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THE VALUE OF WAIST CIRCUMFERENCE TO HIP CIRCUMFERENCE IN ASSESSMENT OF OBESITY IN CHILDREN

Dr. Hala Abdul Khalak yahea
M.B.Ch.B., D.C.H. \ (Pediatrics), Iraqi Ministry of Health,
Kirkuk Health Directorate, Hospital of Delivery and
Children (al nasr hospital), Kirkuk, Iraq
Halapaediatrician@gmail.com

Dr.Zuhair Saleh Farhan
M.B.Ch.B F.I.C.M.S.Pediatrics
Iraqi Ministry of Health, Diyala Health Directorate,
Alkhalis General Hospital, Diyala,Iraq.
drzuhairsalehf@gmail.com

Dr. Ali Qais Abdulkafi
M.B.Ch.B., D.C.H. \ (Pediatrics)
Iraqi Ministry of Health, Kirkuk Health Directorate,
Director of the Technical Affairs Department,
Kirkuk Teaching Hospital, Kirkuk, Iraq.
Newiraqhospital@yahoo.co.uk

Dr. Aws ali qais
Medical Student, University of al-ameed ,
College of Medicine, Karbala
Aawsali41994@gmail.com

Abstract
In medical terms, "overweight" means carrying about extra weight, whereas "obesity" means having too much fat. In industrialized nations, childhood obesity is becoming an increasingly pressing public health issue. Worryingly, the incidence of obesity is on the rise in developing nations. The epidemic of childhood obesity is a global health concern. In childhood, adolescence, and adulthood, obesity can lead to other health complications. Children who are overweight around the middle are more likely to develop metabolic and cardiovascular disorders. The present investigation is a cross-sectional observational study that drew 300 participants via a multistage stratified random sample procedure. We randomly selected pupils and elementary schoolers from Beiji City's Primary Health Center. The research spanned the months of July 2013 to December 2013. The goals of this study are (1) to determine the incidence of overweight, obesity, and central obesity among children aged 5–18 years old, and (2) to identify potential risk factors for these conditions. We used worldwide cut-off points to measure body mass index and compared the

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results to standard tables. By comparing the waist circumference (WC) to the hip circumference, one can determine if and to what degree central obesity is present. The waist-to-hip ratio refers to the connection between the two measurements. Water Heater. A questionnaire was developed to gather information on potential risk factors. A total of 300 elementary- and preschool-aged children were affected. There were 49 cases of overweight (16.3%), 21 cases of obesity (7%), and 40 cases of central obesity (13.4%). Some eating habits, family history, socioeconomic status, and residence (urban/rural) were significantly associated with overweight. It is crucial to closely monitor and regulate modern eating habits since they significantly contribute to the rise of childhood obesity. In addition, there was a correlation between childhood obesity and growth; when children's obesity levels rise, they are taller than children of the same age, but as they become older, their height falls short of that of their non-obese peers. Both android (apple-shaped) and gynoid (pear-shaped) central obesity develop with age, gender, and genetic predisposition. **Overview**. One of the most pervasive health issues nowadays is childhood obesity. Childhood obesity increases the risk of adult obesity. A major public health concern that is adding to the substantial excess in mortality and morbidity is the rising incidence of overweight and obesity. (1) A large percentage of body fat is considered an obesity indicator. This indicates that the adult Body Mass Index (BMI) exceeds 30. Obesity in children was defined using the modified body mass index (BMI) for age; a BMI between the 85th and 95th percentiles is considered overweight; a normal weight range is 5th to 85th percentiles, and underweight is 5th to 95th percentiles (2). There are several cardiovascular risk factors linked to pediatric obesity, such as insulin resistance and hyperinsulinism, high cholesterol and triglyceridemia, low levels of high-density lipoprotein (HDL), and high blood pressure. In addition to genetic considerations, a number of other variables have a role in the onset of obesity, the most important of which is an imbalance between caloric intake and energy expenditure (3). Obesity runs in families because of hereditary factors and environmental factors, such as the availability of foods high in calories and fat and the discouragement of physical activity (4). Clinically referred to as central obesity, abdominal obesity goes by a few different names. Central obesity occurs when fat accumulates around the upper and middle parts of the body, unlike the "pear-shaped" profile caused by fat around the hips and thighs. This leads to a large waist circumference and a body shape often referred to as "apple-shaped" (5). The risk of death increases in direct correlation with both the waist-to-hip ratio and total waist circumference (6). By comparing the waist circumference (WC) to the hip circumference, one can determine if and to what degree central obesity is present. The waist-to-hip ratio (WHR) (7) describes the connection between the two dimensions. But kids had no yardstick by which to measure themselves. According to the standard, a waist-to-hip ratio of 0.90 for men and 0.80 for women is abnormal (8).

Aim: To track the health of children (5–18 years old) in order to identify cases of obesity at an early stage.

Objectives:Goals The social and demographic characteristics of the sample, including their age, sex, socioeconomic status, and place of residence, are the focus of this research. 2. Consider the child's length and growth in relation to WC and HC. 3. Count the number of overweight children in the population. 4. Demonstrate the PHCC in the waist and hip circumferences of children in

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Baije city, ranging from 5 to 18 years old. 5. Detect the presence of cardiac, metabolic, and endocrine illnesses in the samples.

Keyword: Obesity, childhood, hip circumference, waist circumference, body shape.

Introduction

DEFINITION OF OBESITY:

While "obesity" describes a person with an excessive amount of fat, "overweight" describes someone with an excess of total body weight. Unfortunately, there are currently no accessible methods for measuring body fat in a clinical setting. This is why indirect measures of body fat are commonly used to diagnose obesity (6). For both adults and children, the most reliable indicator of excess fat is the body mass index (BMI) (7). As a general rule, one should aim to maintain a body mass index (BMI) that is equal to one's weight divided by one's squared height. Additional indicators of pediatric obesity include skin fold thickness, regional fat distribution metrics (such as waist circumference and waist-to-hip ratio), and weight-for-height, which is especially helpful for children under the age of three (6). For children, "obesity" is defined as a body mass index (BMI) more than the 95th percentile for their age and gender, while "overweight" is defined as a BMI between the 85th and 95th percentiles, respectively. A reference standard for body mass index in children aged 2–20 was developed by the National Center for Health Care Statistics and the Centers for Disease Control and Prevention. (7). As kids grow into adults, the weight categories of overweight (defined as a body mass index (BMI) of 25 or higher) and obese (defined as a BMI of 30 or higher) are roughly 25 and 30, respectively (8).

