schools was:

a) Kafr Hegazy Preparatory: 580 students (305 boys and 275 girls)

b) Al-Shohadaa Preparatory: 430 students (230 boys and 200 girls)

c) Gazerat El-Hagar Secondary: 680 students (360 boys & 320 girls)

d) Al-Shohadaa Secondary: 640 students (400 boys and 240 girls)

1.Study Tools and Methods
a.   Interview form

A specifically designed interviewing form was used to collect data relevant to topic of the study. The form includes personal, family, socio-economic, physical activity, and dietary data. A code number for each form was used instead of name.

The form had two parts:

The 1st part:

Data filled from school records about student's personal data as name, gender, residence, academic grade, and birth date.

The 2nd part:

Questions answered by students through interviewing them at school or home as appropriate. The following items were inquired:

●   **Assessment of dietary habits**

Feeding pattern was assessed using food frequency sheet for eating different food groups in the week. Fruits either as it is or juiced vegetables either fresh green leafy or cooked, legumes, cereals, animal protein as milk, egg, fish and meat and lastly sweets.

The possible responses were "≤ 1 time/ week", "2–4 times/week", "5–6 times/week", and "7 times/week". Also questions about dietary habits as frequency of meals per day, eating breakfast, and fast food meals were used to assess it.

●   **Anthropometric measurements**

The researcher himself took the different anthropometric measurements for boys, while a well-trained health visitor took the different anthropometric measurements for girls at the school clinic under supervision of the researcher. Students were instructed to take off heavy clothes, shoes, and belts.

●   **Height (*per cm*)**: It was measured by using a measuring stick, which was fixed to a vertical wall. The subject was standing bare footed on flat surface, with weight distributed evenly on both feet, heels together and the head positioned so that the line of vision was vertical on the body. The arms hanged freely by the sides and the head, back, buttocks, and heels were in contact with the wall on which a measuring tape was attached. The participants were asked to maintain erect position and flat object was brought in a horizontal plane on the top point of the head with sufficient pressure to compress the hair and touch the tape on the wall. Height was recorded to the nearest 0.1 cm.

●   **Weight (*per kg*):** A Tanita TBF-300A professional scale was used. Accuracy of the scale was tested with standardized weights. Every morning, the scale was set up and the ground level was checked to ensure it was flat. The estimated weight of the clothing was entered and the scale was zeroed before each weight. Students were asked to step barefooted onto the foot shapes on the scale look straight ahead with arms relaxed by their sides. The weights were automatically taken and electronically recorded when the scale sensed the subject was still and balanced. Weight was recorded to the nearest 0.1 kg.

●   **Body mass index** or **Quetelet index:** It is a measure of relative weight based on an individual's mass and height. Devised between 1830 and 1850 by the Belgian polymath Adolphe Quetelet during the course of developing "social physics", it is defined as

the individual's body mass divided by the square of their height – with the value universally being given in units of kg/m^2.

$$BMI = \frac{\textbf{Weight (kg)}}{\textbf{Height (m2)}}$$

It was calculated and then the results of the equation were applied separately for every child to the age and gender specific BMI Z- score curves of the World Health Organization (*de Onis et al., 2007*). Accordingly, participants were classified as:

- **Obese:** If body mass index (BMI) >+2 standard deviations above the WHO growth standard median.

- **Overweight:** If BMI >+1 standard deviation above the WHO growth standard median.

- **Normal:** If BMI between -2 and +1standard deviation of the WHO growth standard median.

- **Underweight:** BMI <-2 standard deviations below the WHO growth standard median.

2.Facilitating factors and Constraints encountered during application of the study Constraints encountered during application of the study

a. Permission of the responsible authority was so complicated issue that took valuable time and efforts at the expense of the actual study.

b. High class density and lack of cooperation from students made the process of students control during data collection too exhaustive.

Data collection:

Students completed a self-administered questionnaire on family and personal background, and their dietary habits. Participants were given a list of the most frequently used food items in Egypt and asked how many times in a typical week they consumed each food. Periods of religious festivals and social events were excluded. The items were regrouped into the following food groups.7: 1) vegetables (whether green or cooked or canned) e.g. tomato, spinach, garden rocket (garger), romaine lettuce, Jew's mallow (molokheya), rampion (serees), carrots and others; 2) Fruits (whether fresh, canned or juice) e.g. orange, mango, guava, apricots, lemon, banana, apples, grapes and others; 3) Animal proteins e.g. red meat, beef, poultry, fish, kabab, kofta, egg and others; 4) Plant proteins e.g. beans (ful and ta'ameyya), lentils, peas, and others; 5) Milk. and dairy products e.g. full or half cream milk, cheese of any type, yoghurts (zabadi), and others; 6) Bread and rice e.g. low and high extraction bread and rice; 7) Fast foods e.g. hamburger, pizza, fried chicken, grilled chicken; 8) Sweets e.g. excess refined sugar, cakes, honey, piaster, pasta and others; and 8) Carbonated (soft) drinks e.g. Pepsi, Coca-cola, Miranda, and others. Questions about tea drinking and its relation to meals, as well as subjective reports of excess salt/salty food or sugar intake were included in the questionnaire.

