Original Article

Assessment of the Nutritional Status and Associated Factors among Adolescent Girls in Preparatory Schools at Al-Kut City

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Abstract

Background: Adolescence is a critical stage in human life, marking the shift from childhood to maturity and marked by a remarkably fast growth rate. Nutritional needs of adolescents at this phase of life are higher for the majority of nutrients than at any other time due to their fast growth. **Objective:** To assess the nutritional status domains of adolescent girls and identify the factors associated with their nutritional status among adolescent girls in preparatory schools in Al-Kut City. **Materials and Methods:** A descriptive cross-sectional study design has been carried out in preparatory schools in Al-Kut City. The study subjects included 650 adolescent girls selected from preparatory schools. The technique of adolescent student selection was simple random sampling. Data was collected via direct interview technique with each participant of adolescent students. The study instrument used a constructional questionnaire. **Results:** In the distribution of body mass index of the study population, the highest percentage was 67.08% of participants with normal weight, followed by underweight 18.46%; the majority 82.8% were fed both types of feeding; the number of meals per day was 2–3 (66.2%); regular exercise answer was no 75.2%; type of exercise was aerobic 39.4%, health, family, and the environment of adolescent girls; most of the answers were yes and high significant correlation between socio-demographic characteristics and nutritional factors of adolescent girls, including their age, family members, father's occupation, mother's occupation, and arrangement in the family and show the significant relationship of their economic status. **Conclusion:** Nutritional status is very important for adolescent girls and very important to growth, development, and learning in school.

Keywords: Adolescent girls, nutritional status, preparatory schools

Introduction

The Greek word "adolescere," which means "to mature," is the source of the English word "adolescence." Adolescence, as defined by the World Health Organization, is the time between the ages of 10 and 19 years.[1] This age group makes up over 1.2 billion people worldwide 20%, the majority of whom (about 84%) reside in low- and middle-income nations.[2] In the course of human development, adolescence is a time of rapid growth and maturation, necessitating additional nutrients to sustain this growth spurt. In other words, adolescence is a phase of severe anabolism during which the body requires more of all nutrients. A total of 20% of ultimate adult height, 50% of adult weight, and 45% of bone mass are obtained throughout adolescence.[3]

Modern public health considers nutrition to be one of the most fundamental issues since it affects both an individual's and a community's health. A vital part of overall adolescent healthcare is nutrition. A crisis in nutritional demands may result from adolescent changes. Eating patterns might shift from regular home-cooked meals to fast food, irregular meals, missing meals, and snacks with low nutrition. Reduced risk of several diseases, including four of the top causes of death: heart disease, cancer, stroke, and diabetes, is linked to a healthy diet.[4]

Undernutrition, which includes being underweight for one's age, too short for one's age (stunted), too thin to one's

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height (wasted), and functionally vitamin and mineral deficient, is an issue around the world, but it is particularly severe in impoverished countries.[5] Malnutrition and its results are especially dangerous for teenagers because this is a time when their bodies and minds are changing quickly. Undernutrition makes people small and thin, and it is linked to a loss of muscle strength. It starts at birth, goes through adolescence and adulthood, and can last for generations. It can also help reduce infection resistance and other illnesses that make it hard to work and lower production.[6]

Several global studies suggest that malnutrition is very common during this stage, manifesting as either overweight or underweight.[7,8] It is now well known that being overweight and obese during childhood and adolescence is a risk factor for long-term health issues like diabetes, heart disease, and early death, while an inadequate diet during adolescence can cause many nutrition-related disorders, delayed sexual maturation, and can arrest or slow linear growth.[9] Recent research has revealed that adolescents' lifestyles and eating habits are to blame for these nutritional issues.[10]

A body of research revealed that, while it affects both developed and developing nations worldwide, the prevalence of adolescent undernutrition is disproportionately higher in developing Asia (32–65%) and Africa (4–30%), making these regions more susceptible to low productivity, ill health, and early deaths. Adolescent undernutrition is more common in Sub-Saharan Africa (15–58%) than in other African nations.[11,12]

This study aimed to assess the nutritional status domains of adolescent girls and identify the factors associated with nutritional status among adolescent girls in preparatory schools in Al-Kut City.