Central Obesity and Body Shape • Abdominal obesity • Abdominal obesity, also known as belly fat or clinically as central obesity, When fat gathers in the upper and middle regions of the body, it causes central obesity. This results in a wide waist circumference and a body form that is frequently called "apple-shaped"—different from the "pear-shaped" profile that is caused by fat accumulation in the hip and thigh areas. By comparing the waist circumference (WC) to the hip circumference, one can determine if and to what degree central obesity is present. The waist-to-hip ratio (WHR) describes the connection between the two dimensions. The term "central obesity" describes a person who has a lot of extra fat around their middle, mostly from visceral fat. Excess fat in the abdominal region might cause the release of fatty deposits into the bloodstream since it is fed via the portal blood system (3). Excessive fat surrounding the abdominal region and stomach is referred to as central obesity. Obesity in the abdomen region can run in families, affecting children and teenagers alike. Central obesity is strongly associated with cardiovascular disease. No one is immune to the effects of abdominal obesity; it affects people of all ages. Numerous metabolic and vascular illnesses, including Alzheimer's, have been associated with obesity in the abdominal region. [7]. • such as: High blood pressure Endometrial cancer, atherosclerosis, insulin resistance, metabolic syndrome, type 2 diabetes, cardiovascular disease, altered metabolic profile, metabolic syndrome, and metabolic syndrome • Lipid abnormalities associated with obesity (such as hypertriglyceridemia and hypo-HDL-cholesterolemia). Type 2 diabetes is strongly associated with abdominal fat, particularly visceral and central fat, as well as waist circumference. The peritoneal cavity contains visceral fat, organ fat, or intra-abdominal fat, which is packed in between

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the body and internal organs, in contrast to subcutaneous fat beneath the skin and intramuscular fat scattered throughout skeletal muscle (5). Central obesity, often called the "pot belly" or "beer belly," makes the stomach stick out too much and happens when there is too much visceral fat, which includes different types of fat like mesenteric, epididymal white adipose tissue (EWAT), and perirenal fat. The "apple-shaped" body type is different from the "pear-shaped" one, which is characterized by fat deposition on the hips and buttocks. Researchers now know that assessing obesity is best done by looking at total body fat percentage rather than weight alone (6). After discovering a link between abdominal obesity and diabetes, dyslipidemia, and cardiovascular disease in the 1980s, researchers began to pay more attention to the condition. Metabolic disturbances associated with cardiovascular disease were more strongly associated with abdominal obesity than with overall obesity. New imaging techniques emerged in the late 80s and early 90s, which shed light on the dangers of excess body fat and helped us comprehend them better (7). In most cases, the WC measure is not utilized to detect risk in youths since there is insufficient data to determine the right threshold. Techniques like computed tomography and magnetic resonance imaging have made it possible to dissect adipose tissue masses in the abdomen [8]. While further study is required, here are some broad suggestions: Between the ages of 12 and 19, the risk of cardiovascular disease increases for males with a waist circumference (WC) of 66.8 to 87.5 cm and for girls with a WC of 71.5 to 87.2 cm. Disparities in age and ethnicity contribute to the wide variations. Associated with:. Additionally, elevated blood pressure is linked to a high WC in children and adolescents. A thicker layer of Cut down on HDL (the "good") cholesterol. • The heart's left ventricle; • Elevated cholesterol and triglyceride levels in the blood.

Causes The primary reason behind obesity is a net energy imbalance, which occurs when the body takes in more useful calories than it uses up, eliminates, or wastes. We don't know what causes obesity, but it's likely a product of both genetics and environmental factors. Several studies have linked the excessive consumption of fructose to visceral obesity, lipid dysregulation, and reduced insulin sensitivity. [9] is a Additional environmental elements, like dietary estrogenic substances, endocrine-disrupting toxins, and maternal smoking, might play a role as well. [80] When it comes to high-carbohydrate diets, obesity is a major contributor to the metabolic problems with lipids and carbohydrates. There is an inverse relationship between the percentage of belly fat and the amount of high-quality protein consumed in a day, as well as the amount of time it takes to reach the required amino acid threshold of about 10 g. The proportion of essential amino acids to total protein consumed each day is the standard by which protein absorption is judged. [8] The When blood flows directly to the liver through the portal circulation, visceral fat cells discharge their metabolic waste. Triglycerides and fatty acids are produced in excess by visceral fat cells and will ultimately accumulate in the liver. The liver will convert the majority of it into fat. 'Lipotoxicity' describes this idea. [2] Central obesity is a symptom of hypercortisolism, which can manifest in conditions like Cushing's syndrome. In the presence of high insulin levels, central obesity can be a side effect of many prescription medicines, including steroids and dexamethasone (3). In both developed and developing nations, the urbanization of populations is linked to the rise in abdominal obesity, which is fueled by sedentary lifestyles and excessive caloric intake (4). Waist measurement is less accurate than measuring weight and height. We should use both

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standards. Waist circumference estimates visceral fat and the risk of obesity-related diseases, whereas body mass index (BMI) shows the optimal estimation of total body fatness. [5]

