

Obesity Among Adult Patients Aged 18 Years Old And Above Attending Main Primary Health Care Centers In Babil Governorate, Iraq 2015: Prevalence And Some Possible Risk Factors

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Abstract

Background: A cross-sectional survey was conducted at the period from 1st of January to 31st of March 2015 in Babil Province-Iraq. A systematic random sampling technique was used to collect 420 patients from randomly chosen 8 main primary health care centers. They directly consented to an interview by the researcher by using questionnaire form. Of the 420 patients, 168 (40%) were obese. The body mass index classes had a statistical significant association with ; age, occupation, residence (P=0.000). Eating: sweet, chocolate (P=0.000); fruit (P= 0.001); skipping breakfast (P=0.027); TV watching time (P=0.004); moderate activity frequency and time consumed (P=0.000), sleep duration, family history of obesity (P=0.000). Logistic regression analysis predicted some factors that increased the odds of obesity; age (OR=1.159), no job or retired(OR=10), business (OR=12.6), skipping breakfast (OR=1.46), eating sweet and chocolate (OR=2.709), time of TV watching (OR=3.319), and family history (OR=3.746), whereas some factors decreased the odds like; farmer (OR=0.013), laborer (OR=0.042), rural residence (OR=0.136), eating fruit (OR=0.502), moderate physical activity (OR=0.26) .

Conclusions and recommendations: Obesity prevalence was 40%, and associated with socio-demographic features, eating habits, physical activity , sleep duration, and family history. The study recommended adoption of health education programs about obesity by Ministry of Health regarding healthy diet, decrease sedentary lifestyle, encouraging of physical activity at all ages for proper prevention of obesity.

Key words: Obesity, Lifestyle, Healthy diet.

INTRODUCTION

Obesity is a prevalent metabolic condition, which is in recent years has been increasing explosively becoming a major health challenge.

Currently, the prevalence of obesity has been estimated to count 671 million individuals and, if trends continue, projection on models have estimated the global obesity prevalence to

reach 1.12 billion individuals by the year 2030^(1,2).

Obesity is defined as a state of accumulation of abnormal or excessive body fat that may impair individual's health and well-being⁽³⁾. It is a major public health problem resulting in serious social, physical and psychological damage, with high rate of morbidity and mortality⁽⁴⁾. In 2014, World Health Organization (WHO) stated that more than 1.9 billion adults aged 18 years and older are overweight with 600 million adults are obese representing 39% overweight and 13% obese respectively⁽⁵⁾. It has been speculated that diet and lifestyle play a significant role in both the development and control of obesity⁽⁶⁾.

A strong association has been made between socioeconomic status (SES) and obesity with an inconsistent relationship that has been reported between these two factors, depending on the degree of the economic development of the country⁽⁷⁾. It is associated with the increased risk of serious health problems such as, cardiovascular disease, type 2 diabetes mellitus, and various types of cancer where, these 3 comorbid conditions are associated with great use of health care services among obese patients⁽⁸⁾. Obesity can be measured by various methods such as body mass index BMI, waist circumference, waist-hip ratio, skin-fold thickness, underwater weighing and bioelectrical impedance⁽⁹⁾.

In Eastern Mediterranean Region, it has been shown that there were certain possible factors determining obesity such as; nutrition transition, inactivity, skipping breakfast, high intake of sugary beverages, in addition to long period of time watching TV⁽¹⁰⁾.

In Iraq, especially in Babil governorate, there is no national figure available on obesity with anecdotal data about them and it is not representative. It has been stated, however, that obesity constituted 25% among Iraqi women

attending 2 outpatients clinics in Baghdad with the significance of older age⁽¹¹⁾.

Materials and Methods

A Cross-sectional survey conducted in Babil governorate in the middle of Iraq, due to the lack of research on adult obesity and its associated possible risk factors in this city. Male and female adult patients, aged 18 years and above attending main Primary Health Care centers in Babil governorate for any cause and meet the inclusion criteria of the study at the period from 1st of January to 31st of March 2015, would be included in the study. All the patients participated in the study gave informed consents of their participation before the enrollment in the study. Any currently pregnant women at the time of interview was excluded from the study.

