



ASSESSMENT OF NUTRITIONAL STATUS OF THE ADOLESCENTS (13-18 YRS) STUDYING IN SECONDARY SCHOOLS IN ELHAFEIR AREA-DANGLE LOCALITY- NORTHERN STATE 2018

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ABSTRACT Cross-sectional descriptive study conducted among the secondary schools students in Elhafaier area, Dongle locality at Northern state. The objective of the study was to assess their nutritional status and related risk factors of students' adolescents. Data was collected by using questionnaire that covered information on socio demographic characteristics of students (age, gender) and family, dietary intake, anthropometric measures and physical activities. The number of the students was 210, (52% males, 47.6% females), students' age fell between the age group of 13-18 years old. Almost half of the students (55.2%) had normal weight, (30%) were underweight, (14.8%) were overweight/obesity, only (7.6%) suffered from stunting. Significant relationship was found between BMI for Age and Family size, family income and mother education, ($p < 0.05$). Most of the students consumed three meal/day (88.1%) and only (1.4%) consumed more than three meal/day and (68.1%) consumed 1-2 snacks/day. The results of food habits revealed that, the students consumed bread daily (87.1%), red meat consumed daily by (31.4%), milk was consumed daily by (37.1%), yoghurt and cheese were consumed two times/week by (41.4%, 38.6% respectively). The majority of students consumed bread-beans daily (91.4%). A lentil was consumed two times /week, (51.9%). Cooked and fresh vegetables consumed daily by (40.5%, 41.9% respectively). The result showed different levels of physical activities among the students, (51%) played foot balls, (19%), swimming, (2.6%) jogging and (1%) practiced walking. The study concluded, significant relationship was observed between BMI for age with monthly income, family size and mothers education ($p < 0.05$), and recommended, Introducing nutrition curricula in the schools to increase the students awareness about healthy and nutritious foods.

KEYWORDS : P Adolescents, Nutrition status Assessment, Food frequency,

Background:

Adolescents are tomorrow adult population, and their health and well-being are crucial, interest in the health of adolescents is relatively recent, and a focus on their nutrition (WHO, 2005). Sudan has a land area of 1,861,484 km² and it shares borders with seven countries the total population by 2014 is projected to be about 37.4 million. The average household size is 6 persons, and the total fertility rate is 5.7 per woman. Almost half (45 per cent) of the population is under 15 years old, including 16.4 per cent under 5 years old. The country still has one of the lowest levels of human development in the world; poverty remains widespread with 46.5 % of the population living below the poverty and has a huge burden of acute malnutrition according to the WHO threshold for assessing severity of under nutrition (WFP& UNICEF, 2014). Adolescent defined by WHO include persons aged 10-19 years (WHO, 2005). Young people (10-24 years) greater proportion of the population in sub-Saharan Africa more than one third of population, by 2025 the number increase to 436 million, by 2050 number increase to 605 million (UNFPA, 2012). Adolescent is period of transition between childhood and adulthood consider to be with puberty, process physical, psychological and emotional development by endocrine changes that lead to sexual maturation and reproductive capability (UN, 2012). In 2009 there 1.2 billion adolescent aged 10-19 in the world, 18% of world population, majority of adolescents 88% live in developing countries (UNICEF, 2011).

Statement of the problem:

Previous studies were found the prevalence of underweight was highest among adolescents (22%) in the Northern Sudan (Ahmed & Onsa, 2014), other study revealed, underweight was (25%), while overweight was (23%) (Alam, et al., 2010). The purpose of this study is to assess the nutritional status of adolescents in Elhafaier area, Dongla locality.

Justification:

Nutrition needs of adolescents could be an important step towards

breaking the vicious cycle of malnutrition, chronic diseases and poverty (WHO, 2006) (. Adolescents are a nutritionally vulnerable group for specific reasons; including their high requirements for growth, eating patterns and lifestyles. Risk-taking behaviors and their susceptibility environmental influences. Inadequate nutrition in adolescence can potentially retard growth and sexual maturation, although these are likely consequences of chronic malnutrition in early infancy and childhood (WHO, 2005). Good and healthy nutrition is very important for adolescents regarding their future nutrition status in adulthood, this drew the researcher attention to study about the nutritional status of students adolescents.

General objective:

To Assess the Nutritional status of Adolescents (13-18 years old) studying in Secondary Schools in Elhafaier area, Dongla locality.