Diagnosis: While central obesity can be obvious just by looking at the naked body , its severity is determined by taking waist and hip measurements. The absolute waist circumference (>102 centimeters (40 in) in men and >88 centimeters (35 in) in women) and the waist-hip ratio (>0.9 for men and >0.85 for women) are both used as measures of central obesity. A differential diagnosis includes distinguishing central obesity from ascites and intestinal bloating (6). Waist circumference was found to be a better indicator of health risks related to obesity than body mass index (BMI) in a study of 15,000 people, and this finding was statistically significant. In other words, excessive waist circumference appears to be more of a risk factor for metabolic syndrome than BMI. [8] A waist-to-height ratio (WHtR) of >=0.5 (i.e., a waist circumference at least half of the individual's height) is predictive of increased risk of cardiovascular disease, and it has been shown to be a better predictor of risk than body mass index (BMI). [8] Another diagnosis of obesity involves the analysis of intra-abdominal fat, which poses the greatest risk to an individual's personal health. The increased amount of fat in this region relates to the higher levels of plasma lipids and lipoproteins. [9] An increasing acceptance of the importance of central obesity within the medical profession as an indicator of health risk has led to new developments in obesity diagnosis, such as the Body Volume Index, which measures central obesity by measuring a person's body shape and their weight distribution. Abdominal fat affects both obese and non-obese people and contributes to insulin sensitivity. (9) Health risks

Central obesity is associated with a statistically higher risk of cardiovascular disease, hypertension, insulin resistance, and diabetes mellitus type 2 [9] . With an increase in the waist-to-hip ratio and overall waist circumference, the risk of death increases as well. Metabolic syndrome is associated with abdominal obesity, blood lipid disorders, inflammation, insulin resistance, full-blown diabetes, and increased risk of developing cardiovascular disease. It is now generally believed that intra-abdominal fat is the depot that conveys the biggest health risk. [1] Central obesity can be a feature of lipodystrophies, a group of diseases that is either inherited or due to secondary causes (often protease inhibitors, a group of medications against AIDS). Central obesity is a symptom of Cushing's syndrome and is also common in patients with polycystic ovary syndrome (PCOS). Central obesity is associated with glucose intolerance and dyslipidemia. Dyslipidemia can become a severe problem once it reaches a certain level. An individual's abdominal cavity generates an elevated free fatty acid flux to the liver. Abdominal fat affects both obese and non-obese people and contributes to insulin sensitivity. (9)

Relationship with Diabetes There are numerous theories as to the exact cause and mechanism in Type 2 Diabetes. Central obesity is known to predispose individuals to insulin resistance. Abdominal fat is especially active hormonally, secreting a group of hormones called adipokines that may possibly impair glucose tolerance [9]. Insulin resistance is a major feature of Diabetes Mellitus Type 2 (T2DM), and central obesity is correlated with both insulin resistance and T2DM itself. Increased adiposity (obesity) raises serum resistin levels, which in turn directly correlate to insulin resistance. Studies have also confirmed a direct correlation between resistin levels and T2DM. Waistline adipose tissue (central obesity) appears to be the primary type of fat deposit

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contributing to increased serum resistin levels. Conversely, a decrease in adiposity following medical treatment leads to a decline in serum resistin levels. [4]

Relationship with Asthma Abdominal obesity can increase the risk of developing asthma, which is a significant health concern. As a result of breathing at low lung volume, the muscles are tighter and the airway is narrower. It is commonly seen that obese people breathe quickly and often while inhaling small volumes of air. [5] People with obesity are also more likely to be hospitalized for asthma. A study has stated that 75% of patients treated for asthma in the emergency room were either overweight or obese. [6] 2.15.3 Relationship with Pulmonary Function One study found a relationship between abdominal obesity and lung function. Research demonstrates a strong correlation between increasing waist circumference and spirometry, or breathing results. Furthermore, abdominal obesity affects pulmonary function more in men than in women. [7]

Measurement: There are various ways of measuring abdominal obesity, including.

Absolute waist circumference (>102 cm in men and >88 cm in women) [26] . Waist–hip ratio (the circumference of the waist divided by that of the hips, with a ratio greater than 0.9 for men and greater than0.85 for women) [19]. Index of Central Obesity [23] •Sagittal Abdominal Diameter [5]

Measure your waist circumference while exhaling. You should relax and not contract any abdominal muscles. Align the tape measure at the level of the belly button, and circle the whole way around the body and back to the starting point (8). The situation is depicted in pictures 2-3.

3. Methods and Patients:

Management and Moral Issues: Prior to conducting the study, we got official permission from both the family and the manager of the PHCC in Beiji City.

Socio-Demographic Factors: Children enrolled in the study ranged in age from five to eighteen and came from a variety of urban and rural backgrounds; they were all residents of Beiji city.

Research Plan: The present investigation was an observational cross-sectional randomized trial that included children who were overweight and took place between July 1, 2013, and December 31, 2013, during regular business hours.

Questionnaire Development: We gathered all data pertinent to socio-demographic characteristics through the development of the questionnaire.

Refer to Appendix 3.1.5 for details 3.1.5: Data Collection: The study consists of two parts: collecting anthropometric measurements (Ht, Wt, WC, and HC) and having interviewers administer questionnaires. We outlined the goal of data gathering and sought permission before the interview. At the PHCC in Bajie city, the kids were questioned and checked over. Children ranging in age from 5 to 18 were chosen for the sample.

Requirements for Inclusion and Exclusion 1. Requirements for Inclusion: Obese and non-obese youngsters, ranging in age from 5 to 18 years, made up the sample. 2. Criteria for Exclusion The study did not include children who were already overweight due to medical conditions such as nephrotic syndrome or who were using steroids. A Review They were wearing minimal clothing and were not wearing shoes. We set the pointer to zero before taking the measurements. (6). On page 4 of the attached document 2. Height: Height was measured with the children standing at