An appropriate sample size was calculated according to the sample size determination equation. The following sample equation was applied⁽¹²⁾.

$$Z^2 \times p \times q$$

$$N = \frac{\quad}{d^2}$$

where : N is the sample size required for the study. $Z^2 = 1.96^2$ which is statistical for a level of confidence of 95%.

P: expected proportion (0.5) and according to the literature and related studies of the world, It is expected that prevalence (proportion) is around 50 %. $q = 1-p = 0.5$, d = absolute precision and it was set as 5% (0.05). According to the equation, the sample size required for this study is **384** patients. By adding about 10% for non-response, the total sample at the end was **420** patients.

According to the data obtained from Ministry of Health (MOH) – Babylon Health Directorate/ Public Health Department, there are 42 main primary health care centers

distributed throughout the whole of Babil governorate, where 25% of the centers located in the northern part of the governorate (Al-Musayyeb and Al-Mahaweel provinces), 50% of them in the middle part (Al-Hilla province), whereas the rest 25% located in the southern part (Al-Hashimiyah province) with coverage of both urban and rural areas of the governorate.

Stratification was done on these centers and 8 centers being chosen by simple random sampling, 2 centers from the northern, 4 from the middle and 2 from the southern part. Then, the patients from each center were selected by systematic random sampling methods to choose every 5th patients who met the inclusion criteria; 50 patients were obtained from each center by estimating the daily attending patients to the selected centers and dividing this number on the sample needed by the researcher to find the interval between the selected patients.

Regular visits were conducted on these centers during the period of the study, 4 days per week with 2 days/ week for the middle centers and one day/week for each southern and northern centers respectively; 6-7 visits were conducted to each center throughout whole period of the survey. The time of attending in each center was 4 hours from 9 am o'clock to 1 pm o'clock including the time consumed for the interview with each patient, measurement of height and weight for each, explaining the benefit of the study. Number of patients included in the study was 420, 100 from the northern, 220 from the middle and 100 from the southern part, where all of them agreed to participate in the study with 100% response rate.

Direct interview with patients according to the questionnaire which was written in English and designed after reviewing the literature. It was filled by the researcher through direct interview with the study participants which included the following parts:

1. First part, socio-demographic characteristics of the patients which includes; (name, age, gender, marital status, occupation, residence, and level of education).
2. Second part, eating habits of the patients which include; type of food eaten (carbohydrates, fatty foods, and drinks), skipping breakfast with their frequency per week (never, sometimes, often, and every day) in addition to the questions about fast foods with their frequency per week, and number of meals eaten per day.
3. Third part, physical activity: divided in to 3 categories with their frequency per week and the time of each activity ; passive entertainment activities (TV watching because this activity is very interested and common in all Iraqi people, and the time consumed of above activities (<2 hrs., 2-4 hrs., > 4hrs. /day) , moderate activity (walking, housework, cycling, gardening) with their frequency per week (never, < 5 times/week, ≥ 5 times/week), and the time consumed for them (<30 minutes, ≥ 30 minutes), in addition to the vigorous activity (jogging, swimming, running, football) and it's frequency per week (never, <3times, ≥ 3 times) and duration of each activity (<20 minutes, ≥ 20 minutes).
4. Fifth part, medical and surgical history including certain non-communicable diseases such as; hypertension, ischemic heart disease, type 2 DM, hyperlipidemia, asthma, and joint diseases. Also, sleeping hours per day with its duration (<5 hrs., 5-7hrs., 8 hrs. and more). Family history of obesity; father, mother , siblings, grandfather , and grandmother .

Anthropometric measures of weight and height of all patients included in the study were done by the researcher himself to obtain more accurate results :

- Height would be measured in centimeter in standing position by a plastic tape measure

fixed on the wall, with the patient was barefoot together, ensuring the nape, back, calves and ankles pressed against measuring tape with error accepted of 0.5 cm.

