



بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Shendi University

Faculty of Graduate Studies

And Scientific Research



**Assessment of Nutritional Status for Middle
Adolescent's through Anthropometrics
Measurement in Shendi Secondary School**

A thesis submitted for partial fulfillment of master degree
in pediatric nursing

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2016

ذَلِكَ



ذَلِكَ الَّذِي كَفَّرْنَا بِهِ عَنْ قَوْمِكَ مَا كُنْتَ لِيَّ بِمُؤْمِنٍ

قال الله تعالى:

{وَفِي الْأَرْضِ قِطْعٌ مُتَجَاوِرَاتٌ وَجَنَّاتٌ مِنْ أَعْنَابٍ وَزَرْعٌ

وَنَخِيلٌ صِنُونٌ وَغَيْرُ صِنُونٍ يُسْقَى بِمَاءٍ وَاحِدٍ وَنُفِضٌ

بَعْضُهَا عَلَى بَعْضٍ فِي الْأُكُلِ إِنَّ فِي ذَلِكَ لَآيَاتٍ لِقَوْمٍ

{يَعْقِلُونَ}

سورة الرعد، الآية (4)

Dedication

To whose helping to make me who I am , for teaching me to be proud of who I am , for showing me how to be strong , for giving me the courage not weak , and giving me the strength to always strive for better .

My mother and father

To my unique source of success, the person who always support me, encourage me, drive me to be a Better through my life .

Saddam Abdelrahman

To anyone who one inspire me and drew a smile on my face , those whom perfume my life with givens and happiness

Marmory , Rahamy and Hammody



Acknowledgement

I would like to express my gratitude to all those who gave me the possibility to complete this thesis

I Can't find satisfactory words to express my gratefulness to her for encouragement and patience . It is not easy for me to do this work in this form without the kind experienced and confident guidance my supervisor

Dr. : Iamyia Eltiab Alhadi

I would like to draw great thanks to all my college in faculty of nursing sciences - Shendi University

I would to thanks the staff in the two schools for giving me permission to commence this thesis and all students their participation in this study.

I want to thank them for all their help, support me in my research work.



Abstract

This descriptive cross sectional community base study was conducted in Kamel Ibraheem Model School for Girls and Abdullah Ibn Abbas School for Boys; to assess the nutritional status for middle adolescents through anthropometric measurement in the period extended from August to November 2016. The study involves eighty one respondents they were selected with stratified random sampling; the data was collected by structured questionnaire which composed of 25 questions and analyzed by SPSS a statistical methods.

The study showed that all respondents were knowledgeable about the important of nutritional elements during the adolescent period and majority of them (90%) knowledgeable about the nutrition; also more than half of study group were underweight, although the knowledge of study group distributed between Good and Fair knowledge about the important of nutritional elements during adolescents period. The study found that there are differences between both sex in nutritional status; in addition of that, there was significant relationship between BMI and age of studied group with (P value 0.05).

Finally, the study recommended that establishing right system diet for adolescents in school noshery and adopt the total responsibility of this system also supervise it regularly and design nutrition healthy unit at school with nutritionalist to follow the nutritional status of students.

ملخص البحث

أجريت هذه الدراسة الوصفية المقطعية في مدرسة كامل إبراهيم النموذجية للبنات ومدرسة عبد الله بن عباس للبنين لتقييم الحالة الغذائية للمراهقين _ في فترة المراهقة المتوسطة _ من خلال قياس الطول والوزن في الفترة الممتدة من أغسطس إلى نوفمبر 2016م.

شملت الدراسة عدد واحد وثمانون طالباً تم اختيارهم بالعينة الطبقية العشوائية، وتم جمع البيانات عن طريق الاستبيان الذي يتكون من خمس وعشرون سؤالاً، وتم تحليلها بواسطة برنامج الحزم الإحصائية للعلوم الاجتماعية والطرق الإحصائية اليدوية المبسطة، حيث أظهرت الدراسة أن جميع المشاركين كانوا على دراية حول أهمية العناصر الغذائية في فترة المراهقة، والغالبية العظمى منهم (90%) كانوا على علم بأن العناصر الغذائية تُقسّم إلى عناصر غذائية صغرى وكبرى. وبيّنت الدراسة أن أكثر من نصف عدد المشاركين كانوا ناقصي الوزن على الرغم من أن معظم مجتمع الدراسة تتوزع معرفتهم بين جيّد ومتوسط المعرفة عن أهمية العناصر الغذائية في فترة المراهقة. أيضاً أثبتت الدراسة وجود فروق غذائية بين الجنسين وأوضحت أن هناك علاقة ذات دلالة إحصائية بين مؤشر كتلة الجسم والعمر (قيمتها 0.05).

أوصت الدراسة بإنشاء نظام غذائي صحيح للمراهقين في مقصف المدرسة وتبني المسؤولية الكاملة لتطبيق هذا النظام ومراقبته بصورة منتظمة، وتصميم وحدة صحية غذائية في المدرسة في وجود خبير تغذية لمتابعة الحالة الغذائية للطلاب.

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List of abbreviations

Abbreviations	Meaning
IQ	Intelligence Quotient
Kg	Kilo-gram
RDA	Recommended Dietary Allowances
BMI	Body Mass Index
DNA	Dexoyribo Nucleic Acid
Kcal	Kilo-calorie
mJ	Milli Joule
CDC	Centers for Disease Control and prevention
AAP	American Academy of Pediatrics
NCMP	National Child Measurement Program
HSE	Health Survey for England
SPSS	Software Package Statistical Analysis

Introductions:-

Adolescents are tomorrow's adult population, and their health and well-being are crucial. Yet, interest in the health of adolescents is relatively recent, and a focus on their nutrition even more so. The term "adolescents", as defined by the World Health Organization (WHO), includes persons aged 10–19 years. Being in transition, adolescents may no longer benefit from the attention and care usually given to children, and may not obtain the protection associated with adulthood either. Adolescents make up roughly 20% of the total world population. Adolescents have an even higher demographic weight in developing countries, i.e. approximately 26% in Salvador, compared to 14% in USA. In 1995, there were 914 million adolescents living in the developing world, contributing 85% to their total number. Their number is expected to reach 1.13 billion by the year 2025⁽¹⁾.

Healthy Eating for Children require adequate amounts of a balanced variety of foods. These include fruits, vegetables, whole and enriched grains and cereals, milk and other dairy products, and meat, fish, poultry, and other protein products.' Fruits and vegetables are the primary sources of vitamins **A** and **C** and contain other nutrients such as B vitamins, trace minerals, and fiber.' Breads and cereals are excellent sources of B vitamins and, if enriched, iron. Whole-grain breads and cereals are also good sources of fiber. vitamin E, and trace elements such as magnesium⁽¹⁾.

Adolescent Nutritiona, dolescence is a period of transition from childhood to adulthood. It is also a period of biologic. physical, emotional, and cognitive change , teenagers want to be more independent, have an active lifestyle and find their identity⁽¹⁾.

Nutrition influences growth and development throughout infancy, childhood and adolescence. However, nutrient needs are greatest during adolescence. Many adolescents are in school, which provides an effective and efficient opportunity for large portions of the population beyond the students themselves to be reached, including school personnel, families and community members Overall, nutritional status is better assessed with anthropometry in adolescence, as well as at other stages of the life cycle⁽²⁾.

Anthropometry is the single most inexpensive, noninvasive and universally applicable method of assessing body composition, size and proportion , body mass index (BMI) has been recommended for use as a screening tool for overweight, obesity and thinness in adults and adolescents. However, only a few studies in Nigeria have studied sex differences with respect to the level of under nutrition in adolescent boys and girls , body Mass Index is determined by dividing the person's weight in kilograms by their height in meters squared: The formula for BMI is: $BMI = \text{weight (Kg)}/\text{height (meters)}^2$ ⁽³⁾ .

Rational:-

The nutrition influence in growth and development through infancy and adolescent , the adolescent its most important period can affected on person future , Adolescents are tomorrow's adult population, and their health and well-being are crucial. Yet, interest in the health of adolescents is relatively recent, and a focus on their nutrition even more so, the adolescent represent the window of opportunity in which to prepare nutritionally for healthy adult life⁽¹⁾.

Growth during adolescence is faster than at any other time in an individual's life except the first year. Good nutrition during adolescence is critical to cover the deficits suffered during childhood and should include nutrients required to meet the demands of physical and cognitive growth and development, provide adequate stores of energy for illnesses and pregnancy, and prevent adult onset of nutrition-related diseases.

The adolescent period is very important and complex period in the person life because during the time occur the most important change in the body composition particularly during the puberty (middle adolescent). Therefore, the researcher need to assess nutritional status during this period.

