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Prevalence of Obesity among a Group of Kirkuk Women

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Abstract: An obese person's body suffers from the accumulation of fat, which has a detrimental effect on their health. A person is considered obese when their body weight is at least 20% more than it should be. Overweight is when the Body Mass Index (BMI) is between 25 and 29.9. While a BMI of 30 or more indicates obesity. The research goals are to detect how prevalent obesity is among Kirkuk women and its relation with education level, exercise, and other factors. The type of study is cross sectional study. The area chosen for this study was Kirkuk city, samples taken randomly from schools among teachers, primary health care visitors, and Azadi teaching hospital (mainly relatives of patients). The women were aged between 18-66 years old, and we exclude pregnant females. The data was collected using questionnaires. We measured height by tape-measure and weight by scales, and then we calculated their BMI using the following equation: BMI = weight in Kg/height in meter squared. Our results showed that 40% of the women were overweight, 23% were obese, and 12% were morbidly obese. Only around 25% of the sample was of normal weight. In our study, we found the prevalence of overweight and obesity increases with age. This finding might be related to a decrease in physical activity as people get older. Concerning the type of clothes worn by the women, it was found that those women who wore skirts and trousers quickly noticed changes in their body weight. We found a significant relationship between the increased number of glasses/cups of tea drunk during the day and the prevalence of obesity and overweight. Lactating women were found to be more overweight and obese in this study, but this was not significant. In conclusion, this study mainly has found that normal-weight was less than one-quarter of the sample studied. Type of clothes worn inside the home and older age were the main factors associated with obesity. Despite being a small study in 2 clinics, and the findings cannot be generalized, it still shows there is a problem and should immediately be addressed. More data about this problem needs to be collected and studied. Large studies are required to evaluate the prevalence of obesity in Kirkuk city. Encourage the community to change their eating habits and to exercise as they get older. Educate the community about the negative effects and complications of obesity. The study detected that most of the participants in the study were overweight or obese.

Keywords: obesity, overweight, women, Kirkuk.

一群基尔库克妇女的肥胖患病率

摘要:

一个肥胖的人的身体遭受脂肪的积累，这对他们的健康有不利影响。当一个人的体重比应有的体重高出至少20%时，就被认为是肥胖的。超重是指体重指数(体重指数)介于25和29.9之间。而体重指数为30或更高则表明肥胖。研究目标是检测基尔库克女性肥胖的流行程度及其与教育水平、运动和其他因素的关系。研究类型为横断面研究。本研究选择的地区是基尔库克市，样本从教师、初级卫生保健访问者和阿扎迪教学医院（主要是患者亲属）中的学校随机抽取。女性年龄在18-

66岁之间，我们排除怀孕女性。数据是使用问卷收集的。我们通过卷尺测量身高，通过体重秤

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测量体重，然后我们使用以下公式计算他们的体重指数：体重指数=体重（公斤）/身高（米）的平方。我们的结果显示，40%的女性超重，23%肥胖，12%病态肥胖。只有大约25%的样本体重正常。在我们的研究中，我们发现超重和肥胖的患病率随着年龄的增长而增加。这一发现可能与随着人们年龄的增长而减少体力活动有关。关于女性穿的衣服类型，发现那些穿裙子和裤子的女性很快就会注意到她们的体重变化。我们发现白天饮用的玻璃杯/茶杯数量增加与肥胖和超重的流行之间存在显着关系。在这项研究中发现哺乳期妇女更重和肥胖，但这并不显着。总之，这项研究主要发现正常体重不到所研究样本的四分之一。在家中穿的衣服类型和年龄较大是与肥胖相关的主要因素。尽管是在2个诊所的小型研究，结果不能一概而论，但仍然表明存在问题，应立即解决。需要收集和研究更多关于这个问题的数据。需要大型研究来评估基尔库克市的肥胖流行率。鼓励社区随着年龄的增长改变他们的饮食习惯和锻炼。向社区宣传肥胖的负面影响和并发症。该研究发现，该研究的大多数参与者都超重或肥胖。

关键词: 肥胖、超重、女性、基尔库克。

1. Introduction

Obesity is considered globally as a pandemic that can lead to serious health complications. It is estimated that more than 20% of adults in the UK and more than 30% in the US are obese (obesity means a BMI ≥ 30 kg/m^2). In the last 20 years, obesity prevalence has increased threefold and continues to rise. In developing countries, average national rates of obesity prevalence are not as high, but figures show that there are alarmingly high rates of obesity in many urban communities [1].