- Weight would be measured in kg by standard electronic scale (Seca type) for measuring the weight of the patient with barefoot and wearing of light clothes with an accepted error of 0.5 kg.

- Each questionnaire assigned a serial identification number. The data were reviewed, cleaned with double check entry into the

Table 1. The highest percentage among obese group 40.0% (168), the overweight group 37.6% (158), whereas, the lowest percentage among normal weight 22.4% (94).

BMI classification (kg/m ²)	F	%
Normal weight (18.5-24.9)	94	22.4
Overweight (25-29.9)	158	37.6
Obese (≥ 30)	168	40.0
Total	420	100
Mean±SD (Range)		22.4±12.9 (18-77)

Table 2. Variables of age group distributed into 5 categories with lowest age of 18 years and highest one of 77 years with Mean ±SD (41.2±12.9), the highest percentage among the age category (40- < 50 years) with 26%, whereas, the lowest percentage in the age category (≥ 60 years) with 8.1%.

computer using Statistical Package for Social Sciences (SPSS) version 20; then, it was coded by the researcher under supervision of the supervisor and a consultant statistician.

Results

The study included 420 patients. Body mass indexes were distributed among 3 groups, normal weight (BMI 18.5-24.9), overweight (BMI 25-29.9), and obese (BMI ≥ 30) .

Residence: 70% of patients were living in urban residence, in comparison to 30% living in rural residence.

Occupation: was divided into six groups ; no job or retired 51 (12.1%), housewives 100 (23.8%), business 64 (15.2%), government officers 144 (34.3%),farmers 32 (7.6%), and 29 (6.9%) laborers.

Characters	Frequency	%
Age groups		
18 - <30 years	93	22.1%
30 - <40 years	98	23.3%
40 - < 50 years	109	26.0%

50 - < 60 years	86	20.5%
≥ 60 years	34	8.1%
Mean±SD (Range)	41.2 ± 12.9 (18 – 77)	
Residence	Frequency	%
Urban	294	70.0%
Rural	126	30.0%
Occupation	Frequency	%
No job or Retired	51	12.1%
Housewife	100	23.8%
Business	64	15.2%
Government officer	144	34.3%
Farmer	32	7.6%
Laborer	29	6.9%

Table 3: The Socio-demographic features in association with BMI categories.

Regarding age groups, the study has shown that the older age group of patients who were 60 years had the highest percentage of obesity 58.8%, with a highly statistically significant association between the age of patients with their BMI category ($P=0.000$), as in Table (3).

Regarding occupation, patients with no job or retired had the highest percentage of obesity in regard to other groups of occupation 58.8%, whereas 0% in both farmers and laborers, with

a highly statistically significant relation between occupation and BMI categories ($P=0.000$) as shown in the same table.

Urban residents had a higher percentage of obesity 46.3% than rural residence 25.4%, with a highly statistically significant association ($P=0.000$) as shown in table (3).

Variables	Frequency			Total	X ²	P
	N	C	C			
	(N)	(C)	(C)		(C)	
	N	N	N			
Age groups						
18 - < 30 years	5	2	1	9	8	0
30 - <40 years	2	4	3	9	(C)	

40 - < 50 years	1	4	5	1		
50 - < 60 years	7	3	4	8		
≥ 60 years	1	1	2	3		
Occupation						
No job or Retired	1	2	3	5		
Housewife	1	3	5	1		
Farmer	3	2	0	3	1	0
Laborer	2	5	0	2	(	
Business	1	3	3	6		
Government officer	2	6	5	1		
Residence						
Urban	3	1	1	2	4	0
Rural	5	3	3	1		
*Significant at alpha < 0.05.						

Table 4 : The 3 Dietary and Eating Habits

Table (4) showed the 3 dietary and eating habits of the sample like eating carbohydrates like **sweet, chocolate** with *often* or *everyday* frequency had a higher percentage of obesity (50.6%, 53.8%) than *never* or *sometimes* frequency (21.1%, 29.1%) respectively with a statistically significant association (P=0.000).