Materials and Methods

Study design, setting, and sampling techniques

A descriptive cross-sectional study design has been carried out in preparatory schools at Al-Kut City. The study subjects included 650 adolescent girls selected from preparatory schools. The sampling technique for selecting adolescent students was simple random sampling. The sample size was distributed according to preparatory schools in Al-Kut City.

Tool for data collection

Data collection was through the direct interview technique with each participant of adolescent students [Table 1], which lasted from February 2023 to May 2023. The study instrument used was a questionnaire.

Research instrument

The questionnaire format was constructed based on lecture materials and book contents.

Part (1) Socio-demographic information: This part includes age (in years), marital status, residence, class (a-scientific, b-literary), family members, father's occupation, father's educational level, mother's occupation, mother's educational level, economic status scale according to study,[13] head of the family, arrangement in family, and garden in the house.

Part (2) Student's weight and height measurements: Student's weight and height were obtained, and their body mass index (BMI) was calculated according to the following equation: BMI = weight\(height)^2 in meters and categorized obesity in adults and adolescents as the following: <18.5 considered underweight, 18.5–24.5 normal weight, 25–29.5 overweight, and ≥30 obese.[4]

Part (3) Nutritional pattern of adolescent girls: This part includes feeding type, number of fast-food meals per week, meals skipped, number of meals per day, drinking a soft drink every week, and eating snacks between meals.

Part (4) Sports activity of adolescent girls: This part includes regular exercise, hours of watching television, hours of using a mobile and tablet, type of exercise, hours of using a laptop, and time for sports hours and outdoor play.

Part (5) Health, family, or this environment of adolescent girls: The part consists of 10 items, with yes and no answers, distributed with 1 and 2 scoring scales.

Part (6) Repetition of food during this week of adolescent girls: The part consists of 11 items, answered for all items were never, 1–2 times a week, and ≥3 times per week, distributed with 1, 2, and 3 scoring scales.

Ethical considerations

Ethical approval has been obtained from the research ethics committee in the Technical Institute-Suwaira, Middle Technical University, and approval obtained from the educational directorate at Al-Kut City. All students in preparatory school have consented to participate in the study and have signed a permission form to indicate their consent. The subjects were informed of the study's objectives before their involvement, and they were also

Table 1: Distribution of adolescent students participated in the study

Name of school	No. of adolescent students
Natakain preparatory	108
Al-nor preparatory	108
Al-zahraa preparatory	108
Al-fatemeat preparatory	108
Al-ghadeer preparatory	108
Al-yser preparatory	110
Total	650

informed that their participation was entirely voluntary and that they could withdraw from the study whenever they desired. The confidentiality of the data is likewise protected, and it will be kept safe both before and after the study.

Validity

Content validity for the questionnaire has been determined through an expert panel. A draft of the questionnaire was reviewed and evaluated with regard to its contents, clarity, relevance, and adequacy in achieving the present study's objectives. All of the experts' comments have been taken into consideration for modification and revision.

Reliability

Before beginning data collection and following tool creation and modification, a pilot study was conducted. It involved 20 students from the schools under investigation. For each person who took part in the pilot study, an individual meeting was held, and the questionnaire form was modified and clarified as needed.

Data analysis and statistical test

All data were coded, entered, and analyzed using the statistical package for the social sciences software, version 26 (IBM Corp., Armonk, NY). Descriptive statistics, including frequency, percentage, mean, and standard deviation, were used to summarize the study results. Chi-square has been calculated, and a *P* value of less than or equal to 0.05 was considered statistically significant.

Results

Table 2 shows the socio-demographic characteristics of the participants. Regarding age groups,[14] years constituted the majority 30%. A high percentage of participants were single 96.6%. Regarding residence, the majority were urban 98%, the economic status of participants was good 55.2%, the class of participants was (fourth a), and the head of the family was male 82.8%.

In terms of family arrangement, 44.3% of the adolescent girls were 3 and more. Most participants (73.4%) had 6–10 family members. The father's occupation was an employee (57.5%), and the mother's occupation was a housewife (79.7%). A total of 57.2% of adolescent girls answered yes about the garden in the house. The father's educational level was preparatory (31.4%), and the mother's educational level was preparatory (32.6%).