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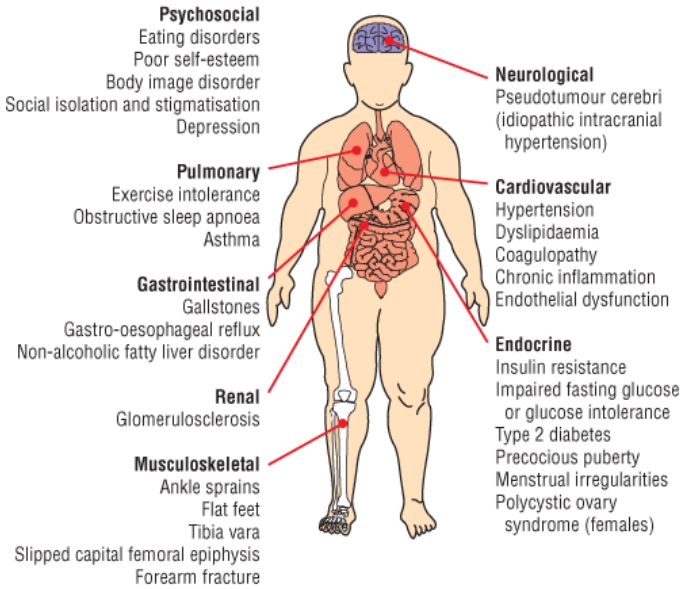
ground level without footwear to the nearest 0.1 cm against the wall where a vertical tape was fixed perpendicular to the ground on the wall, which was used as a scale. The fiberglass used to make this tape could not be stretched. We secured it with transparent tape after carefully checking for folds or tilts. Physical points of contact include the neck, shoulders, hips, knees, and feet. The assessment also included multiple checks of the scale for any signs of tilting or missing adhesive tapes. six, in the fourth appendix Using a stretch-resistant tape that maintains a constant 100 g tension, measure the waist circumference at the midpoint between the lower border of the last perceptible rib and the top of the iliac crest. (the appendix) 5. Hip circumference: Take a measurement at the highest point of the iliac crest or at the broadest part of the buttocks with the measuring tape parallel to the floor. For both measurements, the subject should stand naked, with their feet together, their arms at their sides, and their weight uniformly distributed. Take the measurements at the end of a regular expiration when the person is relaxed. If two measurements are within one centimeter of each other, average them. If there is a discrepancy of more than 1 cm, we recommend taking new measurements. the third (see Annex 5). Making Sense of the Data: We first determined the body mass index (BMI) by dividing the weight in kilograms by the square of the height in meters. 63 and 64 Using the World Health Organization's (WHO) recommended body mass index (BMI) cut-off points, nutritional status is categorized into four groups: underweight, normal, overweight, and obese. Among children, those whose body mass index (BMI) falls between the 85th and 95th percentiles for their age and sex are considered overweight, while those whose BMI is greater than the 95th percentile are considered obese (14). (see Section 3.). Second, the waist-to-hip ratio (WHR) is the proportion of a person's waist to hip circumference. When the waist-to-hip ratio exceeds 0.90 for men and 0.80 for women, it is considered abdominal obesity. We haven't yet taught kids about reference ranges. To find the waist-to-hip ratio, you can measure a slim person's waist at its narrowest point (on the left) or a person with a convex waist at a point approximately one inch [1] above the navel (on the right). The hip is measured at the left side, where the buttocks are broadest, and at the right side, where the greater trochanters are (2). (the appendix) Appendix



Picture (2.1) complication of obesity

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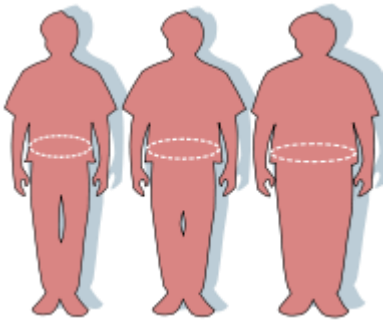


Picture2-3 measurment of waist circumference[98].

Statistical Analysis:

Analytical Methods The SPSS application, version 11, was used for data entry and analysis. A chi-square test was used to compare proportions, with a p-value of less than 0.05 being deemed statistically significant, <0.01 as highly significant, and <0.001 as extremely significant.

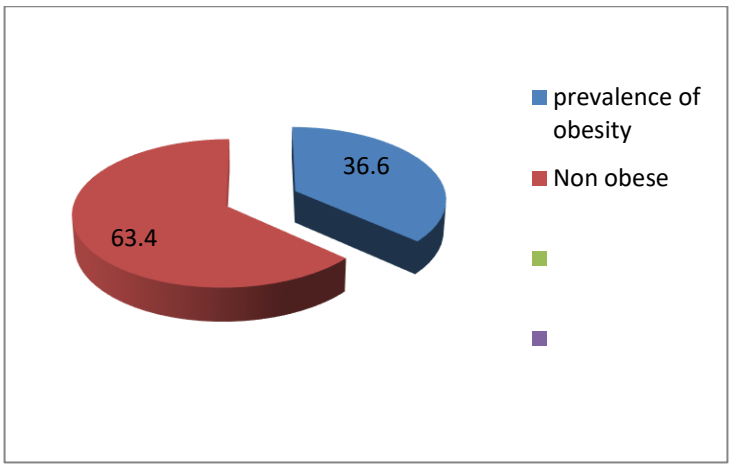
Results:

4.1. Demographic characteristics of the study:

The total sample studied in this research was (300) of the preschool and school child. The age group was taken from5-18 years. The child was recorded in the data collection of the sample in which (146) of the children has been living in urban areas representing 48.7% of the total sample, (154) children have been living in rural areas representing 51.3% of the total sample in the research. The sex of child was also recorded, male students were 163(54.3%), and female students were 137 (45.7%). The ovarwaight,obese ,central obesity ware 49(16.3%),21 (7%),40(13.3%) the prevalence of obesity ware 36.6%.

4.1.Distribution the Prevalence of Obesity:

Figure (4.1)show distribution the prevalence obesity according to total sample size.The prevalence of obesity 36.6% and non obese 63.4%.



Figure(4.1) Distribution of prevalence of obesity.