Objectives

General objective:-

Assessment of nutritional status for middle adolescent's through anthropometrics measurement

Specific objective:

- To identify adolescent's knowledge about elements of nutrition
- To identify eating behavior of adolescent's
- To determine gender differentiation in nutrition status
- To assess nutritional status through anthropometrics measurement

Literature Review

2.1 Definition of Adolescence:-

Adolescence is a period of rapid growth and maturation in human development, and that extra nutrients are needed to support their growth spurt healthy eating patterns in childhood and adolescence Promote optimal childhood health, growth, and intellectual development, as well as prevent health problems later in adulthood and old age WHO defines adolescence as the segment of life between the ages of 10-19 years ⁽¹⁾.

Adolescent comes from the Latin word meaning “to come to maturity,” a fitting description of this stage of life. The adolescent is maturing physically and emotionally, growing from childhood toward adulthood, and seeking to understand what it means to be grown up. Adolescence spans the ages of about 13 to 18 years. Some males do not complete adolescence until they are 20 years old ⁽²⁾.

2.2 Adolescence can be divided into three stages:-

- Early adolescence (11-13 years of age) is characterized by the onset of puberty and increased cognitive development.
- Middle adolescence (14-18 years of age) is characterized by increased independence and experimentation.
- Late adolescence (19-21 years of age) is a time for making important personal and occupational decisions ⁽²⁾.

The phenomenal growth that occurs during adolescence is second only to the growth that occurs during the first year of life, and it increases the body’s demand for energy and nutrients. Nutrition needs are greater during adolescence than at any other time in the life cycle. During this period, adolescents achieve the final 15 to 20 percent of their adult height, gain 50 percent of their adult body weight, and accumulate up to 40 percent of their adult skeletal mass ⁽³⁾.

If adolescents are well nourished, they can make optimal use of their skills, talents and energies today, and be healthy and responsible citizens and parents of healthy babies tomorrow. In adolescence, a second period of rapid growth may serve as a window of opportunity for compensating for early childhood growth

failure; although the potential for significant catch-up is limited Adolescence is considered as a nutritionally critical period of life for several reasons ⁽²⁾.

- Firstly, the dramatic increase in physical growth and development puts greater pressure on the need for nutrients. During this period, adolescents will experience a weight gain equivalent to 65% of their weight at the beginning of the period or 40% of their final weight, and a height gain equivalent to 15% of their adult height ⁽²⁾.
- Secondly, there may be socio-cultural factors or change of lifestyle and food habits of adolescents that can affect both nutrient intake and needs.
- Thirdly, growing adolescents have increased nutrient requirements during pregnancy and illness.
- Fourth, adolescence can be the second opportunity to catch up growth if environmental conditions, especially in terms of nutrient intake are favorable.
- Finally, psychological changes and development of their own personality can impact on their dietary habits during a phase when they are very influence-able ⁽²⁾.

2.3 Adolescent growth and development:-

Changes in Weight and Body Composition Approximately half of adult ideal body weight is gained during adolescence. Peak weight gain follows the linear growth spurt by 3 to 6 months in females and by approximately 3 months in males. Girls will gain approximately 18.3 lb (8.3 kg) per year during peak rates of weight gain, (12.5 years of age on average).

Average weight gains during puberty among females are between 15-55 lb (7-25 kg), with a mean gain of 38.5 lb (17.5 kg). Weight gain slows around the time of menarche, but will continue into late adolescence. Adolescent females may gain as much as 14 lb (6.3 kg) during the latter half of adolescence ⁽²⁾.

Adolescent males gain an average of 20 lb (9 kg) per year during puberty. Overall, male teens gain 15-65 lb (7-30 kg) during puberty, with a mean gain of 52.2 lb (23.7 kg). Body fat levels decrease among males during adolescence, dropping to an average of 12% body fat by the end of puberty. Body composition changes more significantly among females during puberty. The average lean body

mass of teen females falls from 80%-74% while average body fat levels increase from 16%-27% by the end of adolescence. Females experience a 120% increase in body fat during puberty. On average, teen females acquire approximately 2.5 lb (1.14 kg) of body fat mass each year during puberty ⁽²⁾.

2.3.1 Food is that which nourishes the body. Food may also be defined as anything eaten or drunk which meets the needs for energy, building, regulation and protection of the body. In short, food is the raw material from which our bodies are made. Intake of the right kinds and amounts of food can ensure good nutrition and health, which may be evident in our appearance, efficiency and emotional well-being ⁽⁴⁾.

2.3.1 Nutrition has been defined as food at work in the body ⁽⁵⁾.

Nutrition includes everything that happens to food from the time it is eaten until it is used for various functions in the body ⁽⁶⁾.

Nutrients are components of food that are needed by the body in adequate amounts in order to grow, reproduce and lead a normal, healthy life ⁽⁷⁾.

Nutrients include water, proteins, fats, carbohydrates, minerals and vitamins. There are several nutrients in each of the groups: proteins, fats, carbohydrates, minerals and vitamins; hence the plural form of these words has been used. Thus there are over 40 essential nutrients supplied by food. Sugar, butter, oils, etc. These different foods are made up of a number of chemical components called **nutrients** These are classified according to their chemical composition ⁽⁸⁾.

2.3.3 Nutritional care is the use of nutritional knowledge in planning meals and the preparation of these meals in an acceptable and attractive manner to feed people. It involves assessment of the existing meal patterns and improving these in an acceptable manner. Nutrition science came into being because of the discoveries of the roles of certain nutrients in disease development ⁽⁹⁾.

2.3.4 Carbohydrates: Starch found in cereals and sugar in sugarcane and fruits are examples of carbohydrates in foods. The chief function of carbohydrates is to provide energy needed by our body. Those not used immediately for this purpose are stored as glycogen or converted to fat and stored, to be mobilized for energy supply when needed ⁽⁹⁾.

2.3.5 Fats: Oils found in seeds, butter from milk, and lard from meat, are examples of fats found in foods. Fats are concentrated sources of energy, carriers of fat soluble vitamins and a source of essential fatty acids. If excess fats are taken in the diet, these are stored as fat reserves in the body. Energy taken in excess of body needs, is stored as fat in the body⁽⁹⁾.

2.3.6 Proteins: Casein from milk, albumin in egg, globulins in legumes and gluten in wheat, are examples of proteins occurring in foods. The main function of protein is the building of new tissues and maintaining and repair of those already built. Synthesis of regulatory and protective substances such as enzymes, hormones and antibodies is also a function of food proteins. About 10 per cent of the total energy is supplied by proteins in the diet. Protein, when taken in excess of the body's need, is converted to carbohydrates and fats and is stored in the body⁽⁹⁾.

2.3.7 Minerals: The minerals calcium, phosphorus, iron, iodine, sodium, potassium and others are found in various foods in combination with organic and inorganic compounds. Minerals are necessary for body-building, for building of bones, teeth and structural parts of soft tissues. They also play a role in regulation of processes in the body, e.g., muscle contraction, clotting of blood, nerve stimuli, etc⁽¹⁰⁾.

2.3.8 Vitamins: Fat-soluble vitamins A, D, E and K and also water-soluble vitamins C and B group are found in foods. These are needed for growth, normal function of the body and normal body processes⁽¹⁰⁾.

2.4 The Nutritional Needs of Boys and Girls the:-

Nutrient needs parallel the rate of growth, with the greatest demands occurring during the peak period of growth (sexual maturity rating [SMR] 2 to 3 in females and 3 to 4 in males). For females, most physical growth is completed by about 2 years after menarche. (The mean age of menarche is 121 /2years.) Males begin puberty about 2 years later than females, and they typically experience their major growth spurt and increase in muscle mass during middle adolescence. Nutrition and physical activity are major determinants of adolescents' energy levels and influence growth and body composition. Inadequate nutrition can delay sexual maturation, slow or stop linear growth, and compromise peak bone mass. Practicing healthy eating behaviours and participating in regular physical activity

can help adolescents achieve normal body weight and body composition thereby reducing their risk of obesity^(11,13).

The nutritional needs of males and females of the same age differ little in childhood but diverge after the onset of the pubertal growth spurt. After puberty, the differences in nutrient needs persist. The reason for the sex differences in nutrient recommendations after the age of 10 include earlier maturation of females (protein requirements of 11-14 year old girls are higher than the boys of the same age group but are much less for 15- 18 year old girls as compared to their male counterparts), and variations in physiological needs for some nutrients by sex e.g., difference in the requirement of iron. Besides differences in height and weight, boys gain proportionately more muscle mass than fat as compared to girls. They experience increased linear growth to produce a heavier skeleton and develop greater red blood cell mass than girls. Girls on the other hand have more fat than muscle tissues. These differences in body composition have important implications for nutritional needs of male and female adolescents⁽⁴⁾.