1.1. What is Body Mass Index (BMI)?

Body mass index (BMI) is commonly used to assess whether a person is obese or not; normally, it is 18.5-24.9 kg/m^2, overweight is 25-29.9 kg/m^2, and obesity starts when BMI is 30 kg/m^2 and more. BMI is calculated by dividing a person's weight (in kg) by their height (in meter) squared. BMI is the best indicator of a person's healthy body weight [1], but the exact percentage of body fat cannot be measured by it. However, BMI values can be misleading—a muscular man's BMI might be high, although he has less fat than an unfit person whose BMI is lower. However, measuring BMI is generally considered a useful indicator for the average person [1].

Table 1 Classification according to the BMI and risk of comorbidities

Classification	BMI	Risk of comorbidities
Underweight	< 18.5	Low
Normal	18.5-24.9	Average
Overweight	> 25	
Pre-obese	25-29.9	Increase
Obese Class 1	30.0-34.9	Moderate
Obese Class 2	35.0-39.9	Sever
Obese Class 3	> 40	Very sever

1.2. Etiology

Obesity results from genetic, environmental, and socioeconomic factors, and fat accumulation can result from decreased energy expenditure, increased energy intake, or a combination of both, causing serious effects. As much as 40–70% of obesity can be caused by genetic influences [1]. The obesity liability of a person is multifactorial and polygenic in nature, and about 30–50% of the differences in total fat stores between people are thought to be genetically controlled. There are rare monogenic causes of obesity. Melanocortin receptor 4 (MC4R) mutations are found in a small percentage of hugely obese children. Obesity can be caused by secondary conditions, including hypothyroidism, hypothalamic injury, hypogonadism, Cushing's syndrome, and some pharmaceuticals like steroid. Insulin-secreting tumors might result in overeating [2].

Chronic ingestion of excess calories and a sedentary lifestyle are directly related to the prevalence of obesity. Despite these factors being the leading cause in some cases, there is well-recognized evidence of genetic effects on the development of obesity. Studies in adopted children have shown a significant relationship between their BMI and that of their biological parents, but no such relationship is found between their adoptive parents and these children. Studies done on twins have also found significant genetic influences on BMI with mild environmental influence.

In mice, five genes controlling the regulation of appetite have been found. Obesity can be caused by mutations of any gene, and each has a human homolog. One gene codes for a protein found mainly in the adipose tissue—leptin—and another gene for the leptin receptor in the brain tissue. The other three genes have effects on the brain pathways downstream from the leptin receptor. Many other candidate genes for human obesity have been recognized. Single gene mutations are responsible for only a small percentage (4–6%) of human obesity. Most cases of human obesity are believed to be caused by the interactions of environmental factors, multiple genes, and behavior [1].

Exercise can effectively burn calories. Burning 8,000 calories (1 pound of fat = 3,500 calories) can lead to losing one kilogram of fat. Brisk walking is the best initial physical activity for fat burning if you are obese. The combination of a healthy diet and increased physical activity can significantly increase the chances of losing fat permanently and successfully. Exercise and activities are better if suitable for your daily routine. When you add anything as part of your daily life, this is woven into your existing lifestyle and is more likely to be a long-term habit. Try to avoid using an elevator, and increase the use of the stairs, even one or two floors. The same idea can be tried when driving or taking any form of public transport—get off earlier and complete the rest of your journey by walking. If any of your regular shops are within walking distance, leave your car at home. Many studies have shown that most urban car trips outside rush hours are less than a mile long [2] — we can all walk a mile; a morbidly obese person cannot walk a mile. A health care professional's advice should be taken if the case is very obese, unfit, or has any other medical diseases before increasing physical activity.