Eating **fruit** showed a statistically significant association with BMI categories (P=0.001) as shown in the same table where patients with

never or *sometimes* frequency had a higher percentage of obesity (57.8%) than those with *often* or *everyday* frequency (36.8%).

Skipping breakfast is another dietary habit which revealed a statistically significant association with BMI categories of the sample (P=0.027) where patients who skipped their breakfasts at *never* or *sometimes* frequency had a lower obesity rate 33.1% ,33.6% than those who skipped at *often* and *everyday* frequency 46.4%, 49.6% respectively.

Eating habits	BMI classification (kg/m2)			Total (n=420); No. (%)	X ² (df)	p-value
	Normal (18.5-24.9); (n=94); No. (%)	Overweight (25-29.9); (n=158); No. (%)	Obese (≥30); (n=168); No. (%)			
Eating CHO like sweet, chocolate						
Never	38 (50)	22 (28.9)	16 (21.1)	76 (100)	71.57	0.000*
Sometimes	38 (30.9)	49 (39.8)	36 (29.3)	123 (100)		

Eating habits	BMI classification (kg/m2)				Total (n=420); No. (%)	X ² (df)	p-value
	Normal (18.5-24.9); (n=94); No. (%)	Overweight (25-29.9); (n=158); No. (%)	Obese (≥30); (n=168); No. (%)				
Often	10 (11.2)	34 (38.2)	45 (50.6)		89 (100)	(6)	
Everyday	8 (6.1)	53 (40.1)	71 (53.8)		132 (100)		
Everyday	34 (21.9)	57 (36.8)	64 (41.3)		155 (100)		
Eating fruit							
Never or sometimes	5 (7.8)	22 (34.4)	37 (57.8)	64 (100)	13.36	(2)	0.001*
Often or everyday	89 (25)	136 (38.2)	131(36.8)	356 (100)			
Skipping breakfast							
Never	32 (27.8)	45 (39.1)	38 (33.1)	115 (100)	14.27 (6)	0.027*	
Sometimes	31 (26.1)	48 (40.3)	40 (33.6)	119 (100)			
Often	16(23.2)	21 (30.4)	32 (46.4)	69 (100)			
Everyday	15(12.8)	44 (37.6)	58 (49.6)	117 (100)			
*Significant at alpha < 0.05.							

Table 5. The two categories of physical activities of the sample to their BMI categories.

Table 5 showed two categories of physical activities of the included sample to their BMI categories; there was a statistically significant association between the time consumed by the patients during watching TV and their BMI categories ($P=0.004$), where those who watched TV less than 2 hours had a lower

percentage of obesity 30.6% than those who watched TV more than 4 hrs. 56.1%.

Regarding the moderate physical activity, the table showed that patients who never practiced this activity had the highest rate of obesity (63.7%) compared with those who practiced the same activity 5 times per week or more (13.5%) with a statistically significant association ($P=0.000$).

Parameters	BMI classification (kg/m2)			Total	X² (df)	p-value
	Normal (18.5-24.9)	Overweight (25-29.9)	Obese (≥ 30)			
	No. (%)	No. (%)	No. (%)			
TV watching : time spent of watching (hour/day)						
< 2 hrs.	38 (31.4)	46 (38.0)	37 (30.6)	121 (100)	15.51 (4)	0.004*

2-4 hrs.	48 (20.6)	91 (39.1)	94 (40.3)	233 (100)		
> 4 hrs.	8 (12.1)	21 (31.8)	37 (56.1)	66 (100)		
Total	94 (22.4)	158 (37.6)	168 (40)	420 (100)		
Moderate physical activity : housework, walking, gardening, cycling (frequency/week)						
Never	3 (2.1)	50 (34.2)	93 (63.7)	146 (100)	146.21 (4)	0.000*
< 5 times/week	13 (10.3)	58 (46)	55 (43.7)	126 (100)		
≥ 5 times /week	78 (52.7)	50 (33.8)	20 (13.5)	148 (100)		
Total	94(22.4)	158 (37.6)	168 (40)	420 (100)		
* Significant at alpha < 0.05						

Table 6: Patients' Sleeping Hours and Obesity.