2.5 Recommended dietary allowances (RDA) for selected nutrients during adolescence :-

2.5.1 Energy and Protein Requirements:

Adolescence is an important time for gains in height as well as weight. While both muscle and fat increase, girls gain relatively more fat, and boys gain relatively more muscle. Thus, the requirement of energy as well as proteins increases considerably during this period. Energy and protein needs correlate more closely with the growth pattern than with the chronological age the peak in energy and protein requirements coincides with the peak in growth of adolescents. Actual needs also vary with physical activity. Therefore, monitoring weight and height and body mass index [BMI (weight/height²)] is essential to determine the adequacy of energy intake for individual adolescents. Generally, the requirement of protein is met even in economically disadvantaged populations if caloric intake is sufficient. However, if energy intake is limited, dietary protein may be used to meet energy needs and be unavailable for synthesis of new tissues or for tissue repair. This may result in reduction of growth rate and muscle mass despite an apparent adequate protein intake⁽¹⁾.

2.5.2 Mineral and Micronutrient Requirements:-

Minerals play a crucial role in adolescent nutrition. Adolescents, at the peak of their growth velocity, require large quantities of nutrients. The increment in skeletal mass, body size and body density, associated with pubescence, highlights the role of minerals in the growth process (Daniel,

1977). The role of iron, calcium, iodine and zinc in the growth and nutrition of adolescents is explained briefly below ⁽¹⁰⁾.

2.5.3 Iron requirements:-

Iron requirements peak during adolescence due to rapid growth with sharp increase in lean body mass, blood volume and red cell mass which increases iron needs for myoglobin in muscles and hemoglobin in blood (Beard, approximately 10 to 15 mg/day. After the growth spurt and sexual maturation, there is a rapid decrease in growth spurt and need for iron. As a result, there is an opportunity to recover from an iron deficiency that might have developed during this peak growth. In girls, however, the growth spurt is not as great, but menstruation typically starts about one year after peak growth and some iron is lost during menstruation. The mean requirement for iron reaches a maximum of approximately 15 mg/day at peak growth but settles to approximately 13 to 15 mg/day because of the need to replace menstrual iron losses, other benefits of iron for adolescents: Iron helps in improving cognition which leads to better academic performance that may be an incentive for girls to remain in school ⁽¹⁰⁾.

2.5.4 Calcium requirements:-

Dietary calcium has been identified as a nutrient of great potential concern for adolescent; the adolescent years are a window of opportunity to influence lifelong bone health. Because of the accelerated muscular, skeletal and endocrine development, calcium needs are greater during puberty and adolescence than in any other population age group except pregnant women, at the peak of the growth spurt, the daily deposition of calcium can be twice that of the average between 10 to 20 years. In fact, 45% of the skeletal mass is added during adolescence. By the end of the second decade of life, 90-95% of the total body peak bone mass is attained Bone mineral content must be maximized during puberty to prevent

osteoporosis (risk of fracture in later life) . Low calcium intake in early life may account for as much as 50% of the difference in hip fracture rates in postmenopausal years Consumption of calcium rich products with every meal goes a long way towards ensuring that requirements are met for calcium and many other nutrients e.g., phosphorus, magnesium and vitamin D needed for bone health⁽¹⁰⁾ .

2.5.5 Zinc requirements:-

Is cofactor for over 100 enzymes, important transcription factors for DNA. Tissue concentrations of zinc are highest in the choroid of the eye, the prostate and in semen. The first recognized human deficiency disease was adolescent growth retardation and hypogonadism Zinc is known to be essential for growth and sexual maturation during puberty. It enhances bone formation and inhibits bone loss. Limited intake of zinc-containing foods may affect physical growth as well as development of secondary sex characteristics; their mainly vegetable diet was hindered by phytate in unleavened bread⁽¹⁰⁾ .

2.5.6 Iodine requirements:-

Iodine is important during adolescence for two reasons. These are the high growth velocity of adolescents and the increased iodine requirements during pregnancy. As a large percentage of adolescent girls get married early and bear children during adolescence, their requirements for iodine increase to provide for their own growth as well as for the needs of the fetus. Severe iodine deficiency in children results in learning disability and lowered achievement, In fact, even moderate Iodine deficiency can lead to loss of 10-13 IQ points. Iodine deficiency during pregnancy has been associated with increased incidence of miscarriages, still births, birth defects and mental retardation, and if severe, may result in cretinism in the offspring⁽¹⁰⁾ .

2.5.7 Other minerals:-

Although the roles of other minerals in the nutrition of adolescents have not been studied extensively, the importance of magnesium, phosphorus, copper, chromium, cobalt and fluoride is well recognized. The possibility of interactions among these nutrients cannot be overlooked⁽¹⁰⁾ .

2.5.8 Vitamins:-

Vitamins are:

Organic substances or groups of related substances, found in some foods, substances with specific biochemical functions in the human body, not made in the body (or not in sufficient quantity), required in very small amounts ⁽¹⁰⁾.

The requirements for vitamins are also increased during adolescence. Because of higher energy demands, more thiamine, riboflavin and niacin are necessary for the release of energy from carbohydrates. The increased rate of growth and sexual maturation increases the demand for folic acid and vitamin B-12, With increasing evidence of the role of folic acid in the prevention of birth defects, all adolescent girls of childbearing age should be encouraged to consume the recommended amount of folic acid from supplements in addition to intake of food folate from varied die. The Center for Disease Control and Prevention recommend 400 ìg of folate for all females of childbearing age. The rapid rate of skeletal growth demands more vitamin D. Vitamins A, C, and E are needed in increased amount for new cell growth. Adolescents' vitamin needs are also associated with the degree of maturity rather than chronological age because of demands of growth ⁽¹⁰⁾.

2.5.9 Estimated Daily Calorie and Protein Needs for Adolescents:-

Sex	Age	Calories (kcal/day)	Protein (g/day)
Males	12-16	17.1	0.34
Females	12-16	14	0.29

2.6 Eating behaviour:-

Experimentation and idealism are common during middle adolescence. Adolescents may adopt certain eating behaviours (e.g., vegetarianism) to explore various lifestyles or to show concern for the environment. Adolescents are usually interested in new foods, including those from different cultures and ethnic groups Adolescents may try fad diets—and underestimate the health risks associated with them. The social pressure to be thin and the stigma of obesity can lead to unhealthy

eating behaviours and a poor body image. Health professionals can help adolescents practice healthy eating behaviours, participate in regular physical activity, and develop a positive body image. Adolescents spend a lot of time with their friends, and peer influence and group conformity are important. They may eat certain foods to demonstrate loyalty to their friends. As adolescents strive for independence, they begin to spend more time away from home and thus eat more meals and snacks away from home. Although parents cannot control what their adolescents eat when they are away from home, they can make sure that healthy foods are available at home. Many adolescents walk or drive to neighborhood stores and fast-food restaurants and purchase foods with their own money. Snacks and fast foods can be high in fat and calories, and their consumption should be limited. Parents can be positive role models by practicing healthy eating behaviours themselves. In addition, parents need to provide guidance to help adolescents make healthy food choices away from home; adolescent eating is conceptualized as a function of individual and environmental influences. Four levels of influence are described: Individual or intrapersonal [psychosocial, biological]; social environmental or interpersonal [e.g., family and peer]; physical environmental or community settings [e.g., schools, fast food outlets] and macro system or societal ⁽³⁾.

Several facets of eating behaviour are different or more pronounced in adolescents than in other people and each may cause concern in the older generation ⁽³⁾.

- **Missing meals**, Skips breakfast (20%) Skips lunch (22%)
- **Eating snacks** and confectionery. The major snack is usually in the afternoon, after school. Snacks tend to be high in “empty calories”—fat, sugar, and alcohol—but some provide calcium (for example milk) or vitamin C ⁽³⁾.
- **“Fast”, take-away, or carry-out foods**. These provide some nutritious portions, but adolescents may not choose balanced meals from what is offered. There is not enough accessible information about the nutrient composition of fast foods ⁽³⁾.
- **Unconventional meals** may be eaten in combinations and permutations that other members of the family do not approve of, but they often add up to an adequate nutritional mix ⁽³⁾.

• **High energy intakes.** Derives over 30% of calories from fat many adolescents go through a phase of eating much more than adults, sometimes up to 16.7 MJ per day (4000 kcal). This seems to occur near the age of peak height velocity in girls (around 12 years), but in boys may come later than the age of peak height velocity (usually 14 years). Presumably the larger, more muscular male, adolescent is expending more energy at this stage. , Low levels of some nutrients. Iron deficiency is quite common in adolescent girls who are menstruating, still growing, and often restricting their food intake. It may sometimes occur in boys too. Calcium accretion in the skeleton can be as much as 100 g/year at peak height velocity. Around 20% is absorbed so that about 500 grams per year are needed in the diet—that is, 1370 mg/day adolescent dieters. There are two aspects to this: overweight/obesity and social dieting. Obese adolescents are usually inactive and tend to have low socio-economic status. Dietary management should aim to hold the weight constant while the young person continues to grow and so thins out. Increased exercise should be emphasized and anorectic drugs should not be used⁽⁷⁾.

