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PREVALENCE AND ASSOCIATED SOCIODEMOGRAPHIC FACTORS OF OBESITY AND OVERWEIGHT AMONG PUBLIC SCHOOL TEACHERS IN KURDISTAN REGION

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ABSTRACT

Background: Obesity and overweight are two of the main serious health risk factors worldwide. Teachers have been found to be more likely than other groups of the population to be obese or overweight. The study aimed to explore the overweight and obesity prevalence and determine their sociodemographic factors among public school teachers in a sample population in Iraqi Kurdistan.

Methods: The cross-sectional study design was applied from September 15th, 2021, to April 1st, 2022. Stratified-simple random sampling technique was used to select 500 school teachers aged from 18 to 64. The current study used a questionnaire and composed of two parts: the first part; included sociodemographic characteristics, and the second part, consisted of measuring body mass index.

Results: The majority (40.6%) of teachers were aged 30–39 and 64.8% of them were female, and 54.6% were primary school teachers. The combined overweight and obesity prevalence was 71.4%. The higher obesity and being overweight prevalence was found in those over the age of 30, female, married, low to moderate-income teachers, and teachers with a diploma and lower education levels. The BMI of teachers was statistically associated with age (p=0.024), gender (p≤ 0.001), marital status (p≤0.001), income (p≤ 0.001), and education level (p=0.007).

Conclusions: The prevalence of overweight and obesity is high among primary school teachers in this region. They are associated with socio-demographic characteristics.

***KEYWORDS**:* Obesity, Overweight, School teachers, Demographic factors, Kurdistan Region.

1. INTRODUCTION

Obesity and overweight are conditions characterized by abnormal or excessive accumulations of body fat, which have a negative influence on health. The body mass index (BMI) is a standard tool that is used to classify body weight. Body weight is considered obese when BMI is more than 30kg/m^2 and considered overweight when BMI is more than 25kg/m^2 (WHO, 2021).

The body energy balance indicates the association between the intake of energy and energy-consuming through metabolic processes and physical activity (PA) (Hill *et al*., 2012). The energy balance of the body refers to the energy intake equaling energy expenditure, which leads to the stability of body weight. The differences between energy-consuming or expenditure and energy intake will lead to body weight loss (negative energy balance) or gain of body weight (positive energy balance) (Gilman & Volpe, 2018).

Sedentary behaviors contribute to various health problems such as obesity /overweight occurrences and other chronic diseases (Musaiger *et al*., 2016). Obesity and being overweight are growing public health issues that have spread globally. Many findings have shown that obesity and overweight are related to various non-communicable diseases like hypertension, cardiovascular disease, type 2 diabetes mellitus, hyperlipidemia, and various types of cancer (WHO, 2021).

Obesity and overweight are worldwide public health issues. In 2016, it was estimated that more than 1.9 billion adults aged 18 years and older were overweight. Of these, more than 650 million were obese. Overweight and obesity are responsible for over 4 million deaths among people each year, according to the global burden of diseases report since 2017 (WHO, 2021).

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Socio-demographic characteristics are important factors that contribute to well-being (Bala *et al*., 2016; Pollitt *et al*., 2007). Diseases are associated with socio-demographic factors, despite whether they are infectious, genetic, metabolic, malignant, or degenerative (Yang *et al*., 2013). Furthermore, studies found that obesity has been linked to low socioeconomic status (SES) (Wagner *et al*., 2018); also, findings on gender difference and weight found that gender was associated with overweight and obesity (Asif, *et al*., 2020).

Teachers are considered a high-risk occupation subgroup that is more susceptible to obesity factors than the general population (Pobee *et al*., 2013). Because of the nature of their jobs, they spend a lot of time doing sedentary activities, and their socioeconomic status may have an impact on their ability to adapt to less PA (Zubery *et al*., 2021). The current study aimed to identify the trend of association between overweight/obesity and socio-demographic factors among public school teachers in the Kurdistan Region, Iraq.

2. METHODS

2.1. Design

The current cross-sectional study was conducted among public school teachers in Duhok City in Iraqi Kurdistan between September 15th, 2021 and April 1st, 2022.

2.2. Population and sampling

The sample size required for this study was calculated by the Cochrane formula. The Cochrane formula is a formula for large sample size. The total number of teachers in the schools in Duhok City was 9684. We estimated including 370 teachers in the study. However, we increased our sample size by 500 to compensate for the possible missing information or rejection. The total number of teachers was divided into 3 strata (primary, intermediate, and secondary school teachers). The number of teachers chosen from each stratum was based on the equal proportion of teachers, and they were all included in the formal lists obtained from the General Directory of Education. After taking strata representation from the total number of teachers, simple random sampling is used to select the numbers of teachers from each stratum. After selecting the teachers, the author explained the study's aim to the teachers and invited them to the purpose of study participation. Current study data was collected through direct interviews with selected teachers.