Table 6 showed that patients with sleeping hours less than 5 hours per day had the highest

proportion of obesity 57% compared with those of sleeping more than 5 hours per day (5-7, 8 hrs. and more) 34.1%, 38.3% respectively with a statistically significant association (P=0.000).

Sleeping hours per day	BMI classifications (kg/m ²)			Total No. (%)
	Normal (18.5-24.9)	Overweight (25-29.9)	Obese (≥ 30)	
	No. (%)	No. (%)	No. (%)	
< 5 hrs.	6 (7)	31 (36)	49 (57)	86(100)
5-7 hrs.	55 (25.7)	86 (40.2)	73(34.1)	214(100)
≥ 8 hrs.	33 (27.5)	41 (34.2)	46 (38.3)	120(100)
Total	94(22.4)	158 (37.6)	168 (40)	420(100)
X ² = 20.52 df=4 p-value= 0.000* (Significant at alpha <0.05)				

Table 7. Patients with Absence (No) Family History of Obesity

Table 7 : Showed that patients with absence (No) family history of obesity among their first degree relatives had a lower percentage of

obesity 17.1% compared with those with positive (Yes) of family history of obesity 53% with a statistically significant association (P=0.000).

Family history of Obesity	BMI classifications (kg/m2)			Total No. (%)	X2 (df)	p-value
	Normal (18.5-24.9) No. (%)	Overweight (25-29.9); No. (%)	Obese (≥ 30) No. (%)			
No	57 (37.5)	69 (45.4)	26 (17.1)	152(100)	59.37 (2)	0.000 *
Yes	37 (13.8)	89 (33.2)	142 (53)	268(100)		
Total	94(22.4)	158 (37.6)	168 (40)	420(100)		
*Significant at alpha < 0.05.						

Table 8: A Binomial Logistic Regression Analysis of the Effect of Different Variables on Overweight and Obesity.

Variables	C	P	C	P
Age (years)	0	0	1	(
Occupation (Government officer is the comparative occupation)				
No job or Retired	2	0	1	(
Farmer	-4	0	0	(
Laborer	-3	0	0	(
Business	2	0	1	(
Residence (rural)	-3	0	0	(
Eating fruit	-0	0	0	(
Skipping breakfast	0	0	1	(
Eating CHO like sweet & chocolate	1	0	2	(
Family history of obesity	1	0	3	(
Time spent for TV viewing activity per day (<2 hours is the comparative time)				
2-4 hrs.	0	0	1	(
> 4 hrs.	1	0	3	(
Moderate activity per week	-3	0	0	(
Constant	0	0	2	-
*Significant at 0.05 level				

Note :OR : odds ratio CI : confidence interval

Table 8: We used a binomial logistic regression analysis to predict the effect of

different variables on overweight and obesity after using of Chi-square test which

compared between the dependent and independent variables.

The results showed that: **age** in years significantly affects overweight and obesity by 1.159 times when increased (OR=1.159; P=0.000; 95% CI for OR= 1.11-1.21); overweight and obesity in patients of **no job or retired** was significantly higher than state officials by 10 times (OR=10; P=0.026; 95% CI=1.317-75.943); **farmers** had less overweight and obesity than state officials by 0.013 time (OR=0.013; P=0.000; 95% CI=0.003-0.06). However, **laborers** had lower overweight and obesity than state officials by 0.042 time (OR=0.042; P=0.000; 95% CI=0.014-0.12) while **business persons** had higher overweight and obesity than state officials by 12.6 times (OR=12.6; P=0.014; 95% CI=1.666-95.315). **Rural residence** of patients had less effect on overweight and obesity than urban residence by 0.136 time (OR=0.136; P=0.000; 95% CI for OR=0.06-0.307). Yet, patients **eating fruit** frequently had less overweight and obesity than patients who did not eat fruit by 0.502 time (OR=0.502; P=0.04; 95% CI for OR 0.26-0.967),

Discussion

This current research showed the prevalence of overweight and obesity among patients aged 18 years and above who attended main primary health care centers in Babil governorate of Iraq. The prevalence of overweight and obesity according to this present survey was 37.6%, and 40% respectively. This result was comparable to other results in Arabic-speaking countries neighbored to Iraq; where the prevalence of obesity ; in Kuwait (30% for male, 55% for female), in King Saudi Arabia (23% male, 36% female), in United Arab Emirates (25% for male, 43% for female) according to WHO estimate in 2010 ⁽¹³⁾.