Specific Objectives:

- To assess nutritional status of adolescents using anthropometric measures.
- To assess the Food habits among the adolescents.
- To identify the relationship between socioeconomic status and nutritional status of the adolescents.

Methodology:

Cross-sectional school base study was carried to assess the nutritional status of adolescents in Elhafaier area and Dangle Locality at Northern state in Sudan. The study population included adolescents males and females aged (13 -18 years old). The primary data was collected using, the questionnaire completed by researcher that included demographic data, socio-economic status, food habits (FFO) anthropometric indices (weight, height) and physical activity. Secondary data was collected from published studies in scientific journals, books, and researches.

Sample selection: In the present study four schools were included in present study(the only four schools in Both areas (Elhafaier area&

Dongla locality) . Systematic random sampling is used to distribute the sample among the students in the four schools .The sample size was calculated by the following equation:

$$n = \frac{N}{1 + N \cdot e^2}$$

Where:

n =size sample

N=the total number of students 445

e=contagious confidence and amount (0.05)

$$n = \frac{445}{1 + 445 \cdot (0.05)^2} = 210$$

Table (1) demographic variables among the students

Gender	Frequency	Present (%)
Males	110	52.4
Females	100	47.6
Total	210	100.0
Age(years)	Frequency	Present (%)
13-14	38	18.1
15-16	87	41.4
17-18	85	40.5
Total	210	100.0
Marital status	Frequency	Present (%)
Single	202	96.2
Married	8	3.8
Total	210	100.0
Family size	Frequency	Present (%)
1-3	5	2.4
4-6	88	41.9
7-9	72	34.3
More than 9	45	21.4
Total	210	100.0
Educational level of mother	Frequency	Present (%)
Illiterate	12	5.7
Elementary	71	33.8
Intermediate	34	16.2
Secondary	55	26.2
University	32	15.2
Postgraduate study	6	2.9
Total	210	100.0
Educational level of father	Frequency	Present (%)
Illiterate	5	2.4
Khalwa	7	3.3
Adult education	8	3.8
Elementary	88	41.9
Intermediate	14	6.7
Secondary	74	35.2
University	14	6.7
Total	210	100.0
Families income	Frequency	Present (%)
Less than 4000SDG	43	20.5
4001-6000SDG	131	62.4
More than 6000SDG	36	17.1
Total	210	100.0

Table (1) demonstrates that (52.4%) of the students were males, while (47.6%) were Females. Their age group were classified as follows, (18.1%) at the age group (13- 14) years old , (41.4%) at the age group of (15-16) years old and 40.5% at the age group of (17-18) years old. Majority of students were single (96%) and married (4%), (41.9%) were having family members ranged between 4 and 6 persons, and small family size (3 persons) comprised (2.4%) of the sample. As for the students' mothers education level ,(5.7%)of the mothers were illiterate , (33.8%)of the mothers had elementary education, (16.2%) had intermediate education, (26.2%) had secondary education,(15.2%), had university education while only (2.9%) had postgraduate studies. Regarding their fathers education levels (42%), had elementary education ,(36%) had Secondary education, (7%), had university and intermediate education , (3.3%) had khalwa while only (2.4%) were illiterate. Most of families had monthly income between 4001- 6000SDG (62.4%), (20.5%) of them had monthly income less than4000, while only (17.1%) had monthly income more than 6000 SDG.

Table (2) physical activity among the students

Practicing of exercise	Frequency	Present (%)
Yes	155	73.8
No	55	26.2
Total	210	100.0
Type of exercise	Frequency	Present (%)
Walking	2	1.0
Jogging	6	2.9
Swimming	40	19.0
Football	107	51.0
No exercise	55	26.2
Total	210	100.0
Duration of exercise	Frequency	Present (%)
Less than 30 minutes	8	3.8
30-60 minutes	40	19.0
More than 60 minutes	107	51.0
No exercise	55	26.2
Total	210	100.0
Frequency of exercise	Frequency	Present (%)
Daily	100	47.6
Two-three time/week	55	26.2
No exercise	55	26.2
Total	210	100.0

Table (2) shows that (73.8%) of students participated in physical activities while (26.2%) did not participate in physical activities, (51%) played football, (19%) swimming, (2.9%) jogging, while walking stated by (1%). Regarding the duration of sport, (51%) of the students exercised more than 60 minutes, (19%) exercised between 30-60 minutes while (3.8%) exercised less than 30 minutes. Those who exercised daily were (47.6%) and who practiced Two-three time/week (were 26.2%).