1.3. Pathologic Consequences of Obesity

An increase in mortality rates is significantly associated with obesity, reaching 50–100% of the increased risk of death from all medical causes compared to normal-weight individuals, mainly due to cardiovascular causes. In the United States, obesity and being overweight are well known as the second leading causes of preventable death, accounting for 300,000 deaths per year. As obesity increases, mortality rates rise, especially when obesity is associated with increased central (intra-abdominal) fat. In a moderately obese person, the life expectancy is shortened by 2–5 years, and in a 20- to 30-year-old male with a BMI > 45, life expectancy might be shortened by up to 13 years. Genetic factors determine the degree to which obesity affects particular parts of the body [2].

1.4. Insulin Resistance and Type 2 Diabetes Mellitus

Hyperinsulinemia and insulin resistance are common features of obesity, increasing with weight gain and decreasing with weight loss. Insulin resistance is mainly associated with central (intra-abdominal) fat rather than the accumulation of fatty tissue in other parts of the body. The association of obesity and insulin resistance in different body tissues, such as fat, muscle, and liver, has been well defined. Many factors are under investigation to find the contributing factors for obesity, including (1) insulin hormone, by trying to induce insulin receptor downregulation; (2) intracellular lipid accumulation; (3) some free fatty acids (if they increase, it can interfere with insulin production); and (4) different peptides in circulation that are produced by adipocytes—these include the "adipokines" adiponectin and resistin, cytokines TNF-& and IL-6, RBP4 — have different expressions in obese adipose tissue and can affect insulin production and action [2].

1.5. Reproductive Disorders

Abnormalities affecting the reproductive axis are highly associated with obesity in both women and men. Increased adipose tissue can lead to male hypogonadism and distribution that resembles a female pattern [2].

Menstrual irregularity is associated with obesity in women, especially in women with upper-body obesity. Laboratory investigations have found decreased SHBG, increased peripheral conversion of androgen to estrogen, and increased androgen production. Oligomenorrhea is found in most obese women; this is associated with ovarian hyperandrogenism and anovulation; up to 40% of women with PCOS complain of obesity [2].

1.6. Cardiovascular Disease

The Framingham Study has found that obesity is an independent risk factor for the 26-year incidence of cardiovascular disease in women and men, including stroke, congestive heart failure, and coronary disease. The best predictor of these risks is the waist/hip ratio. Obesity can increase mortality due to cardiovascular causes in women at BMIs as low as 25. Atherogenic lipid profile is associated with obesity, especially abdominal obesity; obesity is also associated with high levels of very-low-density lipoprotein, low-density lipoprotein (LDL) cholesterol, and triglyceride; decreased levels of the vascular protective adipokine adiponectin, and decreased high-density lipoprotein cholesterol. Hypertension is highly related to obesity [2].

1.7. Pulmonary Disease

Obesity is significantly associated with many respiratory diseases and abnormalities. These increased work of breathing, reduced chest wall compliance, reduced expiratory reserve volume and functional

residual capacity, an increase in minute ventilation due to increased body metabolic rate, and morbid obesity is believed to be highly associated with the "obesity hypoventilation syndrome" with attenuated hypoxic and hypercapnic ventilatory responses and obstructive sleep apnea [2].

1.8. Gallstones

Biliary secretion of cholesterol increases in obesity, supersaturation of bile, and higher incidence of gallstones, especially cholesterol gallstones [2].

1.9. Cancer

The mortality rate from cancer in males is increased with obesity, including rectum, colon, esophagus, liver, pancreas cancer; among females, obesity is attributed to a high mortality rate from breast, gallbladder, ovaries, endometrium, and cervix cancer [2].

1.10. Bone, Joint, and Cutaneous Disease

Osteoarthritis is highly related to obesity, partially related to the trauma of excess weight-bearing joints and joint malalignment. Obesity is associated with high gout prevalence [2].

2. Patients and Methods

The area chosen for this study was Kirkuk city; samples were taken randomly from school teachers among primary health care visitors and from Azadi teaching hospital (mainly relatives of patients). The age taken was women between 18-66 years old. We exclude pregnant females. Data was coded on the questioner. We measured height by a tape measure and weight - by scales, and then we calculated BMI by the equation BMI=weight in Kg/height in meter squared. We asked about marital status, smoking, eating habits, tea and coffee drinking, using a spoon for eating, lactation, home and outside home cloths, presence or absence of chronic disease, practicing exercise or not, education level and finally we asked the opinion of women if she considers herself obese or not and the cause behind her obesity. We took the data in five months, and the sample size is 200 cases.