Data analysis:

Were analysed using SPSS, version 16. Variables were presented as number and per cent. Chi squared test was used for comparison between groups. Logistic regression analysis using forward Wald method was done to find out the independent predictor of daily consumption of different food groups. Odds ratio (OR) and their 95% confidence intervals (CI) were calculated. $P \leq 0.05$ was considered significant.

3. Results

Data of 927students were analysed. Their age ranged from 15 to 20 with a mean of 15.9 ±1.2 years. In a typical week about 89.6 %, 78.2 % and 71% of students consumed bread/rice, vegetables and plant protein on daily basis; respectively. Fast foods and carbonated drinks were consumed on daily bases by 64.6% and 19.6 %; respectively. About 79.6 % of students drink tea more than 3 times daily with 87.5% of tea drinker drinks it after meals. Excess salt and excess sugar/sweet intake were reported by 67.4% and 54 % of students; respectively (Table 1).

Table (2) shows that consumption of starchy food was significantly higher in students from rural areas than those from urban areas. On the other hand, animal protein consumption was significantly higher in general school students and in students from urban areas and among girls. Plant protein consumption was significantly higher in students from rural areas and among boys. Consumption of vegetables was higher among students from rural areas that from urban areas and fruit consumption were significantly higher in general school students and in students from urban areas. Students with working mothers as well as highly educated mothers show significantly higher consumption of proteins (animal and plant) and fruits. Significant difference was detected between students belonging to different social classes regarding all food elements except bread and rice.

Table 3 shows that daily consumption of fast food and carbonated drinks were significantly higher in general school students, students from rural areas, students with working and highly educated mothers. Regarding tea, significant higher rates of consumption and drinking tea after meals were detected in students from rural areas and students with non-working as well as less educated mothers. On the other hand, excess consumption of tea was significantly higher in general than vocational school students and among boys than girls but drinking tea after meals was higher among vocational school students.

Table (1): Relation between body mass index of studied adolescent students and their meat intake per week.

Meat intake per week		No		once		Twice or more		Chi square test	
		No.	%	No.	%	No.	%	X^2	P-value
BMI categories	Under weight	10	12.7%	5	2.2%	0	0.0%	28.718	0.001
	Normal weight	58	73.4%	157	69.5%	40	63.5%		
	Overweight	4	5.1%	30	13.3%	9	14.3%		
	Obese	7	8.9%	34	15.0%	14	22.2%		
Total		79	100%	226	100%	63	100%		

Table (2): Relation between body mass index of studied adolescent students and their starchy foods intake per week.

Starchy foods intake per week		No or one		Twice or more		Chi square test	
		No.	%	No.	%	X^2	P-value
BMI categories	Under weight	10	31.3%	5	1.5%	119.075	<0.001
	Normal weight	21	65.6%	234	69.6%		
	Overweight	0	0.0%	43	12.8%		
	Obese	1	3.1%	54	16.1%		
Total		32	100%	336	100%		

Table (3): Relation between body mass index of studied adolescent students and their vegetables intake per week.