2.3. Inclusion and exclusion criteria

Teachers from both genders who agreed to engage in this study were included. However, those female teachers who were in their menstrual cycle or whose participation had declined were excluded.

2.4. Data collection

The required information of this study was obtained through a researcher-administered self-report technique and recorded in a pre-designed questionnaire. The questionnaire used in this study was divided into two following parts. Sociodemographic factors were part of the first part, and body measurements of height, weight, and BMI were the second part. The socio-demographic data of the study participants' socio-demographic factors were: age, gender, education level, socioeconomic status, and marital status.

2.5. BMI Calculation

An individual's BMI was calculated by dividing their weight in kilograms by the square of their height in meters. The categories of BMI were classified as follow: less than 18.5 kg/m^2 recognized underweight, from 18.5-24.9 kg/m^2 Normal, 25-29.9 kg/m^2 overweight, and above 30 $kg/^{m2}$ recognized obese (WHO, 2021).

2.6. Data analysis:

SPSS version 23 was used to analyze descriptive statistics such as mean, standard deviation, frequency, and percentage. The association between variables was determined using Chi-square, with a statistical significance level of $p<0.05$.

2. RESULTS

Table 1 reveals that the majority of teachers were at age 30-39 (40.6%) and 64.8% of them were female, more than half (54.6%) of them were working in primary school. Regarding marital status, most of the school teachers were married (83.2%). With regard to educational level, most of them had graduated with a diploma or college graduate (47%, 47.4%), respectively.

Table (1): Sociodemographic characteristics of teachers

		Statistics	
Characteristics (n=500)		**No (%)**	**Mean (SD)**
Age	Less than 30 years	28 (5.6)	41.24 (7.948)
	30-39	203 (40.6)	
	40-49	184 (36.8)	
	50-More	85 (17)	
Gender	Male	176 (35.2)	
	Female	324 (64.8)	
School Type	Primary school	273 (54.6)	
	Intermediate school	121 (24.2)	
	Secondary school	106 (21.2)	
Marital Status	Single	80 (16.0)	
	Married	416 (83.2)	
	Divorce	4 (0.8)	
Educational Level	Primary school	3 (0.6)	
	Intermediate school	3 (0.6)	
	Secondary school	14 (2.8)	
	Diploma	235 (47)	
	College	237 (47.4)	
	Post Graduate (MSc, PhD)	8 (1.6)	
Income	<500000-1500000	382 (76.4)	
	>1500000-3000000	99 (19.8)	
	>3000000 and More	19 (3.8)	

Concerning body mass index among school teachers, there was a high prevalence of overweight and obesity among school teachers 71.4% (overweight 39.4%, obesity 32%), and approximately a quarter of them were at normal body weight (27.6%) as shown in figure 1.

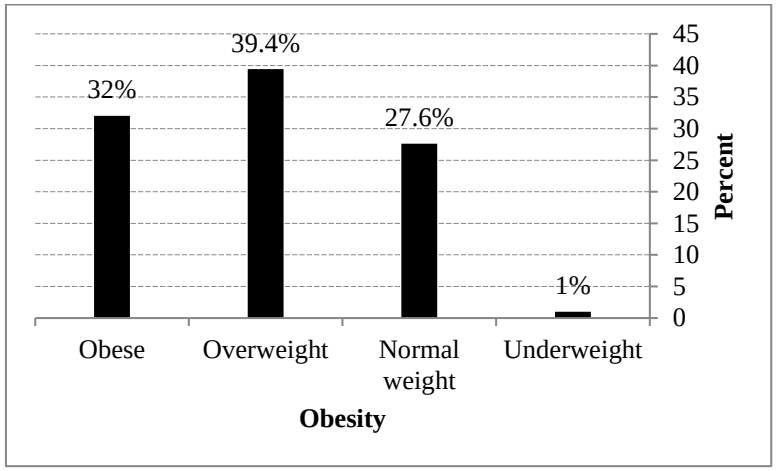

Fig. (1): Obesity of school teachers

As shown in Table 2, the association between high BMI and sociodemographic factors of teachers. Overweight and obesity were significantly associated with age 50 and older (P=0.024), being female (P≤ 0.001), married (P≤ 0.001), having a diploma or graduate degree (P≤ 0.001), and earning less than 3000,000 IQD (P=0.007).

Table (2): Association between BMI and sociodemographic factors of school teachers.