3. Results

Our results showed that 40% of the studied samples were overweight, 23% were obese and 12% were morbidly obese. Just 25% of the sample studied were of normal weight. 75% of the women were abnormal, as shown in Fig. 1.

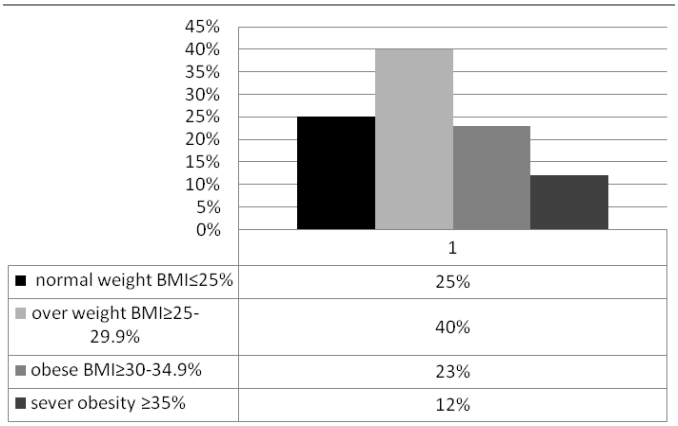

Fig. 1 Distribution of study sample by BMI

Table 2 shows the relation between age and weight and indicates that the proportion of women with overweight, obesity, and morbid obesity increases with increasing age.

Table 2 Distribution of the women by age and BMI

Age	Total No.	Normal weight BMI < 25 kg/m2	%	Overweight and obesity BMI > 25 kg/m2	%
< 30	50	25	50	25	50
31-40	47	12	25.5	35	74.5
41-50	56	8	14.3	48	85.7
> 50	47	5	10.6	42	89.3
Total	200	50	25%	150	75%

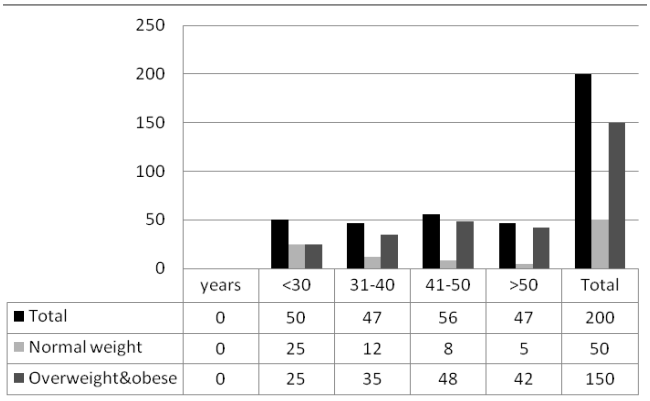

Fig. 2 Distribution of the women by age and BMI

Table 3 shows no significant relation detected between the BMI and the education level of the women.

Table 3 Distribution of the women by BMI and educational level

Educational level	Total No.	Normal weight BMI < 25 kg/m2	%	Overweight and obesity BMI > 25 kg/m2	%
Illiterate	7	1	14.3	6	85.7
Read and write	23	5	21.8	18	77.2
Primary	32	5	19.4	27	80.5
Intermediate	24	4	16.2	20	84.8
Secondary	41	13	31.8	28	68.2

Institute	23	5	19.04	18	80.9
College	50	17	34	33	66
Total	200	50	25	150	75

Table 4 reveals that most women (87.6%) who believe that they were obese or overweighted were this, and 72.07% of the women who did not believe that they were obese or overweighted were found to be this.

Table 4 Women's opinion about their weight status by actual BMI

Do you think you're obese?	Total No.	Normal weight BMI < 25 kg/m2	%	Overweight and obesity BMI > 25 kg/m2	%
Yes	89	11	12.3	73	87.6
No	111	31	27.9	80	72.07

Table 5 reveals the causes of obesity or overweight as explained by the women. The majority of the women thought that the cause of obesity was pregnancy and childbirth. Other women associated their status with the family history, eating habits, and inactivity.