Table 3 shows the distribution of BMI of the study population. A high percentage (67.08%) of participants were classified as having normal weight, followed by 18.46% underweight, while the lower percentage (2.77%) of participants were classified as obese.

Table 4 illustrates the nutritional pattern domain of adolescent girls; the findings indicate that 82.8% reported consuming both types of feeding. The majority of participants (66.2%) had 2–3 meals per day. For fast-food consumption, 47.5% reported eating it 2–3 times per week. Regarding soft drink consumption, 37.2% drank soft drinks once a week. Most participants (73.4%) skipped breakfast, and 80.3% answered yes to eating snacks between meals.

Table 5 shows the sports activity domain of adolescent girls. The findings indicate that 75.2% of participants answered no to regular exercise. The type of exercise was aerobic 39.4%. The majority spent 1–2 hours watching television (80.2%) and using a laptop (58%). For mobile and tablet use, 46.5% reported using these devices for 5 or more hours. Additionally, 62.9% of participants answered no to sports hours and outdoor play.

Table 6 indicates that, in the health, family, and environment domains of adolescent girls, most of the answers were yes.

Table 7 indicates the repetition of food during the week domain of adolescent girls; the majority of responses were 1–2 times a week.

Table 8 shows a highly significant correlation between the socio-demographic characteristics and nutritional factors of adolescent girls, including their age, family members, father's occupation, mother's occupation, arrangement in the family, and a significant relationship with their economic status. No significant relationship was found with marital status, residence, head of the family, father's educational level, or mother's educational level.

Discussion

According to the BMI in the study sample, the highest percentage were girls with normal weight, followed by underweight, while the lower percentage of participants were girls who had obesity. This result reflects the nutritional status of the study participants as a consequence of their healthy eating habits. Ganesan *et al.*[15] showed the participants' calculated BMI and the distribution of body image dissatisfaction. According to the data, 58.3% of the participants had a normal BMI.

The study presents the nutritional pattern domain of adolescent girls. The timing and pattern of puberty are significantly influenced by nutrition, with implications for adult height, the accumulation of muscle and fat mass, and the risk of developing non-communicable diseases later in life. Beyond musculoskeletal development, nutrition has an impact on adolescents' immunity, cardiorespiratory health, and neurodevelopment. Anju *et al.*[16] indicated that the majority of girls 93.5% were not vegetarians in terms of diet. In that, the majority 90.4% used to eat meals at home, and 84.4% consumed more than two meals every day. A total of 17.8% of people reported having changed appetites in the previous 6 months. A whopping 83%

Table 2: Distribution of socio-demographic characteristics of adolescent girls

Age	F	%	Marital status	F	%
16	195	30	Single	628	96.6
17	158	24.3	Married	21	3.2
18	180	27.7	Widow	1	0.2
19 and more	117	18	Total	650	100
Total	650	100	**Economic status**	**F**	%
Residence	**F**	%	High	359	55.2
Urban	637	98	Moderate	276	42.5
Rural	13	2	Low	15	2.3
Total	650	100	Total	650	100
Class	**F**	%	**Head of the family**	**F**	%
Four a	110	16.9	Male	539	82.8
Four b	106	16.3	Female	111	17.1
Five a	107	16.5	Total	650	100
Five b	109	16.8	**Arrangement in family**	**F**	%
Six a	109	16.8	1	175	29.9
Six b	109	16.8	2	187	28.8
Total	650	100	3 and more	288	44.3
Family members	**F**	%	Total	650	100
Under 5	128	19.7	**Mother occupation**	**F**	%
6–10	477	73.4	Housewife	518	79.7
11 and more	45	6.9	Employee	132	20.3
Total	650	100	Total	650	100
Father occupation	**F**	%	**Garden in the house**	**F**	%
Earner	276	42.5	Yes	372	57.2
Employee	374	57.5	No	278	42.8
Total	650	100	Total	650	100
Father educational level	**F**	%	**Mother educational level**	**F**	%
Not read and write	24	3.7	Not read and write	30	4.6
Read and write	151	23.2	Read and write	147	22.6
Primary	100	15.4	Primary	136	20.9
Preparatory	204	31.4	Preparatory	212	32.6
Bachelor	139	21.4	Bachelor	106	16.3
Higher and more	32	4.9	Higher and more	19	2.9
Total	650	100	Total	650	100