Characteristics (n=500)		BMI no (%)				P. Value
		Under-weight	Normal weight	Over-weight	Obese	
Age	Less than 30 years	0(0.0)	14(2.8)	8(1.6)	6(1.2)	0.024*
	30-39	2(0.4)	65(13)	81(16.2)	55(11)	
	40-49	3(0.6)	38(7.6)	79(15.8)	64(12.8)	
	50-More	0(0.0)	21(4.2)	29(5.8)	35(7)	
Gender	Male	5(1)	59(11.8)	76(15.2)	36(7.2)	≤ 0.001*
	Female	0(0.0)	79(15.8)	121(24.2)	124(24.8)	
Marital Status	Single	0(0.0)	40(8)	28(5.6)	12(2.4)	≤ 0.001*
	Married	5(1)	97(19.4)	167(33.4)	147(29.4)	
	Divorce	0(0.0)	1(0.2)	2(0.4)	1(0.2)	
Educational Level	Primary school graduate	0(0.0)	0(0.0)	1(0.2)	2(0.4)	≤ 0.001*
	Intermediate school graduate	0(0.0)	0(0.0)	2(0.4)	1(0.2)	
	Secondary school graduate	0(0.0)	4(0.8)	5(1)	5(1)	
	Diploma	2(0.4)	49(9.8)	86(17.2)	98(19.6)	
	College graduate	2(0.4)	83(16.6)	101(20.2)	51(10.2)	
	Postgraduate (MSc, PhD)	1(0.2)	2(0.4)	2(0.4)	3(0.6)	
Monthly Income	<500000-1500000 IQD	5(1)	112(22.4)	154(30.8)	111(22.2)	0.007*
	>1500000-3000000 IQD	0(0.0)	17(3.4)	36(7.2)	46(9.2)	
	>3000000 IQD	0(0.0)	9(1.8)	7(1.4)	3(0.6)	

Pearson chi-squared test was performed for statistical analyses.

4. DISCUSSION

Obesity and overweight have been recognized as a worldwide public health issue (Zubery *et al*., 2021). Both developed and developing countries are affected (Murtagh & Collaboration NRF, 2017). The rising overweight and obesity prevalence in developing countries has enhanced the spread of non-communicable diseases like cardiovascular diseases, diabetes, and cancer, necessitating the implementation of preventive measures (Ajayi *et al*., 2016). Teachers have been identified as having several risk factors that may correlate to health problems development such as obesity and hypertension (Monica *et al*., 2018).

Regarding the BMI of teachers, the overweight and obesity prevalence was high at 71.4% (39.4% of them were overweight, and 32% were obese). This study's high prevalence of overweight and obesity corresponded with previous findings, which revealed that 13% of adults worldwide, ages 18 and older, were obese and 39% were overweight in 2016 (WHO,2021).In the Eastern Mediterranean region, where the overweight/obesity prevalence among adults ranged from 25% to 81.9 %, In 2014, the adult prevalence of overweight in Kuwait was 37% and obesity was 40.3 %, while in Iran, the overweight/obesity prevalence among adults was 59.3 percent in 2016. In 2017, 77.2 % of men and 74.5 % of women in Jordan were overweight or obese, whereas 35.5 % of adults were overweight and 20.6 % were obese in Morocco (Pengpid & Peltzer, 2021). Furthermore, the findings corresponded with earlier studies, which found that the overweight and obesity prevalence among working adults was 68.9 % (31.1 % were overweight and 37.8 % were obese). In addition, 60% of teachers from the Nursing School were overweight/obese in Brazil (Dauchet *et al*., 2006).

Sedentary behaviors among working adults may be affected by their professional nature and socioeconomic status. This may result in less PA and the consumption of unhealthy foods, contributing to an increase in overweight/obesity prevalence among working adults (Choi *et al*., 2010; Ismail *et al*., 2013). Furthermore, because teaching is a mentally demanding profession, many teachers engage in less PA and consume unhealthy foods (especially those living in urban areas) (Opara & Maduka, 2020). According to various published literature, sociodemographic factors like age, gender, marital status, and residence area are risk factors for overweight and obesity (Khan *et al*., 2017; Asif *et al*., 2020; Abdullah RY *et al*., 2017).

The results of the present study revealed that older teachers had higher obesity rates compared to younger age groups. The older the teachers, the higher the obesity occurrence (Bhatta *et al*.,

2014; Rahayu *et al*., 2012). These results are consistent with systematic review results that found that body weight gradually increases with age and obesity remains a significant issue among older adults (Hajek *et al*., 2022). The prevalence of central obesity among those aged > 40 is approximately double that of those aged 15–40 (48.0% versus 23.8%), due to the fact that older adults have a lower basal metabolic rate than younger adults, resulting in the excess fat accumulation due to an increase in the energy intake to energy expenditure ratio. Another possibility is that older people are less physically active than younger adults and have lower energy expenditure (Wong *et al*., 2020). Additional explanation is that as people age, their body composition changes, resulting in an increase in fat mass and a decrease in fat-free mass (Seidu *et al*., 2021). Additionally, the fact that the peak age for career progression is between 40 and 60 years old may be associated with the increase in obesity with age, so people tend to relax and decrease in PA, hormonal changes may also play a role (Low *et al*., 2009).