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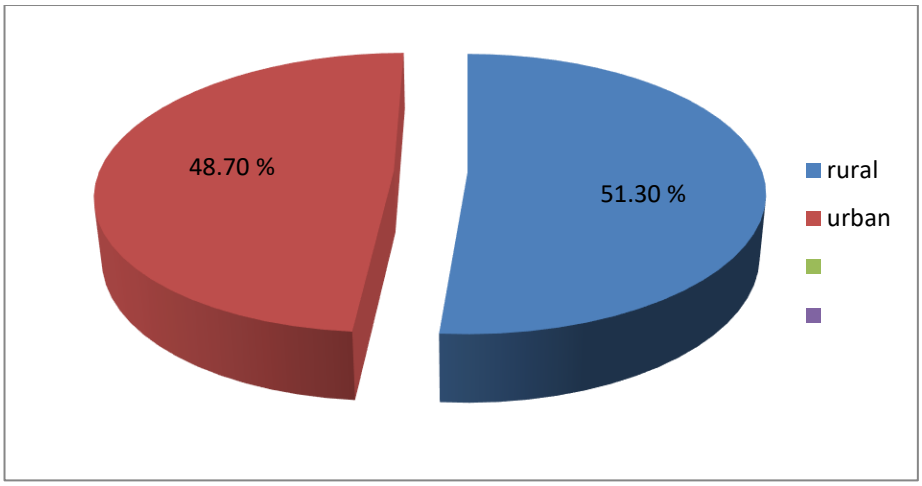
4.2. Distribution of sample size according to Residence:

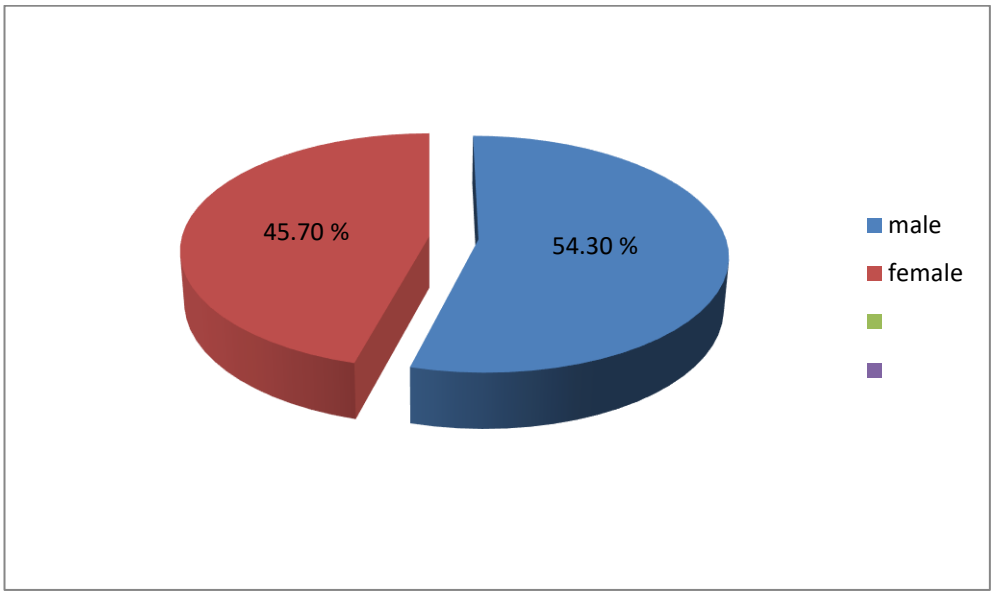
Distribution of the sample size according to Residenc .Most of cases were rural cases 154 (51.3%) when urban cases 146(48.7%) as shown in figure(4.2). .



Figure(4.2)distribution of sample size according to residence

4.3. Distribution of sample size according to sex:

Distribution of sample size according to sex. Most of cases were male cases 163(54.3%) than female cases 137 (45.7%).As shown in figure (4.3).



Figure(4.3)Distribution sample size according to sex

4.4. Relationship between types of obesity and Age:

Concerning the age of children and its relations to types of obesity the study found that overweight,obesity and central obesity tend to be more prevalent with increasing age as shown in table (4.1)

Table(4.1) Distribution of cases according to age and type of obesity

Type of obesity	over weight		obesity		central obesity		Total	
	No	%	No	%	No	%	No	%
5-10year	9	39.1	5	21.7	9	39.1	23	20.7
10-15year	15	41.7	6	16.7	15	41.7	36	32.6
>15year	25	49.0	10	19.6	16	31.4	51	46.2
Total	49	44.5	21	19.1	40	36.4	110	100.0

df=4, P >0.05 not significant

4.5. Relationship between Types of Obesity and Sex:

Regarding sex of children overweight ,obesity and central obesity were found to be more prevalent among female child. For overweight there were 40cases (52.6%) and9 cases (26.5 %) for females and males respectively. Mean while obesity accounts for 11 cases (14.5%) and 10 cases (29.4%) for females and males and central obesity there were 25 cases (32.9%) and 15 cases (44.1%) as shown in table (4.2)

Table (4.2) distribution of cases according to sex

Type of obesity	Female		Male		Total	
	No	%	No	%	No	%
over weight	40	52.6	9	26.5	49	44.5
obesity	11	14.5	10	29.4	21	19.1
central obesity	25	32.9	15	44.1	40	36.4
Total	76	100.0	34	100.0	110	100.0

df=2, P <0.05 significant

4.6. Relationship between Types of Obesity and Residency:

The prevalence of types of obesity were distributed differently according to the residence.
Table (4.3) shows that urban areas have more cases of overweight 42(47.2%) , obesity 15(16.9%)and central obesity 32 (36.0%)than rural areas in which overweight cases 7(33.3%) , obese cases 6(28.6%) ,central obesity cases were 8(38.1%)respectively.

Table(4.3)distribution of cases according to residence and type of obesity

Type of obesity	Urban		Rural		Total	
	No	%	No	%	No	%
over weight	42	47.2	7	33.3	49	44.5
obesity	15	16.9	6	28.6	21	19.1
central obesity	32	36.0	8	38.1	40	36.4
Total	89	100.0	21	100.0	110	100.0

df=2, P >0.05 not significant

4.7. Relationship Between Types of Obesity and Social Class:

Regarding social class and it's relation with types of obesity, the following table shows that overweight ,obesity and central obesity are more common in high social level 31 cases (45.6%) , 21cases (17.6%) and 25 cases (36.8%)respectively.