Another cross-sectional study conducted in the South of Iraq (Basrah city) showed that the overall prevalence of obesity from 2003-2010

Overweight and obesity were 1.46 times higher in patients who **skipped breakfast** frequently compared with those of no skipping (OR=1.46; P=0.027; 95% CI for OR= 1.045-2.039); eating CHO like; **sweet and chocolate** had the highest effect on overweight and obesity by 2.709 times compared with patients with no such intake (OR=2.709; P=0.000; 95% CI for OR= 1.855-3.956). **Family history** of obesity patients had overweight and obesity 3.746 times higher than those without history (OR=3.746; P=0.000; 95% CI=2.323-6.04). The **TV watching** activity had a great effect on overweight and obesity where watching for 2-4 hrs. per day were more overweight and or obese by 1.765 times than those with less than 2 hrs. per day watching (OR=1.765; P=0.025; 95% CI for OR=1.072-2.904). Finally, **moderate physical** activity had a significant effect on lowering overweight and obesity when practice for more than 5 days per week by 0.26 times is compared with patients of practice for less than 5 days per week or never (OR=0.26; P=0.003; 95% CI for OR= 0.108-0.624).

was 55.1% of the population (54.7% women, 45.3% men) ⁽¹⁴⁾.

Age: According to the current study, the percentage of overweight and obesity had increased as the age increased; this result agreed with a study done in Pakistan to highlight that there was an increasing in the prevalence of overweight and obesity with increasing age (OR: 1.15, 95% CI: 1.12-1.18, P<0.05) ⁽¹⁵⁾. When a patient gets aged, hormonal changes, less active lifestyle with low physical activity, and the amount of muscle mass tend to decrease with age which lead to decrease in metabolism.

Occupation: The current study showed highest percentage of obesity was among no job or retired, business, and housewife compared with both farmer and laborer. this result agreed with

a study conducted in the Kingdom of Saudi Arabia in 2004 which showed that the prevalence of obesity was higher among housewives ($P=0.0001$)⁽¹⁶⁾; it also agreed with another study conducted in Pakistan on 897 men their age 30 yrs. as the current study showed that occupation was a significant predictor of overweight/obesity among the study participants. Furthermore, the study showed that business persons were more prone to be obese than others by 2.29 times ($OR=2.29$, $95\% CI=1.34-3.94$, $P<0.05$)⁽¹⁵⁾.

Residence: The current study showed that urban residents had a higher proportion of overweight and obesity than rural residence; hence, it agreed with the studies in EMR which showed that the prevalence of overweight in urban areas of Egypt 45.3% in male, and 39.6% in females, whereas in rural areas 28% in male and 36.5% in female respectively. Similar findings had been seen in Morocco, Oman, Palestine, and Kingdom of Saudi Arabia. After adjusting some confounding factors, urban residence had a major determinacy of general obesity ($OR=2.62$, $95\% CI= 3.32-3.92$)⁽¹⁷⁾.

Obesity is more prevalent in urban than rural sectors because urbanization means decreased level of physical activity and increased availability of food, as well as exposure to fast food. In addition, another change in lifestyle between urban and rural areas leads to increase exposure to western media in urban areas, which influence the urban people to match with western ways of life⁽¹⁸⁾.