F: frequency, %: percentage

Table 3: Distribution BMI categories of adolescent girls by age

Indicator	16 years		17 years		18 years		19 years and more		Total	
	F	%	F	%	F	%	F	%	F	%
Underweight	46	23.7	32	20.2	25	13.9	17	14.3	120	18.46
Normal weight	131	67.5	101	63.9	129	72.1	75	63.1	436	67.08
Overweight	12	6.2	22	13.9	20	11,2	22	18.4	76	11.69
Obesity	5	2.6	3	2	5	2.8	5	4.2	18	2.77

F: frequency, %: percentage

of people had food allergies, and 42.5% added vitamin supplements to their diet.

This finding shows the sports activity domain of adolescent girls. Sport increases adolescent girls' self-esteem and provides opportunities for their advancement despite gender-based barriers. It is imperative that females participate in sports. Athletics for health: sport promotes and enhances physical fitness and diminishes obesity. Fatima *et al.*[14] from the Kingdom of Saudi Arabia suggested that when it comes to preventing childhood obesity, the intensity of physical activity may be more significant than the quantity. This issue may be crucial in understanding the prevalence rates of overweight/obesity even if we did not offer data on the level of physical activity.

Table 4: Nutritional pattern domain of adolescent girls

Feeding type	F	%	Number of meals per day	F	%
Vegetarian	83	12.8	1	54	8.3
Meat	29	4.5	2–3	430	66.2
Both	538	82.8	4–5	133	20.5
Total	650	100	6 and more	33	5.1
Number of fast food per week	**F**	**%**	Total	650	100
1	212	32.6	**Drink a soft drink every week**	**F**	**%**
2–3	309	47.5	1	242	37.2
4–5	87	13.4	2–3	209	32.2
6 and more	42	6.5	4–5	89	13.7
Total	650	100	6 and more	110	16.9
Meals leave out	**F**	**%**	Total	650	100
Breakfast	477	73.4	**Eat snacks between meals**	**F**	**%**
Lunch	83	12.8	Yes	522	80.3
Dinner	90	13.8	No	128	19.7
Total	650	100	Total	650	100

F: frequency, %: percentage

Table 5: Sports activity domain of adolescent girls

Regular exercise	F	%	Type of exercise	F	%
Yes	161	24.8	Aerobic	256	39.4
No	489	75.2	Strength training	159	24.5
Total	650	100	Football	235	36.2
Hours of watching television	**F**	**%**	Total	650	100
1–2	521	80.2	**Hours of use laptop**	**F**	**%**
3–4	88	13.5	1–2	377	58
5 and more	41	6.3	3–4	151	23.2
Total	650	100	5 and more	122	18.8
Hours of use mobile and tablet	**F**	**%**	Total	650	100
1–2	132	20.3	**Time for sports hours and outdoor play**	**F**	**%**
3–4	216	33.2	Non	409	62.9
5 and more	302	46.5	1–2	186	28.6
Total	650	100	3 and more	55	8.5
			Total	650	100

F: frequency, %: percentage

Table 6: Health, family, and the environment domain of adolescent girls

S no.	Question	Yes		No	
		F	%	F	%
1	Domestic toilet available	641	98.6	9	1.4
2	School toilets are available	595	91.5	55	8.5
3	Use the school toilet appropriately	405	62.3	245	37.7
4	Availability of soap and water near the toilet for hand washing	573	88.2	77	11.8
5	Wash hands with soap after using the toilet	639	98.3	11	1.7
6	The source of drinking water is protected	579	89.1	77	10.9
7	Good waste disposal method	592	91.1	58	8.9
8	Start of menstruation	606	93.2	44	6.8
9	Exposure to menstrual disorders in the last time	345	53.1	305	46.9
10	Exposure to any disease in the last month	289	44.5	361	55.5

F: frequency, %: percentage

The study indicates the health, family, and environment domain of adolescent girls. The family and environment health have strong effects on the adolescent nutritional status that influences learning, growth, and development.