Table(4.4) Distribution of cases according to social class and type of obesity

	low		Middle		High		Total	
Type of obesity	No	%	No	%	No	%	No	%
over weight	7	46.7	11	40.7	31	45.6	49	44.5
obesity	3	20.0	6	22.2	12	17.6	21	19.1
central obesity	5	33.3	10	37.0	25	36.8	40	36.4
Total	15	100.0	27	100.0	68	100.0	110	100.0

df=4, P >0.05 not significant

4.8.Relationshipe between Types of obesity With Associated Disease:

The table(4.5) show distribution of cases according to associated diseases and types of obesity. Most of cases have hypertension, overweight cases 5 (33.3%),obesity cases 3(20.0%) and central obesity cases 7(46.7%),while the cases have DM , overweight cases 2(33.3%),obesity case 1(16.7%)and central obesity cases 3(50.0%).Associated disease overweight cases 2(40%), obesity cases1(20%),and central obesity2(40%) respectively.

Table(4.5)distribution of cases according to associated disease and type of obesity

	Hypertension		DM		Ather associated disease	
Type of obesity	No	%	No	%	No	%
over weight	5	33.3	2	33.3	2	40
obesity	3	20.0	1	16.7	1	20
central obesity	7	46.7	3	50.0	2	40
Ttotal	15	100.0	6	100.0	5	100.0

df=2, P >0.05 not significant

4.9. Relationship between Types of Obesity and Family History:

Regarding to the family history and it's relation to types of obesity.Overweight ,obesity and central obesity of the following table shows that overweight counts for 34cases (54.8%) ,central obesity 18 cases (29.0%) and obesity 10 cases (16.1%)of those with positive family history. While those with a negative family history count for15 cases(31.3%) ,22cases (45.8%)and 11cases(22.9%) for overweight , central obesity and obesity respectively. as showed in table (4.6).

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Table (4.6) distribution of cases according to family history and type of obesity

Type of obesity	positive		negative		Total	
	No	%	No	%	No	%
over weight	34	54.8	15	31.3	49	44.5
central obesity	18	29.0	22	45.8	40	36.4
obesity	10	16.1	11	22.9	21	19.1
Total	62	100	48	100	110	100

df=2, P <0.05 significant

4.10. Relationship between Types of Central Obesity and Age:

Table (4.7)show distribution of central obesity types according to age.Most of cases prevelance gynicoid type increase with age when >15yeares cases 10(41.7%),10-15 years cases9(37.5%) and 5-10 years5 cases(20.8%).While android type >15 years 6cases(37.5%),10-15yaers 6cases(37.5%) and 5-10 yaers 4 cases(25.0%) respectively.

Table (4.7) Distribution of central obesity cases according to age .

Age	Android		Gynicoid		Total	
	No	%	No	%	No	%
5-10year	4	25.0	5	20.8	9	22.5
10-15year	6	37.5	9	37.5	15	37.5
>15year	6	37.5	10	41.7	16	40.0
Total	16	100.0	24	100.0	40	100.0

df=4, P >0.05 not significant

4.11.Relationship between Types of Central Obesity and Sex:

Table (4.8)shows distribution of central obesity types according to sex .Most android type in male 19 cases (79.2%) than in female 5 cases(15%).While gynicoid type more in female 10 cases (62.5%) than in male 6 cases(37.5%).

Table (4.8) Distribution of central obesity cases according to sex

Type of obesity	Android		Gynicoid		Total	
	No	%	No	%	No	%
Male	19	79.2	6	37.5	25	62.5
Female	5	15	10	62.5	15	37.5
Total	24	100.0	16	100.0	40	100.0

df=1, P <0.05 significant

4.12.Relationshipe between Central Obesity Types and Residence:

Figure (4.4) show distribution of central obesity types according to residence.Most of cases in urban 11 cases (68.8%) of android type and 21 cases (32%)of gynicoid type.While rural have 5 cases (31.3%)of andoid type and 3 cases(12.5%)of gynicoid type.

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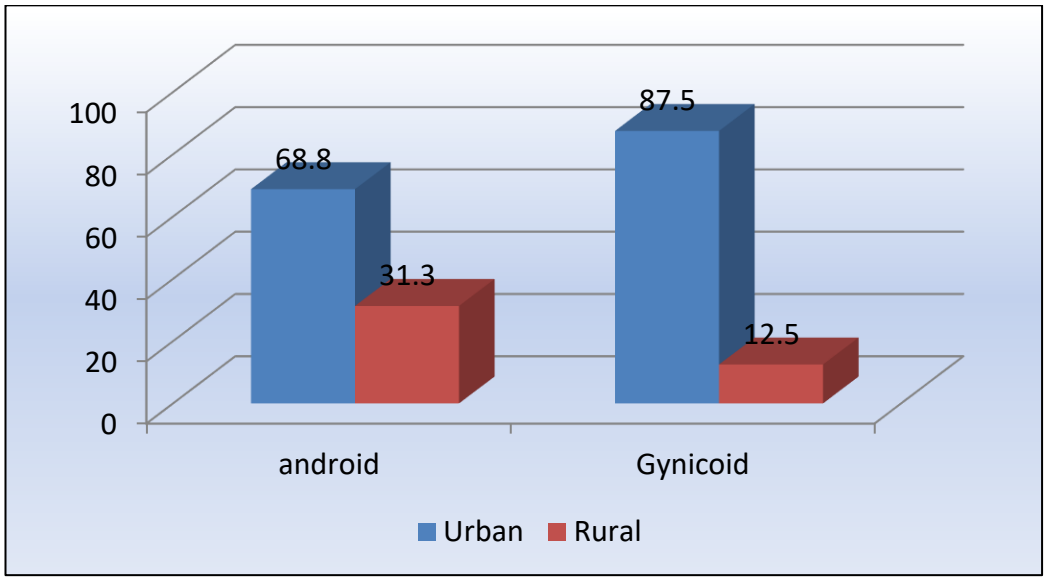

Figure (4.4) Distribution of central obesity cases according to residence

4.13. Relationbetween Central ObesityTypes and Family History:

Table(4.9)shows distribution of central obesity types according to family history .Most of cases have posative family history 11cases(68.8%)of android type and 11 cases (45.8%)of gynicoid type. While nagative family history 5 cases(31.3%) of android type and 13 cases(54.2%)of gynicoid type.