Partnerships among health professionals, families, and communities are integral to developing nutrition and physical activity programs Schools can play a significant role in promoting healthy eating behaviours among adolescents School cafeterias can reinforce what is taught in the classroom by providing healthy foods, Puberty by its very nature, is associated with weight gain, and many adolescents experience dissatisfaction with their changing bodies. In a culture that glorifies being thin, some adolescents mostly girl become overly preoccupied with their physical appearance and, in an effort to achieve or maintain a thin body, begin to diet obsessively⁽³⁾.

2.7 Nutritional assessment:-

Anthropometrics measurement is very important tools for nutritional assessment during adolescents because it allows the monitoring and evaluation of hormones – mediated change in growth and maturation during this period , also the growth sensitive to nutritional deficit and surfeit Nutritional assessment in children has special significance because under-nutrition is the single most important cause of growth retardation Assessment of the nutritional status of populations as well as individuals occurs at several levels, overall assessment examines birth and death statistics, life span, family size, economic factors, food

distribution, food handling and preservation, and food disappearance from the marketplace. An individual assessment requires a careful analysis of the foods consumed concomitant with whole-body assessment and then a functional, physiological, and biochemical assessment of organs and tissues. This type of nutritional assessment can be quite detailed and very expensive. Except under research conditions where very specific questions are being addressed, this detailed assessment is usually not needed. Assessment of body size and composition can provide, from an anthropometric point of view, information on an individual's health status. Measurements of height, weight, bone density, fat mass, and muscle mass indicate whether the energy and protein needs are being met. Normal growth and development do not occur when macronutrient intake is inadequate ⁽¹⁸⁾.

2.7.1 Anthropometry is the measurement of physical dimensions of the human body at different ages. Comparison with standard references for age and sex helps determine abnormalities in growth and development that may have resulted from nutrient deficiencies or excesses.

Revised standards are expected to be available soon. Repeated measurements of an individual over time provide objective data on nutrition, health, and well-being. Body weight is a reproducible growth parameter and a good index of acute and chronic nutritional status. An accurate age, sex and reference standard is necessary for evaluation. Weight is evaluated in three ways: weight for age, weight for height and body mass index (**BMI**) Interpretation. Weight below the 10th percentile or above the 90th percentile may indicate weight deficit or excess, respectively. Weight can be calculated as a percentage of standard weight (the 50th percentile for age and sex) ⁽¹⁸⁾.

$$\text{standard} = \frac{\text{actual weight}}{\text{standard weight}} \times 100$$

- >120% standard = excess
- 80 to 90% standard = marginal deficiency
- 60 to 80% standard = moderate deficiency
- < 60% standard = severe deficiency

2.7.2 Length Measured with appropriate equipment and technique, length is a simple and reproducible growth parameter that provides, in conjunction

with weight, significant information, **Interpretation.** Length for age below the 5th percentile indicates a severe deficit, and measurements that range between the 5th and 10th percentiles should be ⁽¹⁹⁾.

2.7.3 Body Mass Index:-

Body mass index is determined by dividing the person's weight in kilograms by their height in meters squared.!!

The formula for BMI is:

$$BMI = \frac{\text{weight (kg)}}{\text{height}^2 \text{ (meters)}} \times 100$$

Body Mass Index Measurement in Schools as the United States continues to search for answers to the growing problem of obesity among children and adolescents, much attention has focused on body mass index (BMI) measurement programs in schools. The BMI is the ratio of weight to height squared. It is often used to assess weight status because it is relatively easy to measure and it correlates with body fat for obesity. A BMI at the 95th percentile may range from 18 to 30 depending on the age and sex of the child. In 2005, the Institute of Medicine called on the federal government to develop guidance for BMI measurement programs in schools. With guidance from an expert panel, the Centers for Disease Control and Prevention (CDC) developed a report to help inform decision-making on school-based BMI measurement programs. Little is known about the outcomes of BMI measurement programs, including effects on weight-related knowledge, attitudes, and behaviours of youth and their families. American Academy of Pediatrics (AAP) recommends that BMI should be calculated and plotted annually on all youth as part of normal health supervision within the child's medical home. The Institute of Medicine recommends annual school-based screening ⁽²⁰⁾.

2.7.4 BMI for Children and Teens:-

BMI is used as a screening tool to identify possible weight problems for children. For children and teens, BMI is age and gender-specific and is often referred to as “BMI-for-age.” BMI is calculated using the same method as adults, but is expressed, not as an absolute value, but as a percentile which can be obtained from either a graph or a percentile calculator. These percentiles express a child’s BMI relative to other children of the same gender and age ⁽²⁰⁾.

BMI	Weight Status
Below 18.5	Underweight
18.5 – 24.9	Normal
25.0 – 29.9	Overweight
30.0 and Above	Obese

The Weight Status Category for the calculated BMI-for-age percentile

2.7.5 Some issues to consider when using BMI for children and adolescents:-

The concerns associated with using BMI for adults also apply to children and adolescents. Other factors, including height and level of sexual maturation, influence the relationship between BMI and body fat among children as well. In addition, the accuracy of BMI varies substantially according to the individual child’s degree of body fatness. Among obese children (or a BMI-for-age greater than or equal to the 95th percentile), BMI is a good indicator of excess body fat. However, among overweight children (or a BMI-for-age between the 85th and 94th percentiles), elevated BMI levels can be a result of increased levels of either fat or fat-free mass. Similarly, among relatively thin children, differences in BMI are often due to differences in fat-free mass ⁽⁶⁾.

2.7.6 The different BMI levels for children and adolescents be interpreted:-

BMI is calculated the same way for adults and children, but the results are interpreted differently. For adults, BMI classifications do not depend on age or sex. For children and adolescents between 2 and 20 years old, BMI is interpreted relative to a child's age and sex, because the amount of body fat changes with age and varies by sex.

Percentiles specific to age and sex classify underweight, healthy weight, overweight, and obesity in children. The BMI-for-age determined for an individual indicates the relative position of the child's BMI value among children of the same sex and age. BMI for-age categories and corresponding percentiles are standardized⁽⁵⁾.

Percentile Ranking	Weight Status
Less than 5 th percentile	Underweight
5 th percentile to less than 85 th percentile	Healthy weight
85 th percentile to less than 95 th percentile	Overweight
Equal to or greater than the 95 th percentile	Obese

Easily reproducible protocols should be used for measuring height and weight, so that inaccuracies and inconsistencies are minimized. ethical considerations should also be taken into account, particularly when weighing and measuring children. The National Child Measurement Program (**NCMP**) and the Health Survey for England (**HSE**) have established basic standards for these procedures, including using standardized weighing and measuring equipment and ensuring consistent posture and head positioning of participants when measuring height⁽²⁰⁾.

Material and Methods

Study design:-

The study was descriptive cross-sectional school community based study conducted to assess nutritional status of middle adolescent's through anthropometrics measurement in period extended from August to November 2016.

Study area:-

The study was conducted in Shendi town which is located in 172km to Khartoum city Shendi locality is one of the localities of the River Nile State. It is bounded by Khartoum state to the south, El-ddamer locality to the north, River Nile to the west and Kassala state to the east. Culturally the population of Shendi is a mixture of the various cultures that occur in Sudan though the Northern tribes, particularly ElGaalien, are predominant. About 60% of the population is rated as 'poor'. The literacy rate is high in the towns. Basic Education consist of (30) primary schools. Secondary Education consist of (8) secondary schools (three for girls and five for boys) .

Setting:-

Two schools were selected as setting for study, Kamel Ibrahim model school for girls and Abdullah Ibn Abbas School for boys.

Kamel Ibrahim school which is established in 1993. It was graduated about twenty batches, now the total number of students is 322 students. It has 7 class, 22 teachers, 4 office and school noshery, Abdullah bin Abbas which is established since 1964. The total number of students is 128. It has 16 teachers, 6 classes and 4 offices.

Study population:-

The study population are secondary school students the targeting age (14-18) years for boys and (12-16) years for girls.

Exclusion criteria:

- All students their age range from (less than 14 to above 18) for boys, (less than 12 to above 16) for girls were excluded from this sample.

Sample Size and Sampling technique:-

The sample size was calculated using software Known as the survey system available at <http://www.raosoft.com/samplesize.html>. The system inertly relies on this equation:

Sample size:-

$$\text{Sample size } (n) = \frac{Z^2 \times pq}{d^2}$$

Where:

n = the sample size

Z = the standard normal deviate, usually set at 1.96, which corresponds to the level of the 70% confidence level.

P = the proportion of target population

d = absolute precision required on either side of the proportion

p = q = 0.5

The sample size was calculated to be 81 from (325) students.