Table (3) Nutritional status of students

BMI for age percentile	Frequency	Present (%)
<5th Underweight	63	30
≥5th and <85th Normal	116	55.2
≥85th and <95th overweight	18	8.6
≥95th obese	13	6.2
Total	210	100.0
Height for age percentile	Frequency	Present (%)
<3rd stunting	16	7.6
≥3rd and <97th normal stature	191	91
≥97th tall stature	3	1.4
Total	210	100.0

Tale (3) reveals the present nutritional status of the students, (30%)were underweight,(55%) at normal weight, (14.8%) were overweight while (6.2 %) were obese. Regarding students' height for age percentile, (7.6%) was stunting, (91%) had normal status, and (1.4%) were taller than the normal range .

Table (4) The relationship between BMI for age percentile and family size among the students

Classification	Family size									
	1-3		4-6		7-9		More than 9		total	
	No	%	No	%	No	%	No	%	No	%
<5th Underweight	0	0	2	33.3	21	33.1	21	33.1	63	100.0
≥5th and <85th Normal	0	0	48	41.4	51	44.0	17	14.7	116	100.0
≥85th and <95th overweight	5	27.8	6	33.3	0	0	7	38.9	18	100.0
≥95th obese	0	0	13	100.0	0	0	0	0	13	100.0
Total	5	2.4	88	41.9	72	34.3	45	21.4	210	100.0

P value=0.00
Significant relationship was detected between BMI for age & family size (P=0.00).

Table (5) The relationship between BMI for age percentile and income among the students

Classification	Income									
	Less than 4000SDG		4001-6000SDG		More than 6000		total			
	No	%	No	%	No	%	No	%		
<5th Underweight	12	19.0	41	65.1	10	15.9	63	100.0		
≥5th and <85th Normal	31	26.7	64	55.2	21	18.1	116	100.0		
≥85th and <95th overweight	0	0	18	100.0	0	0	18	100.0		
≥95th obese	0	0	8	61.5	5	38.5	13	100.1		
Total	43	20.5	131	62.4	36	17.7	210	100.1		

Chi square = 20.401 d f= 6 p value= 0.02
Significant relationship was detected between BMI for age & income (P=0.02)

Table (6) the relationship between BMI for age percentile and Mother Education among the students

Classification	Mother education													
	Illiterate		Elementary		Intermediate		Secondary		University		Postgraduate		Total	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%
<5th Underweight	0	0	29	46	0	0	16	25.4	18	28.6	0	0	63	100
≥5th and <85th Normal	12	10.3	38	32.8	23	19.8	29	25.0	14	12.1	0	0	116	100
≥85th and <95th overweight	0	0	0	0	7	38.9	5	27.8	0	0	6	33.3	18	100

≥95th obese	0	0	4	30.8	4	0.8	5	38.5	0	0	0	0	13	100
Total	12	5.7	71	33.8	34	16.2	55	26.2	32	15.2	6	9	10	100

Chi square 1.149 = d f= 15 p value=0.00
Significant relationship was detected between (BMI for age & mothers education (P=0.00).

Table (7): Number of meals / day and Number of snacks/day of students

Number of meal pre day	Frequency	Present (%)
One	-	-
Two meals	22	10.5
Three meals	185	88.1
More than three	3	1.4
Total	210	100.0
Snacks	Frequency	Present (%)
Yes	167	79.5
No	43	20.5
Total	210	100.0
Number of snacks/day	Frequency	Present (%)
One	69	32.9
Two	74	35.2
Three	24	11.4
No snack	43	20.5
Total	210	100.0
Type of snacks	Frequency	Present (%)
Sandwich(cheese- egg)	36	17.1
Potato chips	39	18.6
Biscuit	1	0.5
Chocolate	9	4.3
Ice cream	3	1.4
Fruits (date)	75	35.7
No snack	43	20.5
Total	210	100.0

Total 210 100.0 Table (7) Demonstrates that, 88.1% of the students, consumed 2-3 meals/day, 10.5% consumed two meals while 1.4% consumed more than three, 79.5% of students consumed snacks, while 20.5% did not consume snacks, 32.9% of the students consumed one snack , 35.2 % consumed two snacks while 11.4% consumed three snacks/day. Regarding the type of snacks, 75% of students ate fruits, 59% ate biscuits (17.1%) of students ate sandwiches (cheese, egg) 18.6% ate potato chips, 4.3% ate chocolate, 1.4% ate ice-creams, while 1.9% ate jam.