Table (4.9) Distribution of central obesity cases according to family history

type of obesity	Android		Gynicoid		Total	
	No	%	No	%	No	%
Positive	11	68.8	11	45.8	22	55.0
Negative	5	31.3	13	54.2	18	45.0
total	16	100.0	24	100.0	40	100.0

Df=1, p value> 0.05 not significant

4.14. Relationshipe between Central Obesity Types and Associated Diseases:

Table (4.10)show distribution of cases of central obesity types according to presence of associated diseases.Most of cases not associated with diseases 12 cases (75.0%)of gynicoid type and 18 cases (75.0%)of android type .While associated with hypertention 2 cases(12.5%)of gynicoid and 5 cases (20.8%)of android, with DM 2 cases(12.5%)of gynicoidand 1 case (4.2%) of andoid.

Table (4.10) Distribution of central obesity cases according to presence of associated disease

Type of obesity	Android		Gynicoid		Total	
	No	%	No	%	No	%
HT	5	20.8	2	12.5	7	17.5
DM	1	4.2	2	4.2	3	7.5
No associated disease	18	75.0	12	75.0	30	75.0
Total	24	100.0	24	100.0	40	100.0

Df=2, p value> 0.05 not significant

4.15.Relationshipe between Central Obesity Types and Height With Age:

Table (4.11)show distribution of cases of central obesity type according to associate of cases height with age . The study found that types of central obesity cases tend to be short with increasing age as shown in table (4.11)

Table (4.11) Distribution of central obesity cases according to height and age

	Normal		Short		Long		Total	
gender	No	%	No	%	No	%	No	%
5-10year	2	25.0	4	21.1	8	61.5	14	35
10-15year	2	25.0	4	21.1	3	32.1	9	22.5
>15year	4	50.0	11	57.9	2	15.4	17	42.5
total	8	100.0	19	100.0	13	100.0	40	100.0

Df=4, p value> 0.05 not significant

Discussion

More and more, people all across the globe are using the waist-to-hip ratio as a measure of nutritional health. To quantify dietary issues, the waist-to-hip ratio uses specific cutoff points for adults. It is critical to evaluate all three variables, even though WC is more indicative of obesity-related risk than BMI and WHR. Each will highlight a unique facet of obesity, and each has its advantages and disadvantages. New studies have also pinpointed particular permutations of outcomes that carry particular dangers. For instance, a person with a lower body mass index (BMI) has a higher risk of death following a heart attack compared to someone with a high waist circumference (WC) and a high BMI. One possible explanation is that the lower body mass index (BMI) group does not have as much functional subcutaneous adipose tissue and less muscle mass (6). This was the initial investigation into pediatric obesity using the waist-to-hip ratio, conducted at Tikrit University College of Medicine and in Baiji city. Thus, future research including this age group could benefit from the established techniques and outcomes as a foundational set of data. Among the many merits of this study are its age adjustment, its use of a diverse sociodemographic sample (covering both urban and rural residents), and its reliance on basic anthropometric measurements. Section 5.1: Age and Obesity Types This study's results indicate that the prevalence of various forms of obesity rises sharply with advancing age. This could lead someone to believe that central obesity is something that happens over time and gets worse if left untreated. The likely root causes are the lifestyle changes brought about by urbanization, such as less Numerous cultural shifts brought about by globalization further reinforce these changes [6].lobalization [66]. A research study conducted on school-aged children in Leeds confirmed this trend, finding that the percentage of children with central obesity increases significantly with age. (7) is Consistent with previous research, Sanjay et al. discovered that the prevalence of obesity increases with age, being nearly double in the oldest age quarter compared to the youngest age quarter, in a sample of 20,973 children aged 5 to 15 years (8). Section 5.2: Obesity and Sexual Health Although there was a statistically insignificant difference between the sexes in terms of the frequency of obesity categories, the present investigation found that girls had a greater prevalence than boys. During

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puberty, sex steroid hormones cause dimorphisms in body composition, the main cause of sex differences. In men, lower levels of free testosterone are linked to less muscle mass and more fat, while lower levels of total and free testosterone are inversely related to obesity. (9) Nicolas et al. found that female sex is an independent risk factor in their cohort study of African Americans, which contradicts our finding. (9) 5.3 Some Obesity Types and Where They Reside The current study found that the prevalence of certain types of obesity was much higher in urban areas compared to rural ones. This went against the findings of Zuguo et al. from the United States, who found that, despite more noticeable and persistent trends in urban regions, central obesity was on the rise among children in both urban and rural locations (7). The results are in agreement with those of a Dutch study by Fredrik et al. (7) that found central obesity to be more common in cities than in rural areas. The fact that people in cities eat more and are less active than those in rural and agricultural settings might explain this finding. Types of Obesity and Socioeconomic Status (5.4): The study found a strong correlation between different forms of obesity and socioeconomic status. Parents from higher socioeconomic backgrounds tend to have children with higher body mass indexes. Fredrik et al. (7) discovered higher body mass index (BMI) values in children from low-income families, but Mihaela et al. (2) in the United States observed no difference in educational attainment between moms of obese and non-obese children. One reason may be that Iraqis, despite their higher socioeconomic status, lack the medical knowledge of people in industrialized nations. Classification of Obesity and Blood Pressure (5.5): The present study demonstrates a statistically significant relationship between childhood obesity and hypertension, consistent with previous research showing a strong correlation between these two variables. (3) Comparing the current study's HT prevalence to that of Arabian countries reveals a lower figure. However, it is lower than the figures recorded in other countries. (7) Possible explanations for these discrepancies include changes in research methodology, HT definition, blood pressure recording techniques, observer effect, age range, sample size, socioeconomic status, and study design. 5.6 Specific Forms of Obesity and Glycemic Control: Researchers found that children who were overweight in any way had higher random blood sugar readings. Children with central obesity are at increased risk for developing diabetes mellitus, according to this finding. Consistent with previous research, this finding confirms that overweight children and adolescents are at increased risk for cardiovascular disease, insulin resistance syndrome, impaired glucose tolerance, and type 2 diabetes (Eric Ravussin and Boyd A. Swindurn). (5) According to research by Ranjana Sinha, M.D., there is a correlation between the epidemic of childhood obesity in the US and a rise in the incidence of type 2 diabetes in this age group. Additionally, Sinha found that extremely high rates of impaired glucose tolerance were observed in severely obese children and adolescents, regardless of their ethnic background. (6) 5.7 Height and Central Obesity: The present study reveals that although they were taller than youngsters of the same age when they were younger, the correlation between central obesity and stature varies with age. Next, their height decreases as they age compared to when they were the same age. This finding agreed with Farghaly NF but went against the results of Prista A. et al., who discovered that WHtR did not change with age for either boys or girls and that a WHtR cut-off of ≥0.5 was needed to identify central obesity. (8). The number 82 5.8 Obesity Subtypes and Hereditary Factors: Having a good family history is associated with an increased risk of developing certain types of obesity, according to the present study. This