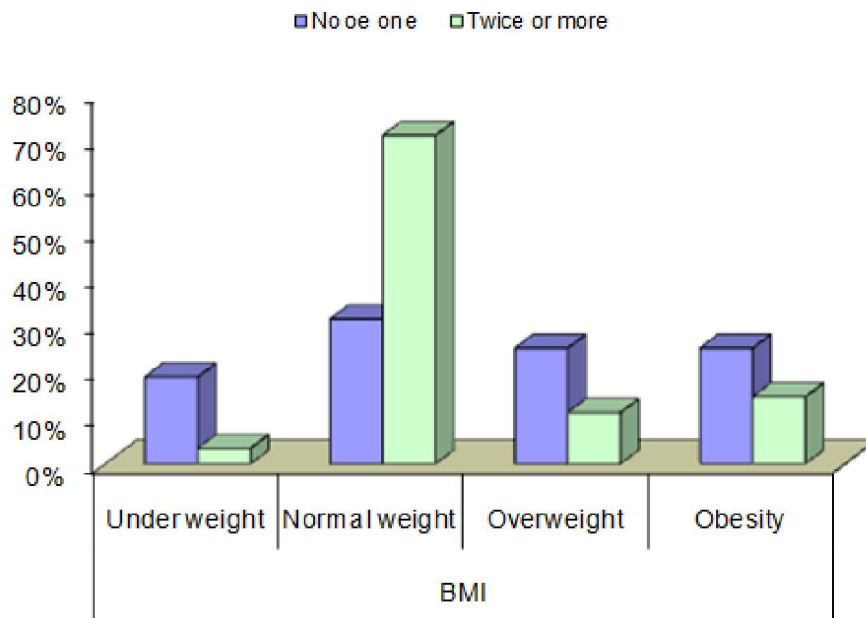| Vegetables intake per week		No or one		Twice or more		Chi square test	
		No.	%	No.	%	X^2	P-value
BMI categories	Under weight	3	18.8%	12	3.4%	141.606	<0.001
	Normal weight	5	31.3%	250	71.0%		
	Overweight	4	25.0%	39	11.1%		
	Obese	4	25.0%	51	14.5%		
Total		16	100%	352	100%		

Table (4): Relation between body mass index of studied adolescent students and their fast food intake per week.

Fast food intake per week		No or one		Twice or more		Chi square test	
		No.	%	No.	%	X^2	P-value
BMI categories	Under weight	14	4.6%	1	1.5%	86.174	<0.001
	Normal weight	232	76.6%	23	35.4%		
	Overweight	27	8.9%	16	24.6%		
	Obese	30	9.9%	25	38.5%		
Total		303	100%	65	100%		

4. Discussion

Wheat and rice are the stable food for majority of the Egyptians which is apparent in this study where about 90% of adolescents reported daily consumption of bread/rice. This is significantly higher among rural area students. According to the survey of young people in Egypt (SYPE) about 70% consume the subsidized brown bread.[9] With plenty of fish in the river and poultry and pigeons in the back yard, red meat is not a regular element in the diet of the farmers, or for the average Egyptian with a limited income. Meat is more commonly consumed on Fridays (the religious day of rest for Muslims) and is eaten during feasts or for meals celebrating special occasions.[3] However, only one-fourth of respondents reported daily consumption of animal proteins with high socioeconomic standard as the most important determining factor. In USA, there was an increased consumption of protein with higher socioeconomic status of higher school students.[10] In accordance with this study, an Egyptian study reported that significantly more female adolescent and more urban adolescents have protein in their diet[11] and among Turkish adolescents; significantly more girls than boys consume meat (60.4% vs.39.6 %).[12] Among Nigerian female adolescents, 19.1% consumed meat on alternative days.[13] On the other hand, more or less similar figures of male and female Sudanese adolescents reported daily consumption of meat.[14] Dairy products such as milk, cheese and yoghurt are an important source of essential micronutrients including calcium, riboflavin, phosphorus, potassium, magnesium, zinc, vitamin A and vitamin B12.[15] They also provide a combination of protein, carbohydrate, and fat. Nutrients from dairy products are well known for their role in building and maintaining strong bones.[16]Being cheaper and available to all sectors of the population, the daily consumption of dairy products is reported by 59% of students with high socioeconomic standard as a determining factor. According to the 2007 Australian National Children's Nutrition and Physical Activity Survey,[17] the majority of Australian adolescents do not consume the recommended intakes of milk. In a Nigerian study on female adolescents, milk and dairy

products was consumed by 8.1% of them.[13] Consumption of fruits and vegetables plays a vital role in providing a nutritious diet and are associated with reduced risk for chronic diseases and some cancers. Low consumption of fruits and vegetables in many regions of the developing world is a persistent phenomenon, confirmed by the findings of food consumption surveys.[2] About 80% and 29% of students reported daily vegetables and fruits consumption, respectively. About one-third of Sudanese adolescent ate fruits, and about 70% eat vegetables in daily basis.[14] Lower rates of was reported in Gaza where 11.6% of boys and 16.2% of girls in Gaza consumed fruits daily.[18] In South-western Saudi Arabia, study revealed that 27% of boys and 23% of girls never consumed any fresh fruits for a week before the study.[19] A study of eating behavior in Liverpool showed that only 21% of secondary school children regularly ate fruits and vegetables.[20] Consumption of fruits and vegetables was different between social classes and this is in agreement with the (SYPE) report that fruits consumption is markedly correlated with wealth level, being higher in the highest wealth.[9] In an Australian study, non- consumption of either fruit or vegetables was inversely related to income.[21] On the other hand, in USA, fruit/vegetables consumption shows no socio-demographic differences.[10] According to the WHO HBCS forum, In the European cross-national study, less than 50% of all young people reported daily eating of vegetable (34% for girls vs. 27% for boys).[22] Fast foods are a way of life for many adolescents, with busy after-school schedules, adolescents frequently eat away from home. Fast foods are popular choices because they are inexpensive, familiar, and available at almost any hour of the day or night and because many adolescents socialize with their peers at fast food establishments.[23] About 64.6% of respondents reported daily consumption of fast food. This figure is higher than fast food consumption among Turkish adolescents where 31.5% consume fast food one or more per day.[12] Consuming fast food is significantly higher among general school students, those of urban residence, those of working and highly educated mothers, and of high socioeconomic status.