Sampling technique:-

The sample was distributed proportionally to the study population and according to total population in their both school as follows:

No	Administrative unit	Population	Percentage	Sample size
1-	First level kamel school	122	38%	30
2-	First level Abdullah school	56	17%	16
3-	Second level kamel school	102	31%	25
4-	Second level Abdullah school	45	14%	10
Total		325	100%	81

Data collection tools:-

The data was collected by two tools, first closed ended questionnaire, the questions was designed by researcher based on reviewing of literature, were consist of three section and second BMI equation:

The first section:-

It contain ten questions (1-10) were designed to collected socio demographic data.

The second section:-

It contains ten questions (11-21) were designed to collected data about knowledge of adolescents regarding the elements of nutrition.

The third section:-

It contains four questions (22-25) were designed to collected data about the eating behaviour.

Body Mass Index (BMI):-

Body mass index is determined by dividing the respondent weight in kilograms by their height in meters squared.

The formula for BMI is:

$$BMI = \frac{\text{weight (kg)}}{\text{height}^2 \text{ (meters)}} \times 100$$

After the respondents were finishing from the questionnaire (expect weight and height) , then the researcher measured the height and weight of each one by used portable calibrated weight scale , placed on hard floor horizontal position in centre scale then zeroing the scale and taught the respondent removed the shoes ,empty the pockets and not move until weight measured , after that the height measured by using tap, put them in horizontal position , measure without shoes and the back ,head , shoulder blades , buttocks and heels were touching the wall ,also the feet straight ahead then the height was measured , and wrote it in their questionnaire , after that the researcher calculate the body mass index (BMI) by affinity soft BMI calculator 1.0 program then the BMI was classified to three categories (Normal , Under and Over weight) .

Percentile Ranking	Weight Status
Less than 5 th percentile	Underweight
5 th percentile to less than 85 th percentile	Healthy weight
85 th percentile to less than 95 th percentile	Overweight
Equal to or greater than the 95 th percentile	Obese

Scoring system:-

Scoring system was established by researcher which the data was distributed in four categories to measure the level of adolescent's knowledge about **elements of nutrition**: if the adolescents respond to (4-3 choice it consider good knowledgeable), (2-1 choices consider fair knowledgeable); (1 choice consider poor knowledge) and (0 choices it consider not knowledgeable).

Data collection technique:-

In this study the data was collected in three week, the questionnaire was distributed to the study group after explanation of their items and the researcher let them to choose the items according to their knowledge.

Data analysis technique:-

After the data collected it coded and transferred into specially designed forms so as to be suitable for computer finding using soft program the statistical package for social sciences (SPSS version 23) following data entry , checking and verification process were carried out to avoid any errors during the data entry tabulated in tables using frequencies and percentage. And was used for statistical analysis Chi-square for qualitative data. For all tests, the significance level will be set at $p < 0.05$, also used the affinity soft BMI calculator 1.0 for obtain the BMI to the study group, also manual analysis used to obtain the level of knowledge of study group for good, fair and poor knowledge the researcher summation the totality of frequent of them then divided the total of frequency in each Colum and on the summation of them.

Ethical consideration:-

The permission has been approved by ethical committee of research in the faculty of graduate and scientific research, the committee reference number 21 / 8 / 2016 the a written permission was supporting littler from original director to each two schools and the permission was taken from the head school of two schools . The purpose of the study was explained verbally and clearly in simple Arabic language to the adolescents and their Autonomy and dignity is kept during the measurement , all the findings were kept in secret and not be to transferred to any body without his permission, to keep the privacy of the participant. The names and address of the participants was not recorded in the questionnaire, the overall data were collected after full informed and then verbal consent has been taken from each one and they told they have right to withdrawal from this study when she/he need .

Results

This Result Was Presented Into The Following Sequences:-

Section I: Distribution of study group according to sociodemographic data.

Section II: Knowledge of study group regarding the important elements of nutrition during the adolescent's period.

Section III: Comparison of both sex in nutritional status and behavioural eating.

Section IV: Figure four presented of study group in relation to number of meals during the day.

Table No. (1): Distribution of study group in relation of their parent's education.

N=81

Level of education	father		mother	
	Frequency	Percentage	Frequency	Percentage
Illiterate	3	4%	4	5%
Primary	13	16%	18	22%
Secondary	36	44%	29	36%
University	15	18%	18	22%
post graduate	14	17%	12	15%
Total	81	100%	81	100%

This table showed that (44%, 36%) for their father's and mother's occupation were moderate level, and (17%, 15%) in higher level of education.

Table No. (2): Distribution of study group regarding their parent's occupation:

N=81

Occupation	Father				Mother				
	Retired	Worker	Employee	Free work	Total	Housewife	Worker	Employee	Total
Frequency	6	9	27	39	81	52	10	19	81
Percentage	8%	11%	33%	48%	100%	64%	12%	24%	100%

This table showed that near to half (48%) of study group their fathers occupation free work and near to two third their mothers occupation were house wife.

Table No. (3): Distribution of study group in relation to their family member and positioning in their family.

N=81

	The number of family member			
	3-6	7-10	More than 11	Total
Frequency	33	35	13	81
Percentage	41%	43%	16%	100%
	The positioning in their family			
	First	Middle	Last	Total
Frequency	24	38	19	81
Percentage	29%	47%	24%	100%

This table illustrated that 47% of study group in middle position and less than half of them had 7-10 members.

Table No. (4): Distribution of study group in relation to (food, prefer, regularity of meal, method of taking meal).

n=81

	Item	Frequency	Percentage
What the frequent types of food eating during day	Carbohydrates	34	42%
	Proteins	34	42%
	Fats	7	9%
	Minerals	6	7%
	Total	81	100%
Daily meals regularly	Always	14	17%
	Sometimes	52	64%
	never	15	19%
	Total	81	100%
The most method favorite for food preparing	House food	42	52%
	School noshery	27	33%
	Manufactured foods	12	15%
	Total	81	100%

This table showed that more than two third (68%) of study group prefer Carbohydrates and Proteins in their meals during day, near to two third of them (64%) not taken their meals regularly, 15% of them taken manufactured foods.

Table No. (5): Distribution of study group in relation to their knowledge about elements of nutrition:

N=81

Items	knowledge of adolescents about the elements of nutrition elements					
	Good		Fair		Poor	
	Frequent	Percent	Frequent	Percent	Frequent	Percent
Nutrition	40	49 %	22	27 %	19	24 %
Classification	33	41 %	14	17 %	34	42 %
Carbohydrate	33	40 %	20	25 %	28	35 %
Proteins	47	58 %	18	22 %	16	20 %
Fats	38	47 %	22	27 %	21	26 %
Minerals	37	46 %	22	27 %	22	27 %
Calcium	46	44 %	26	32 %	19	24 %
Iron	23	28 %	20	25 %	38	47 %
Vitamins	16	20 %	33	40 %	32	40 %
	42.3%		31%		26.7%	

This table clarified that more than two third (73.3%) of study group their knowledge about the nutrition elements distributed between good and Fair knowledge (Good 42.3%, Fair 31%).

Table No. (6): Distribution of study group in relation to their body mass index (BMI) for both sex.

N= 81

BMI	Boy		Girl	
	Frequent	Percent	Frequent	Percent
Under weight	15	55.6%	29	52.7%
Normal weight	11	40.7%	22	40%
Over weight	1	3.7%	3	5.5%

This table showed that more than half of study group (boys/girls) were under weight, and few of them were overweight.

Table No. (7) : Distribution of study group relation to their knowledge about classification of nutrition.

N=81

Classification of Nutrition	Frequency	Percentage
Micronutrient and macronutrient	72	89%
I don't k know	9	11%
Total	81	100%

This table explained that majority of study group (89%) knowledgeable about the nutrition classification and few of them (11%) not knowledgeable of nutrition classification.