In the current study, women had greater obesity rates and were overweight than men, as they were in many other studies that found overweight and/or obesity to be more frequent among women globally (Balhareth *et al*., 2019; Macia *et al*., 2017; Fontes *et al*., 2019; Kaboré *et al*., 2020; Mkuu *et al*., 2021), as well as previous research by Hajian-Tilaki & Heidari (2007); Manios *et al*., (2005); Yabanci *et al*., (2010). Consequently, after marriage, being confined to the home and engaging in less PA may be the primary causes of weight gain. Studies revealed that married adults had higher obesity prevalence due to the fact that married couples are less physically active than singles and are more likely to eat together, which may increase their food intake (Balhareth *et al*., 2019). Biological factors such as less lean mass and more fat mass may account for gender differences in overweight or obesity. Furthermore, sex hormones have a significant effect on the deposition of fat during the childbearing period and increase the risk of excessive weight gain in women (Zubery *et al*., 2021).

In terms of monthly income as a measure of socioeconomic status, the obesity prevalence was higher among lower-income teachers compared to higher-income teachers in this study. The socioeconomic level has been related to higher overweight/obesity rates and poor dietary quality, especially among women (Cois & Day, 2015; Micklesfield *et al*., 2013; Steyn & McHiza, 2014). Furthermore, poverty has been linked to unhealthy behaviors, though the mechanism behind the link is unknown (Lynch *et al*., 1997; Moore & Cunningham, 2011). Factors including education and income revealed the significant relationship between socioeconomic level and living conditions. Education is recognized as a significant socioeconomic component of development because it provides knowledge and life skills that enable better-educated people to have easier access to health-related information and resources. Furthermore, higher household incomes result in improved nutrition, housing, education, and recreation (Adler & Newman, 2002).

Additionally, in developing countries, researchers have found an association between wealth and obesity, which may be explained in part by people in transition overeating due to economic access to food (Monteiro *et al*., 2001; Dinsa *et al*., 2012). Despite this, in developed countries, research implies that poverty is associated with a higher risk of obesity because low-socioeconomic people are more likely to consume junk foods, which are major obesity risk factors (Kim & von dem Knesebeck, 2018; McLaren, 2007).

People with a high socioeconomic status due to their various occupations may have little or no time to exercise. They may engage in less PA, and others may consider physical activity a luxurious living barrier (Seidu *et al*., 2021). Education can serve as a guide to maintaining a healthy weight and body condition. Obesity prevention and promotion efforts are conducted by providing information about the ideal weight. The capability to pick up information from the media is another crucial skill that people must develop to acquire accurate information from the media (Ma & Xiao, 2010; Tammelin *et al*., 2004). The present study findings showed that there was a significant association between education levels and inversely associated with overweight/obesity. These results are similar to the results of other studies (Hajian-Tilaki & Heidari, 2010; Aekplakorn *et al*., 2007). This could be because educated people are more likely than their counterparts to participate in preventive health behaviors like regular exercise and a healthier diet, and women are less likely to have high parity, which is associated with overweight and obesity (Borders *et al*., 2006).

Married teachers had a higher prevalence of overweight and obesity than unmarried teachers. These findings agree with the findings of other studies (Pollitt et al., 2007; Alami et al., 2021; Olatunbosun *et al.*, 2011; Averett *et al*., 2008). Although the exact mechanism associating marital status and overweight/obesity is unknown, several authors have proposed some theories to explain the rise in BMI during marriage, including a) couples are encouraged to eat more regular meals and to eat foods that are richer and denser, with less attention paid to weight control diets and physical exercise habits. Couples also spend more time together building their houses and rearing their children due to the social obligation of marriage. (b) The marriage market hypothesis proposes that single people, particularly women, purposefully lose weight to appear more attractive to possible husbands. This is being investigated by researchers (Prichard & Tiggemann, 2014; Klos & Sobal, 2013). However, after marriage, they are no longer concerned with attracting a mate. This could predispose to an increase in BMI. c) People with lower BMIs, particularly women, are more likely to be selected for marriage (Averett *et al*., 2008). d) Excessive weight gain during pregnancy and postpartum pregnancy weight retention is also known to be significant risk factors for subsequent overweight/ obesity in women (Leddy *et al*., 2008). In this region, the prevalence of overweight and obesity among primary school teachers is high and linked to socio-demographic characteristics. The study recommended further studies to be conducted to investigate the trend of overweight and obesity and associated factors.

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