Table 5 Causes of obesity as expressed by women who considered themselves overweight

Causes of obesity	No.	%
Don't know	15	16.8
Eating habit	11	12.3
Family history	12	13.4
Pregnancy and childbirth	21	23.5
No physical activity	13	14.6
Eating habits with no physical activity	13	14.6
Total	89	

Table 6 summarizes the factors studied that can be associated with overweight and obesity. The incidence of overweight and obesity was greater among women with more tea and coffee consumption, chronic disease, using one dish for the whole family and spoon for eating. Factors not associated with obesity and overweight were smoking, lactation, clothing worn inside and outside the home (p = 0.100), and exercising.

Table 6 The factors associated with overweight and obesity

Variable	Total No.	Normal weight BMI < 25 kg/m2	%	Overweight and obesity BMI > 25 kg/m2	%	Statistic Test (p)
Smoking						0.5
Yes	4	2	50	2	50	
No	196	42	21.4	154	78.5	
Tea and coffee						0.05
Non	27	6	22.2	21	77.7	
1-2	64	16	25	48	75	
3-4	64	12	18.7	52	81.2	
5-6	29	5	17.2	24	82.7	
> 7	9	2	22.2	7	77.7	
Eating habit						0.05
One dish for the whole family	13	1	7.6	12	92.3	
Each family member has a dish	158	29	18.3	129	81.6	
Both practice	29	11	37.9	18	62.06	
Using a spoon for eating						
Yes	199	41	20.6	158	79.3	0.001
No	1	0	0	1	100	
Lactation						0.975
Yes	79	5	6.3	74	93.6	
No	121	34	28.09	87	71.9	
Home cloth						0.1
Pajama	42	15	35.7	27	64.2	
Gown	104	17	16.3	87	83.6	
Both	62	12	19.3	50	80.6	
Cloth outside home						0.1
Skirt	120	30	25	90	75	
Abaa	80	10	12.5	70	87.5	
Presence of chronic disease						
Yes	61	7	11.47	54	88.5	0.02
No	139	36	25.89	103	74.1	
Exercise						0.1
Yes	13	3	23.76	10	76.9	
No	187	38	20.3	149	79.6	

4. Discussion

Overweight prevalence among our sample was 40%, and the prevalence of obesity and morbid obesity was 35%, giving about 75% of the studied sample being above the normal ideal BMI. The results of our study can be compared to the results of a national study carried out

in Jordan by Abbas et al. [3]. That study has found the prevalence of obesity was 37.6% and prevalence of overweight among women was 32.9%, this finding is exactly similar to the findings in our study. Partly this finding can be explained by the similar eating habits in the neighboring states or the similar genetic compositions of both two people [17].

Regarding obesity, the prevalence in this study is (35%), and this is much more than that found by Swiden (23.16%) in 1997 when he studied a sample of 4563 females in Baghdad city [3]. This difference is mainly related to the improvement in the socio-economic lifestyle of the Iraqi people after the end of the international economic embargo on Iraq, which has led to improvement in the feeding style and weight gain among the Iraqi people in general [17].

The high prevalence of obesity and overweight is an important alarm; we found that women with normal body weight were only 25%. Obesity is considered a serious concern in most parts of the world, including the USA. A study carried out in the USA on 16884 males and females in 1988-1994 found a high prevalence rate in the studied sample (55%) [4]. Another study revealed a rising rate of obesity prevalence from 12% in 1991 to 17.9% in 1998 [5]. A Brazilian study has found that more than 50% of females aged 50-69 years old from the northeast and southeast areas of Brazil were obese or overweighted [6]. A study done in Switzerland by Eichholzer and Camenzınd found no statistically significant findings, with a stated prevalence of obesity of 5% and overweight of 26% [7]. Another study carried out in Madagascar has found that just 2.4% of the sample were obese, and 6% of the sample had overweight [8]. In China, a study done in the mid-1990s, which involved a big sample (42751), revealed that the prevalence of overweight was 21.71%, and the prevalence of obesity was 3.73% among females. However, higher rates were found in Shandong and Beijing, so the authors of the study found that obesity and overweight were becoming much more prevalent in China [9].