Table No. (8): correlation between the level education of parents and BMI

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	15.365 ^a	8	.005
Likelihood Ratio	15.906	8	SIG=0.05 =0.05(LEVEL SG) THEN THE RUS IS SIG
Linear-by-Linear Association	1.204	1	
N of Valid Cases	81		

This table showed that significance relation between the level education of parents and BMI

Table No. (9): correlation between the number of meals and BMI

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.181 ^a	4	0.881
Likelihood Ratio	1.193	4	0.879
Linear-by-Linear Association	0.469	1	0.494
N of Valid Cases	81		

This table showed that no significance relation between the number of meals and BMI

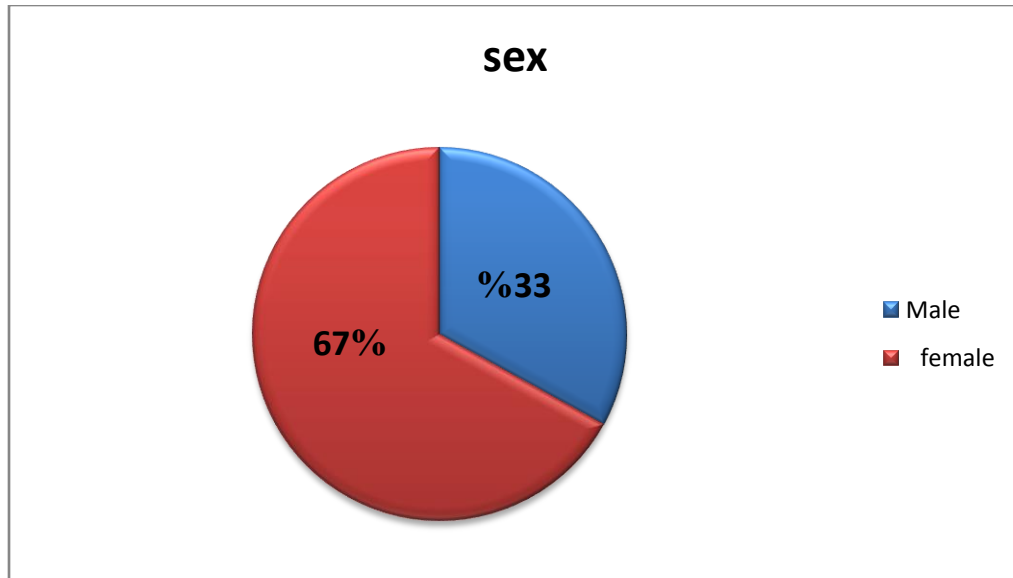


Figure No. (1): Represent that 67% of study group were female and 33% were male.

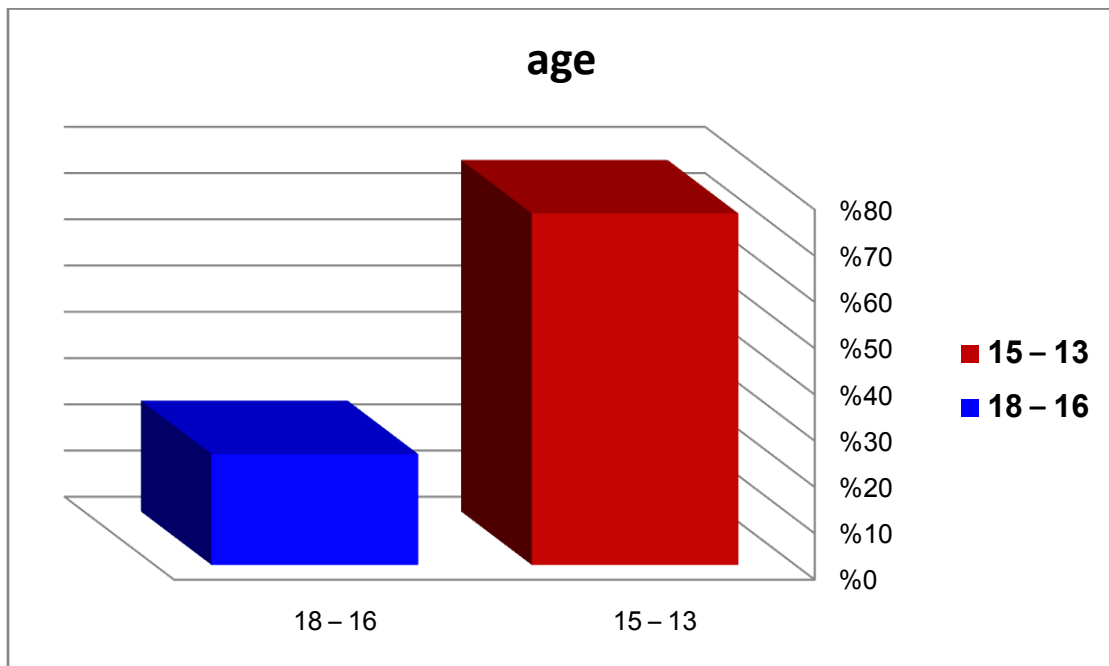


Figure No. (2): Showed that 76% of study group their age ranged between 13-15 years while 24% their age ranged between 16-18 years.

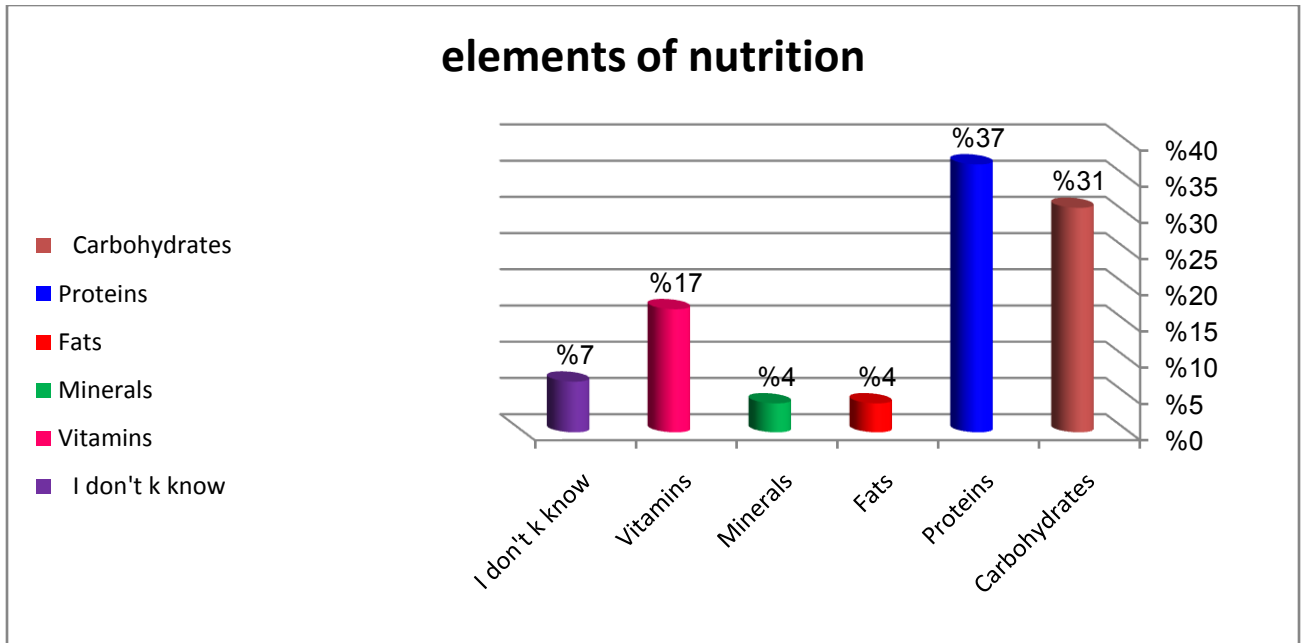


Figure No. (3): Represented that most of study group were knowledgeable about the important element of nutrition during the adolescent period as priorities (proteins 37%, carbohydrates 31%, and vitamins 17%).

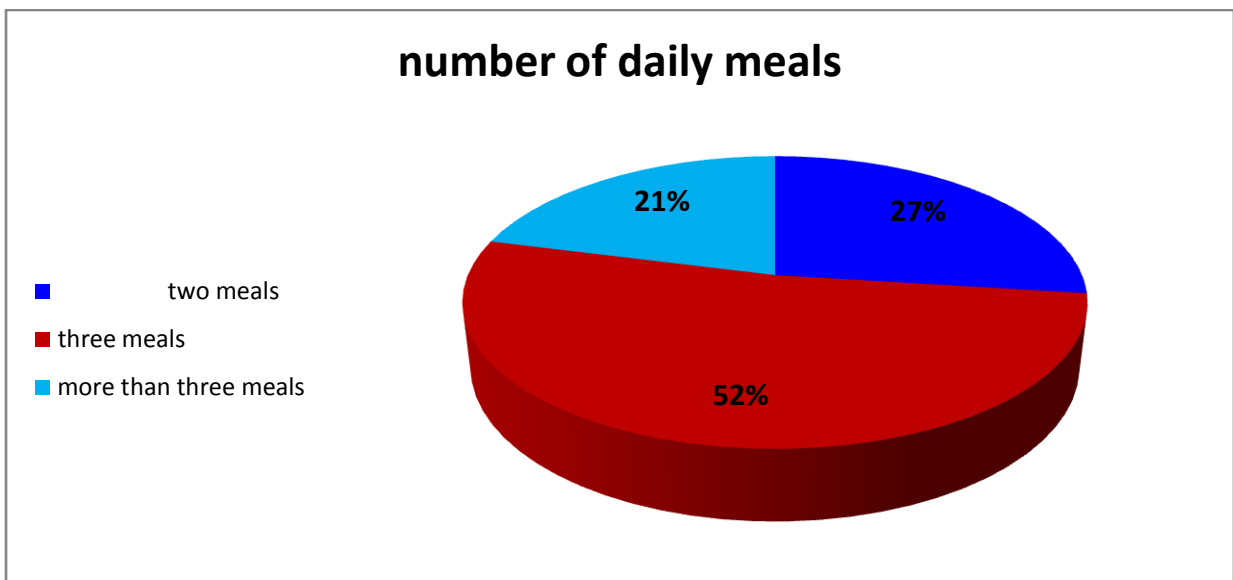


Figure No. (4): Showed that ONLY fifth (21%) of study group eaten more than three meals during the day.