Table (8) food frequency questionnaire data:

Food	Type	Daily (No)	(%)	2time/week (No)	(%)	Once/week (No)	(%)	Monthly (No)	(%)	Never (No)	(%)
Cereals	Bread	183	87.1	20	9.5	7	3.3	-	-	-	-
	Kisra	57	27.1	48	39.0	48	22.9	13	6.2	10	4.8
	Gorassa	58	27.6	106	50.5	24	11.4	10	4.8	12	5.7
	Acida	4	1.9	8	3.8	31	14.8	50	23.8	117	55.7
	Rice	5	2.4	92	43.8	79	37.6	12	5.7	22	10.5
	Macaroni	4	1.9	67	31.9	100	47.6	17	8.1	22	10.5
Meats	Chicken	13	6.2	57	27.1	90	42.9	46	21.9	4	1.9
	Fish	11	5.2	5	2.4	31	14.8	121	57.6	42	20.0

	Red meat	66	31.4	58	27.6	67	31.9	5	2.4	14	6.7
Dairy product	Milk	78	37.1	24	11.4	35	16.7	30	14.3	43	20.5
	Yoghurt	37	17.6	87	41.4	47	22.4	35	16.7	4	1.9
	Cheese	22	10.5	81	38.6	67	31.9	28	13.3	12	5.7
	Eggs	59	28.1	78	37.1	44	21.0	19	9.0	10	4.8
Legumes	Broad bean	192	91.4	12	5.7	-	-	-	-	6	2.9
	White beans	8	3.8	23	11.0	59	28.1	52	24.8	68	32.4
	Lentils	13	6.2	109	51.9	65	31.0	23	11.0	-	-
	Tamia	79	37.6	79	37.6	32	15.2	13	6.2	7	3.3
	Dakwa	48	22.9	66	31.4	19	9.0	39	18.6	38	18.1
Vegetables	Cooked	85	40.5	70	33.3	25	11.9	14	6.7	16	7.6
	Fresh	88	41.9	66	31.4	34	16.2	14	6.7	8	3.8
Fruits	Fresh	75	35.7	33	15.7	72	34.3	10	4.8	20	9.5
	Dried	120	57.1	39	18.6	27	12.9	9	4.3	15	7.1
Drinks	Coffee	46	21.9	20	9.5	32	15.2	14	6.7	98	49.7
	Tea	114	54.3	20	9.5	31	14.8	7	3.3	38	18.1
	Tea with milk	156	74.3	15	7.1	15	7.1	5	2.4	19	9.0
	Soft drinks	12	5.7	83	39.5	75	35.7	26	12.4	14	6.7
	Natural juice	55	26.2	67	31.9	57	27.1	31	14.8	-	-
Miscellaneous	Chips	20	9.5	47	22.4	66	31.4	41	19.5	34	16.2
	Chocolates	8	3.8	50	23.8	61	29.0	30	14.3	61	29.0
	Ice crème	8	3.8	47	22.4	80	38.1	49	23.3	26	12.4
	Pizza	-	-	10	4.8	34	16.2	115	54.8	51	24.3
	Sweets	78	37.1	57	27.1	36	17.1	26	12.4	13	6.2
Others, specify	Endom	34	16.2	16	7.6	5	2.4	-	-	155	73.8

Table (8) Shows results of the food frequency habits of students.

Discussions

This study was undertaken to assess the nutritional status of adolescents (13-18) years old, both males and females, studying in secondary schools in Elhafaer area, Dongle locality.

Numbers of the students were 210 students their age fell between 13-18 years old, (52% Males 47.6% females). Regarding socio demographic data,(41.4%) of the students were at the age group of (15-16) years old, (17.1%) of the families had income more 6000 SDG and (20%) had income less 4000 SDG, There was significant relationship between BMI for age and income(P=0.02), the present study is not in line with study reported by Nontuthuzelo (2012)who found, no statistically significant relationship was found between BMI for age (z score) and the level of income(p=0.442) . Income influences the quantity and quality of food that may be purchased from each of the food group (Park, 2015).

Regarding family members, (41.9%) were having family members ranged between 4 and 6 persons, only (2.4%) students having small family size (3 persons), there was significant relationship was detected between BMI for age and family size (p=0.00) Nutrition status may also be affected by large family size in population density as stated by (Guma, 2006).