The results of our study have found that the prevalence of obesity and overweight increases with increase in age of the candidate. This might be related to a decrease in physical activity and exercise with increase in age. Let us say that if this inactivity results in an increase in body weight by just 1 kg every year, at the end of 10 years, the total body weight will be increased by 10 kg. The association between the age and body weight is well recognized by many other authors [6, 9, 10].

Regarding eating habits, when many people eat the same dish, the amount eaten is neither limited nor measurable, so this might lead to some people eating a lot more food than usual. This study has found the prevalence of obesity and overweight among the people who eat from one dish for the whole family was much higher than those who had their own private dishes; this difference is statistically significant. Using (or not using) a spoon when eating was another eating habit that was highly associated with obesity. This finding does not agree with the study done in Baghdad by N.G. AL Tawil, M.M. Abdulla and A.J. Abull Ameer [17].

In general, Iraqi people and people in other Arab countries add high amounts of sugar (and so more calories) in the tea [17], so it is one of the causative factors of weight gain. This study has revealed that the prevalence of obesity and overweight significantly rose with the increasing number of glasses/cups of tea taken during the day. This finding is statistically significant *(P* = 0.05) [17].

Regarding the lactating women, in Iraq there is a general thought that they have to eat more food than usual so that they can produce more milk for lactation. Our study has found that the prevalence of obesity and overweight was higher in lactating women. However, this finding was not statistically significant. The findings of high prevalence among this group could be related to the age or to the eating habits (the mean age of non-lactating women was 27.21 years compared to the mean age of lactating women of 33.69). This relation between obesity and lactation was recognized and studied by many other authors, but no definite conclusion was found [11, 12].

There was no relation between smoking and obesity, but this might be attributed to the number of smokers in this study being small, so we cannot make any valid conclusions. In the study of Senikal, Stin, and Nil on 2100 people, smoking was not associated with obesity [13]. Another study conducted in the US on 16,587 people found that quitting smoking was related to a 1.98 cm increase in waist circumference measurement [14].

Chronic diseases have been found to be associated with obesity and being overweight. The types of chronic diseases have not been asked in the study participants nor the drug(s) used for treating them. Furthermore, we cannot determine if the chronic diseases preceded obesity or resulted from obesity, as this was a cross-sectional study. Therefore, no clear conclusion can be made [17].

In our study, only 13 women exercised. Despite the lower prevalence of obesity and being overweight among these women, the difference was not statistically significant, although this may be related to the small sample size in our study. Physical inactivity and a sedentary lifestyle have been studied by many authors, who have all revealed a significant association between

physical inactivity and being overweight, and weight loss and exercise [13-15].

No relationship was found between obesity and education level; however, the Jordanian National Study found a significant inverse relationship with the prevalence of obesity among illiterate people and those with lower levels of education [3]. A Spanish study also found an inverse relationship between metabolic syndrome and education level [16].

5. Conclusions and Recommendations

In conclusion, the main finding of our study is that normal weight was found in only 25% of the study participants. The older age group was associated with an increased incidence of obesity. This study is considered relatively limited as it was carried out in only two health clinics, and the findings cannot be generalized over the whole city. However, it sounds an important alarm and suggests immediate action is required regarding the prevalence of this serious medical problem. Furthermore, it suggests the issue warrants more data collection from different clinics, which should then be analyzed.

A more extensive study with a larger number of cases is required to evaluate the prevalence of obesity in Kirkuk city.

Encourage the community to change their diet, exercise more as they age, and not live a sedentary lifestyle.

Educate the community about the effects and complications of obesity on their lives.

The study's focus is dealing with an important and sensitive issue, which is obesity and being overweight. It found that although most of the participants in the study (75%) were overweight or obese, different factors played a role in this issue, such as eating habits, lifestyle, and exercise. In addition, other factors such as the nature and type of clothes worn can affect the assessment of the BMI. The study also showed that obesity and being overweight are increasing with age and can cause serious problems, especially in those with chronic medical diseases like DM and HT.

Some social habits, such as drinking tea with too much sugar, is a significant cause of obesity that needs to be modified. No relationship was found between education level, smoking, and obesity.

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