Discussion

This study was conducted in secondary school community based study in Kamel Ibraheem Model School for Girls and Abdu-allah Ibn Abbas School for Boys to assess the nutritional status for middle adolescents through anthropometric measurement, because The nutrition needs are greater during adolescents than at any other time in the life and the growth sensitive to nutritional defect and surfeit, which the study involve (81) respondents in period extended from August to November 2016.

The study showed that, below half of study subjects (44%, 36%) their parent's classified in moderate level of education, near to quarter (22%) in higher level of education , On other hand, more than half (55.6%, 52.7%) of study group were under weight (male and female respectively), and this corresponding to their parents occupation because the study reflected that 48.1%of study group their fathers occupation free worker and near to two third (64%) their mothers were house wife , this result effected with parents income because this factor is the major factor increase the income and effected in nutritional status of study group, . This may be important causes lead to most of the study group were under weight, this result was corresponding with previous study in 2015Ethiopia that represent “the difference in nutrition status BMI is the mainly may be due to socioeconomic background ⁽¹⁴⁾ .

The study reveal that only one fifth of study group taken more than three meals during the day although during this period the adolescent should be taken three meals with snacks because this period characterize by rapid growth, this result was disagree with the growth and development ⁽²⁾ in adolescent period the dramatic increase in physical growth and development Puts greater pressure on the need for nutrients Eating snacks and confectionery, The major snack is usually in the afternoon, after school. Snacks tend to be high in “ calories, and calcium (for example milk) or vitamin C .The study showed that more than two third of female in study group with BMI (5.5)and mean 1.52, while one third of study group male with BMI (3.7) and mean 1.48 , This result confirm the gender differentiate in nutrition status. This is corresponding with previous study in mnosoura Egypt 2012 that represents majority of the girls (95%) have different food preference such as

fast food and majority of adolescent boys (90%) believed that girls and boys differ in their food choice” (16).

The study represent that all respondents were knowledgeable about the important of nutritional element during the adolescent period and majority of study group (90%) were knowledgeable about the nutrition classification to macro and micro nutrient, this is agree with previous study in monsoura Egypt 2012 that represents “most of adolescent both sex shared a common view regarding the important the nutrition in adolescent health” (16).

The study represented that more than third of study group (37%) were knowledgeable about the important element of nutrition during the adolescent period according to priorities ; proteins, Carbohydrate and fats . Also The study reflected that 3.7% males and 5.5 females were overweight because the study group were knowledgeable about the disadvantage of fatty nutrition, while less than third (31%) of them choice the Vitamins as important elements of nutrition in adolescent period , And same percent of study group were Not aware about the important of adequately of daily vitamins intake and information about the vitamins sources and function, and this is corresponding with previous study done in Italian 2007 that showed The mean of Vitamins intake was below recommended level in adolescent diet although the Vitamins need should be increase during the adolescent period with degree of maturity⁽¹⁷⁾ .

Otherwise, the study showed that more than half of study group were underweight and this result corresponding with other result that clarified 64% of study group NOT taken the meals regularly, This result disagree with previous study done in Ethiopia 2015 that represented “respondent meal frequency and dietary habit and the respondent consuming three regular meal per day” (14).

The study reflected that more than fifth of study group (19%) were skip meals 22% of them were skip breakfast and lunch, and this is agree with previous study done in monsoura Egypt 2012that represents “most of the female (75%) were skip the lunch and most of male (76%) they skip breakfast” (16), and this result also confirm the gender differentiate.

According to adolescents behaviour in taken meals the study showed that more than half (52%) of study group were prefer to take the meals preparing in their house, and third of them (33%) prefer to take food from school noshery, while few of them preferred manufacture foods, this behavioural supported the result that the knowledge of study group distributed between Good and Fair knowledge about the important of nutritional elements during the adolescents period.

Finally, The study represented that there was significant relationship between BMI and age of studied group with (**P value 0.05**) this confirm change with nutrition status and unique with nutrition , growth and development and important of nutrition assessment during adolescent period to asses and follow the nutritional status of adolescent, this is corresponding with the growth and development (2) that showed: “anthropometric measurement is very important tool for nutrition assessment during the adolescent period”.

Also the study represented that there was no significant relationship between the Body Mass Index (BMI) and number of meals; with (**P value 0.881**) and this may be related to many factors such as sexual maturation in this period and this is corresponding with the **American medical association (6)** that represent “some problem associated with using BMI for children and adolescent related to many factors such as height and a level of sexual maturation influence relationship between BMI and number of meals among children” also BMI interpreted for adolescence is different because is depending on the body fat change with age and sex. Also the study founded that most of studied group were underweight.

CONCLUSION

Based On The Finding Of Present Study It Was Concluded That:

The study represent that all respondents were knowledgeable about the important of nutritional element during the adolescent period . majority of study group (90%) knowledgeable about the nutritional classification and more than half of them were underweight, although the study represented that the knowledge of study group distributed between Good and Fair knowledge about the important of nutritional elements. Additionally, the study found that there are differences between both sex in bulk and calories, this based on current results and several studies.

Finally, the study represented that there was significant relationship with BMI and age in study group with (**P value 0.05**).

RECOMMENDATIONS

Based On The Study Finding And Conclusion The Following Recommendation Is Required:

To head director:-

- Establish right system diet for adolescents in school noreshy and adopt the total responsibility of this system and supervise it regularly.
- Design nutrition healthy unit at school with nutritionist to follow the nutritional status of students.
- Importance collaboration among health sectors and education sectors at Shendi city to address adolescent under nutrition problems in the City, and the intervention of scoters should be do in school based on nutrition education.
- Activating the role of food center system in the Shendi locality.
- Cooperation of the local NGO's capabilities in teaching and communicating information regarding the nutrition.
- Further studies must be conducted to implement programs that encourage the adolescents to increased awareness and improvements of the student's attitudes regarding to the nutrition during adolescent period.

Reference:-

1. Kristy M.hendricks , manual of pediatric nutrition , third edition , by F.A Davis company publisher (2009), page 1 - 77.
2. Jamie stang and mary story, adolescent growth and development, fourth edition, 2008, page 177 - 200.
3. American psychological association, Areference for professionals developing adolescents, six edition by creste spce independent publisher, 2015, page 296.
4. Nihiser AJ, Lee sm and etal , International Journal of Nutrition and Food Sciences, 2015; 4(1): 118-124 Published online February 13, 2015) page 2327-2716
5. Deval L. Patrick, community heath and prevention, edition six, Massachusetts department of punlisher, 2014, page 14.
6. Jama J , journal of Amercian medical association decline in student obesity rate linked with school based program , 2014 : 311 (14) , 3140 .
7. Stewart truswell, ANC nutrition of pediatric, fourth edition, 2003, by BMJ publisher, page 34 - 60.
8. Geoffrey P.webb, dietary supplements and functional foods, edition six, 2006, by blakwell publishing, page 39 - 55.
9. Catherine Geissler, Hilary J, human nutrition, fourth edition, publisher by Churchill living stone , 2012 , page 160 - 778.
10. ALLEN Bowling, MD, vitamine, minerals and herbs in MS, second edition, publication by National multiple sclerosis society, 2015, page 6 - 25.
11. JOAnne sibler, flagy Jones, pediatric nursing practitioner certirfication, fith edtion , by bartle LLC publisher, 2011, page 21 - 66.
12. Omobuwa, co Alebiosu and etal, assessmenTof nutritional status in school adolescents in Ibadan, Nigeria, south African family practice F:E 56:4, 2014, 246 - 250.
13. BA swinburn, caterson JC, physical activity and nutrition rsearch unit, diet nutrition and prevention.
14. Omer seid , huruy Assefa , adolescents view and food nutrition , assessment of nutritional status and associated factors among school going adolescents of mlkelle city northern Ethiopia , 2015 , FE 4(1) , 118_124