Mothers and fathers with elementary education were (33.8%, 41.1% respectively), Illiteracy among the fathers and mothers was (2%, 12% respectively), which is lower than reported in the Northern state by (Ahmed & Onsa, 2014), who found (18%) of illiterate mothers. In the present study, significant relationship was found between BMI for age and mothers education (p=0.00). Better-educated parents provide their children with nutritious diet because of their high knowledge about Nutritious and Healthy Food (Mahan & Raymon, 2017).

In the present study,(55.2%)of the students had normal weight and (30%) were underweight which was almost same as the result reported by (O-Omobuwa et al., 2014) in south- Nigeria who found 29% of the students were under weight, higher than the result reported by (Ahmed & Onsa,2014) in northern state, who found(22.2%) of the students were under weight and lower than result reported by(Lamba & Garg, 2017) in India, who found (35%) of the students were underweight. Underweight is major problem that need attention among this age group , underlying factors should be investigated, as the adolescents are the future of the country(WHO 2005).

As shown in the present study (14.8%) were overweight or obese, which lower than (28%) reported by (Salim, 2017) in Khartoum state, and higher than (7.6%)reported by (O-Omobuwa, 2014). Obesity is a complex, multifactorial health issue that is influenced by genetics, metabolic efficiency, dietary intake, environmental and psychosocial factors. Adolescents who are found to be overweight should have a fasting lipid profile diagnose and should be assessed for additional risk factors for chronic disease (Mahan & Raymon, 2017).

Stunting was (7.6%), which is higher than the result reported by (Salim, 2017) in Khartoum state (6.8%). Stunting rate was also lower than the result reported by (Deshmukh. et al., 2006) in India (50.7%). Regarding physical activities (73.8%) of students involved in different levels of physical activities specially football and swimming (51%, 19% respectively). Duration of exercise more than 60 minutes stated by (51%) of the students. Concerning the frequency of exercise,47.6% of the students exercised daily while (26.2%) exercised two-three time/week. Good healthy condition always is the result of exercise with balance nutrition (Sareen, et al., 2008). National recommendations for physical activity suggest that all youth should be active at least 60 minutes each day, including participation in vigorous activity at least 3 days each week (Mahan & Raymon, 2017). Most of students took three meal/day (88.1%) and (86.1%) took 1-2 snack/day. Dates was the more fruit that consumed by the students as snack.

Concerning food habits, (87.1%) of the Students consumed bread daily and traditional cereal product (gorassa and kiswa) consumed 2times /week which are higher than rice and macaroni table (8). A high consumption of cereal was indicated to meet the nutrient average requirement for energy. As for diary and dairy products (37.1%) consumed milk daily. It was stated that, high consumption of yogurt and cheese among the students was (2time/week) table (8). Dairy products are the best source of calcium needed for skeletal growth. Higher recommendation was stated for males than females' adolescents (Mahan & Raymon, 2017). Egg was consumed 2times/week by (37.1%) of the students , red meat consumed daily by (31.4%) of students, chicken was also consumed once/week by(42.9%) of students. The proteins from animal sources are very expensive, thus cannot be afforded by most of households or be included in the daily preparation of meals (Gharib & Rasheed 2011). High daily consumption of broad was observed among the Students (91.4%), legumes consumed 2times /week by (52.9%) of the students, also considered as the sources of plant protein. According to (James, 2004) what people eat is determined by many factors, especially if locally available. The bread bean is growing in northern Sudan and popular food all over Sudan. The daily consumption of cooked vegetables, fresh vegetables and fresh fruit by students (40.5%, 42.9%, 35.7% respectively). The results also demonstrated daily consumption of dried fruits like dates among the students (57%). Adolescents food choices are not meeting dietary guidelines, consequently promoting

inadequate energy and nutrients intake (Nontuthuzelo 2012). Regarding beverages, students consumed tea with milk daily by (74.3%) while soft drink in form of Pepsi and Coca consumed 2 times/week by (39.5%) of them. More consumption of soft drink may cause obesity and may also cause osteoporosis in the future. It's better for the students to drink natural juice because natural juice is healthy more than the soft drinks.

The study concluded, significant relationship was observed between BMI for and monthly income, family size and mothers education ($p < 0.05$). The study recommends the introduction of the nutrition curricula in the schools to increase the students awareness about healthy foods.

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