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finding is in agreement with what Eva Ritvo et al. 5.8 Types of Central Obesity: The results of this study distinguish between two forms of central obesity: gynoid, or apple, and android, or pear shape. This conclusion is in agreement with the findings of Prista A. et al., who found that gynoid obesity is more common in females than in males and tends to increase with age, while android obesity is more prevalent in males and tends to decrease with age (83). The android type is more likely to be related to diseases than the gynicoid type, which is in agreement with James WP. but disagrees with Anwer I. et al., and both types are most common in metropolitan areas. Android and gynoid obesity are different. One kind of obesity, known as "android obesity," is defined by excess fat accumulation around the middle. This form of obesity is characterized by an apple-shaped physique. Diseases associated with obesity are more common in this population, and they include cardiovascular disease, metabolic syndrome, gout, artery-related problems, malignancies, and many more. Other regions where one can observe android obesity include the upper chest, shoulders, and nape of the neck (4). The presence of fat around the hips and thighs is a hallmark of gynoid obesity. People who are overweight in this way will have bigger buttocks than the average person. Pear obesity, also known as gynoid obesity, refers to people whose bodies are formed like pears. This results in a reduced vulnerability to a host of obesity-related illnesses. (5) Obesity comes in many forms, and Android and Gynoid are two of them. Both forms of obesity are characterized by localized fat storage. Fig. 5.1 displays Fatality in Android Affective Obesity Individuals with Android Affective Obesity are at a higher risk of developing obesity-related conditions, including hypertension and cardiovascular disease, among others. The risk of developing obesity-related illnesses has been reduced. Fat accumulates in the belly, upper chest, neck, and shoulders. Most people's body fat is located in their hips and thighs. These patients will have an apple-shaped body. These patients will have a pear shape to their bodies. Table 5.1 compares and contrasts gynoid and android obesity.

Conclusions

1. Among preschool and school-aged children attending PHCC, there were fifty-five instances (44.5%), twenty-one cases (19.1%), and forty cases (36.4%) of overweight or obesity, respectively.2. Women were more likely to be overweight (40.6%) vs. 26.5% of men (6.1.2%). 3. Obesity in females is 11 cases (14.5%) greater than in male cases, 10 (29.4%). The prevalence of central obesity is higher in females (25 cases, or 32.9%) compared to males (15 cases, or 44.1%). Urban areas had a greater prevalence of all types of obesity compared to rural areas (6.1.5). 6. In this investigation, eating habits, family history, and social level were found to be linked risk factors for obesity. 7 Obesity complications, including central obesity and overweight, are strongly associated with hyperglycemia and hypertension. Complications of central obesity have a substantial impact on children's height (6.1.9)

Recommendations:

—for PHCC medical personnel Raising the standard of nutrition: The primary health care center's medical staff and pediatricians will receive training on how to identify and assess preschool- and school-aged overweight children. Even if they reject it at first, keep presenting nutritious food options. No parent is doing their job right if they introduce their child to foods that aren't healthy

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for them. Section 2 for instructors: 1. React to signs of fullness rather than overfeeding; young children can typically control their calorie intake; don't make kids eat until they're full unless they're famished; kids' calorie intake fluctuates from meal to meal. Parents and caregivers of children (and youth) from the ages of 5 to 18 should adhere to certain dietary recommendations for nutritious feeding, which include: First, upping your daily veggie and fruit consumption; second, cutting back on juice; and third, going for whole-grain bread and cereals instead of processed grains. Make sure to consume a lot of fresh produce. 2. Make sure to consume small meals every 3 to 4 hours. Stay away from food after 10 p.m. 4 Make sure you get at least 8 hours of sleep nightly. 4. Consume skim milk, low-fat cheese, and low-fat yogurt as part of your low-fat diet. Keep blood pressure in check. 6. 7. Maintain a healthy weight. 8. Picking out better options for food and drink, such as whole grains, produce, healthy fats, and lean proteins 9. Cutting back on sugary drinks and unhealthful foods like potatoes, processed meat, refined cereals, and sweets 10. Getting more people moving 11. Cutting back on screen time, TV time, and other forms of "sit time" 12. De-stressing Phase 3 of clinical practice: First, the clinician treating obesity should include the patient's family and any other caretakers in the treatment process. Additionally, the patient should start making small changes early on. Clinicians should communicate to families the medical consequences and long-term risks of obesity. The federal government's Department of Health should increase funding for nationwide studies on obesity so that we can compare and evaluate the severity of nutritional issues and develop solutions.

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