Table 7: Repetition of food during the week of adolescent girls

S no.	Question	Never		1–2 times a week		≥3 times per week	
		F	%	F	%	F	%
1	Staple starchy food (grains)	173	26.6	336	51.7	141	21.7
2	Pasta and rice	62	9.5	312	48	276	42.5
3	Fruits and vegetables rich in Vitamin A	71	10.9	302	46.5	277	42.6
4	Other fruits and vegetables	63	9.7	305	46.9	282	43.4
5	Dark green leafy vegetables	181	27.8	318	48.9	151	23.2
6	Legumes/nuts	67	10.3	353	54.3	230	35.4
7	Egg	161	24.8	276	42.5	213	32.8
8	Candies	46	7.1	235	36.2	369	56.8
9	Meat	95	14.6	315	48.5	240	36.9
10	Organ meat	277	42.6	258	39.7	115	17.7
11	Milk and its derivatives (whole milk, cheese, and yogurt)	145	22.3	306	47.1	199	30.6

F: frequency, %: percentage

Table 8: Correlation between socio-demographic characteristics and nutritional factors of adolescent girls

Socio-demographic characteristic	Nutritional factors domain	M.S	S.D	*P* value	Sig.
Age	(Nutritional pattern, sports activity, health, family and the environment, and repetition of food)	2.21	1.35	0.01	H.S
Marital status		1.45	2.82	0.96	N.S
Residence		1.02	1.79	0.417	N.S
Economic status		1.91	0.71	0.03	S
Family members		1.51	0.19	0.001	H.S
Father occupation		2.65	0. 88	0.006	H.S
Mother occupation		1.62	0.47	0.002	H.S
Head of the family		1.33	2.65	0.52	N.S
Arrangement in family		1.73	0.78	0.001	H.S
Father educational level		1.85	2.93	0.22	N.S
Mother educational level		1.47	2.91	0.10	N.S

M.S: mean of score, S.D: standard deviation, Sig.: significant, N.S: no significant, S: significant, H.S: high significant

According to the findings of Hadush *et al.*,[17] 168 (22.8%) of the participants—just under one-third—reported having a house latrine, and 162 (96.4%) of them were using one. Regarding the use of school restrooms, 154 participants 20.9% do not use the restrooms at their schools. A total of 276 (37.5%) of them got their drinking water from a protected or safe water source.

The findings about the repetition of food during the dietary intake of adolescent girls indicate that eating a diet that is rich in whole grains, fruits, vegetables, nonfat or low-fat milk products, beans, eggs, fish, nuts, and lean meats is the greatest approach for a teen to keep a healthy weight and maintain healthy body composition. Eating in a healthy way that is healthy includes consuming the appropriate proportions of various nutrients. Nicholaus *et al.*[18] showed that 84 of the respondents 51.2% ate meat once to twice a week. The respondents of 11 (6.7%), 7 (4.2%), and 8 (4.9%) reported eating less eggs, fish/sardines, and milk, respectively. All respondents consumed cooking oils 100% in some capacity. Few respondents (12.2%, 8.4%, and 7.9%, respectively) reported consuming peanut butter, margarine, and groundnuts infrequently.

According to the correlation between socio-demographic characteristics and nutritional factors, the study showed a highly significant relationship between socio-demographic characteristics and nutritional factors of adolescent girls. Arage *et al.*[2] revealed that stunting was positively correlated with teenagers' ages, housing, and snacking. The adolescent girls' thinness was also favorably correlated with their age, place of residence, and mother's occupation. Due to various socio-demographic and economic circumstances, girls may be at much increased risk of malnutrition.

Conclusion

Nutritional status is very important to adolescent girls and very important to growth, development, and learning in school. The associated factors related to nutritional status that affect adolescent girls include age, family members, father's occupation, mother's occupation, family arrangement in family, and economic status.

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Conflicts of interest

There are no conflicts of interest.

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