15. TomFM.ter BogtPHD , Journal of adolescents heath body mass index and body weight perception as risk factors behavioural among adolescents , in Nether land ,F:E 39(2006) , 27_34 .
16. Abdel.handy . EL- Gilang, pan African medical Journal, socioeconomic determinants of eating pattern of adolescents in mansoura Egypt, 2012, 13:22, ISSN 1937_ 8688.
17. Giovanna turcont , Marianna and etal , original research eating habits and behaviours and food safety knowledge and beliefs in adolescents Italian population , F 15:187 (2007) , page 107_198 .
18. (<http://www.sciencepublishinggroup.com/j/ijnfs> (<http://www.cdc.gov> /heathy weight /assessing /bmi / chidrens bmi / about childrens bmi . html . 22/10/2016 , 2:33pm .
19. [www. Epi.umn.edu/let/pubs/img/adol.chlpdf](http://www.Epi.umn.edu/let/pubs/img/adol.chlpdf)
20. WWW. CDC .gov / heathyouth/npao/ publications.htm

Faculty of granulate studies and scientific research

Pediatric nursing department

Assessment of nutritional status for middle adolescent's through anthropometrics measurement:

(A) Sociodemographic data:-

1- Weight ()

2- Height ()

3- Sex : male () female ()

4- Age :

11 – 12 ()

13 – 15 ()

16 – 18 ()

5- Level of education of the father :-

Illiterate () primary () secondary () university ()

post-graduate ()

6- Level of education of the mother :-

Illiterate () primary () secondary () university ()

post-graduate ()

7- The Occupation of the father:-

Retired () worker () employee () Free work ()

8- The Occupation of the mother :-

Retired () worker () employee ()

9- The positioning in your family :-

First () second () last ()

10- The number of family member are:-

3-6 () 7-10 () more than 11 ()

11- The Nutrition is:-

- Eat, digested , absorbed and metabolism the food ()

- Take all the important nutrition elements ()

- Eat balance food and planning for dietary meals ()

- I don't know ()

- 12- The nutritional classification are:-
 Micronutrient () macronutrient ()
 Micronutrient and macronutrient () I don't know ()
- 13- The elements of nutrition is classified according to chemical composition to :-
 Carbohydrates () proteins () fats () I don't know ()
- 14- The important of nutrition element during the adolescents period the must be taking with enough amount are:-
 Carbohydrates () proteins () fats ()
 minerals () vitamins () I don't know ()
- 15- The Carbohydrates are:-
 - The important source of energy ()
 - Divided to mono-diand polycchacrite ()
 - It is also know cchariste and starch ()
 - Source of its of petoose , core and friutes ()
 - I don't know ()
- 16- The proteins are :-
 - It's important nutrients for growth and building ()
 - It's had two types plant and animal protein ()
 - Should be taking daily due to not ()
 - Storage in the body ()
 - Source of its meals , fish, egg and peanut ()
 - I don't know ()
- 17- The fats are:-
 - It's nutrient that containing fats for energy source ()
 - Classified to saturated and un saturated ()
 - It is have animal and planting source ()
 - Should be taking with little amount in dietary meals ()
 - I don't know ()
- 18- The minerals are :-
 - It's form micro nutrient to body need it is little amount ()
 - It's have many types and classified to micro and macro minerals()
 - The most important function of it is building and strength the bone ()
 - The most source of milk, milk product and some vegetables ()
 - I don't know ()

- 19- The calcium is:-
- One of micro minerals ()
 - It's important mineral for saving the bones and teeth ()
 - Helping in muscle contraction and relaxation ()
 - found in milk, milk product and vegetable ()
 - I don't know ()
- 20- The Iron is:-
- One of micromenreal ()
 - Enter in the composition of hemoglobin ()
 - it's important in blood production and loss of it is can lead to iron deficiency a nemia ()
 - found in leafgreen m, readmeal and yolk ()
 - I don't know ()
- 21- The vitamins are :-
- Its organic compounds needed by little amount ()
 - Its had many function the most important one strength the immunity ()
 - Deficiency of its to many diseases such as neigh blindness and rickets ()
 - The most important source vegetables and fruits ()
 - I don't know ()
- 22- Number of daily meals:-
- One meals () two meals () three meals ()
 more than three meals ()
- 23- Do you taking the daily meals regularly :-
- Always () sometimes () never ()
- 24- What the frequent types of food eating during day :-
- Carbohydrates () proteins () fats () minerals ()
 vitamins ()
- 25- What the most method favorite for food preparing :-
- House food preparing ()
 - School nosherly ()
 - Meals manufactured such as sweets , andomy ()

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

كلية الدراسات العليا والبحث العلمي

قسم تمريض الأطفال

تقييم الحالة التغذوية في مرحلة المراهقة الوسطى من خلال قياس الطول والوزن

أ/ البيانات الاجتماعية :-

1 - الوزن /2 الطول /3 النوع: ذكر أنثى

2 - العمر: 12-11 15-13 18-16

3 - المستوى التعليمي للاب

أمي ابتدائي ثانوي جامعي فوق الجامعي

4 - المستوى التعليمي للأم

أمي ابتدائي ثانوي جامعي فوق الجامعي

5 - وظيفة الاب هي

متقاعد عامل موظف اعمال حره

6 - وظيفة الام هي

ربة منزل عاملة موظف

7 - ترتيبك في الاسرة هو

الاول الوسط الاخير

8 - عدد افراد الاسرتك هو

3-6 7-10 11 فاكثر

ب/ معرفة المراهق بالعناصر الغذائية :-

9 -التغذية هي :

- تناول الطعام وهضمه وامتصاصه واستقلابه في الجسم
 - الحصول علي جميع العناصر الغذائية الضرورية للجسم
 - تناول الطعام المتوازن وتخطيط الوجبات اليومية
 - لا أعرف
- 10 - تنقسم المغذيات الغذائية الى :

مغذيات صغرى مغذيات كبرى مغذيات صغرى وكبرى لا أعرف

11 - تصنف أهم العناصر الغذائية حسب التركيب الكيميائي إلى:

الكربوهيدرات البروتينات الدهون لا أعرف

12 - من أهم العناصر الغذائية في فترة المراهقة التي يجب تناولها بكميات كافية هي :-

الكربوهيدرات البروتينات الدهون المعادن الفيتامينات لا أعرف

13 - الكربوهيدريد:-

- يعتبر من أهم مصادر الطاقة
 - يطلق عليه السكريات أو النشويات
 - لا أعرف
- ينقسم لسكريات أحادية، ثنائية ومعقدة
- من مصادره البطاطا والذرة والفواكهة

14 - البروتينات:-

- تعتبر من أهم الأغذية لبناء ونمو الجسم
 - هي من المواد الغذائية التي يجب تناولها يومياً وهي غير قابلة للتخزين
 - من اهم مصادرها اللحوم والأسماك والبيض والبقول
 - لا أعرف
- من أنواعها بروتينات حيوانية ونباتية

15 - الدهون هي :-

- هي مواد غذائية تحتوي على الشحوم لتمد الجسم بالطاقة
- تنقسم الى دهون مشبعة وغير مشبعة
- لها مصادر نباتية وحيوانية مثل الزيوت واللحوم
- يجب تناولها بكميات قليلة في الوجبات اليومية
- لا أعرف

- 16 - المعادن هي :-
 - من المغذيات الصغرى التي يحتاجها الجسم بكميات ضئيلة
 - لها أنواع كثيرة وتنقسم لمعادن كبيرة ومعادن صغيرة
 - من أهم وظائفها بناء العظام وتقويتها
 - من أهم مصادرها الألبان ومنتجاتها وبعض الخضروات
 - لا أعرف
- 17 - الكالسيوم :-
 - هو أحد المعادن الكبرى
 - يساعد في تقلص العضلات واسترخاءها
 - يوجد في الحليب ومشتقاته والخضروات
 - لا أعرف
- 18 - الحديد هو :-
 - هو أحد المعادن الصغرى
 - يدخل في تركيب الهيموقلوبين
 - ضروري في إنتاج الدم ونقصه يؤدي الى انيميا نقص الحديد
 - يوجد في الخضر الورقية واللحوم الحمراء وصفار البيض
 - لا أعرف
- 19 - الفيتامينات :-
 - هي مركبات عضوية يحتاجها الإنسان بكميات قليلة
 - لها وظائف عديدة منها تقوية الجهاز المناعي
 - نقصها يؤدي الى كثير من الأمراض أهمها العشاء الليلي ولين العظام
 - لا أعرف
- 20 - ما هي عدد الوجبات اليومية التي تقوم بتناولها؟
 - وجبة واحدة - وجبتان - 3 وجبات - أكثر من 3 وجبات
- 21 - هل تنتظم بتناول مواعيد الوجبات الأساسية اليومية؟
 - دائماً - أحياناً - لا أنتظم
- 22 - ما هي نوعية الأطعمة التي تتناولها بكثرة خلال اليوم؟
 - السكريات - البروتينات - الدهون - الفايتمينات
- 23 - ما هي أكثر الأطعمة المحببة إليك؟
 - المحضرة في المنزل - الجاهزة في مقصف المدرسة (بوفيه)
 - الأطعمة المصنعة (الشيبس والحلويات والعصائر)