However the (SYPE) reported a high consumption among adolescents with higher wealth status, among males and among rural respondents.[9]

In Egypt the drinks and beverages based on natural products are replaced by commercially carbonated drinks, other soft drinks entails a significant increase in daily sugar intake apart from depriving the body of the health benefits of the natural beverages.[3] About 20% of students consume soft drinks on daily bases. This is significantly higher among urban students, those of working and highly educated mothers. This is much lower than Sudanese adolescent who 44% of them consume soft drinks daily and also with no sex differences.[14] An Egyptian study conducted in 2001 agreed with this study in significant increase in soft drinks consumption among urban students but underscoring gender as a significant factor for the benefit of males[11]. Also, In South-western Saudi Arabia, boys consumed significantly more soft drinks than girls.[19] According to the WHO HBCS forum, In the European cross-national study, overall 32% of boys and 25% of girls drank sugared drinks daily. Daily consumption of sugared soft drinks was high up to 40% in Israel, Malta, Netherland, Slovenia, Scotland and the United states. More boys than girls drank soft drinks every day in most countries.[22]

The habit of consuming small glasses of sweetened black tea is popular and is labelled a national habit[3]. Tea is an important source of ready calories during the long interval between the waking up drink and the next meal. Also, tea often contains high levels of fluoride[24] and a study reported four cases of bone disorders resulting from chronic fluoride exposure due to excess tea consumption.[25]

About 80% of respondents drink tea more than three times per day and 87.5% of respondents drink tea immediately after meals. This is significantly higher among rural students, boys, those with less educated mothers. Similarly, a previous Egyptian study reported that significantly more male and more rural adolescents drink tea.[11] Also, most of Sudanese adolescents reported drinking tea on daily bases (91% for boys and 84.6% for girls).[14]

Although there is no special penchant for excessive salt seasoning, Egyptians tend to consume more salt during the summer months through eating old white cheese, olives, pickled vegetables, and salted fish. About 37% of respondents reported excess salt consumption. This is significantly higher among adolescents of urban residence, of female sex and of low or very low socioeconomic status families. About 22.3% of (SYPE) respondents noted that they prefer their food to be salty; this preference is higher among females, but no difference with wealth status.[9] However, Among Sudanese adolescents more boys reported excess salty food consumption (42.9% vs. 32.0%)[14]..

Consumption of excess sugar/sweet was reported by 54% of adolescents; being higher in those of urban residence, male sex, working and highly educated mother, and high socioeconomic status. Slightly higher rates were reported among Sudanese adolescents with no sex difference in daily consumption of excess sweet (55% for males vs. 60% for females).[14] According to the WHO HBCS forum, In the European cross-national study, young people reported eating sweets less frequently in Denmark, Finland, Norway and Sweden. Malta had the highest percentage of daily consumption of sweets (54%) followed by Scotland and Ireland (45% and 49%; respectively). Overall gender differences in the consumption of sweets and chocolates were minor.[22] In an Italian study, consumption of cakes and sweets is too high in about 25% of the sample, in that a dessert or cake is always consumed at each meal.[26]

This data may be useful for early detection of students at risk of faulty eating habits and targeting them by appropriate interventions. School-, family- and community-based interventions are timely needed to promote healthy food choices and good eating habits of adolescents. Regular family and school meals could serve as role models for healthy eating behaviour. There is a strong need for further research to understand the behavioural, psychological and cultural factors contributing to unhealthy eating habits and to develop effective intervention for promoting healthy eating during this critical developmental period.

Conclusion

Poor consumption of fruit and excess consumption of fast foods, salt, sugar/sweets, drinking tea more than 3 times a day and immediately after meals were the main unhealthy eating behaviour among adolescent. Socioeconomic level plays an important role in determining the consumption of different food group.

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1/1/2018