Eating Carbohydrates like; sweet, chocolate: The result here agreed with the association between sugar, sweets and some body weight adiposity because sweetened foods are often rich in fat with combined increase in fat and sweet intake can lead to weight gain and sweet elimination is one of the eating process associated with less body weight gain or loss⁽¹⁹⁾. Another study showed that carbohydrate

quality is much more important in preventing more weight gain than quantity like; sugar, sugary drinks which had a high glycemic index and glycemic load that caused fast increase in blood sugar and insulin that in turn causing hunger to spike leading to overeating and subsequent weight gain⁽²⁰⁾.

Eating fruit: The current study agreed with many studies indicating the benefit of frequent intake of fruit to lower or control weight; it had similar findings with a study held to show that the diet which is low in fat, sugar, and high in fruit and vegetables can decrease body weight or prevent weight gain over time, because fruit consumption can reduce the overall energy density of the diet, promote satiety, decrease the total energy intake, and increase diet quality with subsequent significant BMI decrease⁽¹⁹⁾. Another study, conducted in Iran on 486 women aged 40-60 years, showed that the dietary pattern characterized by high consumption of fruit, vegetables and legumes had lower risk of general and abdominal obesity by decreasing their odds ($OR=0.34$, $95\% CI=0.17-0.63$, $P<0.05$)⁽²⁰⁾.

Skipping breakfast: Similar findings were obtained from a meta-analysis study in 2011, suggesting that a positive relationship between skipping breakfast and overweight and obesity is observed globally regardless of the cultural diversity among countries that encourage breakfast consumption in decreasing the risk of overweight and obesity ($OR=1.17$, $95\% CI=1.08-1.28$, $P=0.003$)⁽²¹⁾.

Skipping breakfast is common in both children and adults; breakfast is considered to be the first most important meal of the day; so, skipping it showed to have an inadequate intakes of key nutrients that could be made up later meals including; sugar and protein and vitamins⁽²²⁾.

TV watching: TV is the most popular and commonly used media in all places of Iraq and among all age groups. The current result was in

agreement with the study done in USA which showed that there were two sedentary behaviors common in the U.S society who were TV watching and users of computer where both of them had a positive association with elevated insulin level, obesity, metabolic syndrome, and diabetes ⁽²³⁾. Watching TV can promote weight gain and obesity by promoting poor diet, displacing time for physical activity, giving more chances to unhealthy diet, and by interfering with sleep.

Moderate physical activity: Similar results were obtained from a cross-sectional study conducted in Morocco among 2891 adults; it has been found that the prevalence of obesity was lower in participants engaged in at least a 30-minute moderate physical activity per day compared to another group who were not engaged in such an activity (10.4% vs. 15.6%, $P < 0.001$) ⁽²⁴⁾. The current result coincided with that of the Canadian Health Measures Survey (CHMS) with a statistic collection of data from 2009-2011 from nationally representative sample of Canadian people aged 6-79 years; it showed that overweight and obese adults spend less time in a moderately vigorous physical activity compared to those who were normal weight: obese adults had 16 minutes /day, overweight had 21 minutes /day, whereas normal weight spent 27 minutes /day. In addition, physical activity is important in controlling weight by increasing metabolism, regular sleep, enhancing choices for healthy foods ⁽²⁵⁾.

This result was in line with a study conducted in Saudi Arabia, among Saudi students, which stated that the students who sleep for 7 hrs. or less significantly had increased the risk of obesity in both boys and girls, and those with intermittent sleep patterns also showed an increase prevalence of overweight and obesity ⁽²⁶⁾. Another meta-analysis based on experimental study highlighted that there was an association between reduced sleep amounts and obesity because sleep or sleep deprivation

can cause a feeling of fatigue with reduction in physical activity, and due to neurohormonal effects that increase caloric intake ⁽²⁷⁾.

A similar finding was gained by a cross-sectional study conducted in Egypt from 2011 to 2012 among 500 males aged from 18-30 years; it showed that there was a significant association between obesity and the presence of family history of obesity as a logistic regression analysis revealed that positive family history of obesity increased odds of the young to be obese ($OR=5.72, 95\% CI=1.05-32.43, P=0.012$) which gave a similar result to that of the present study ⁽²⁸⁾. The reason behind the role of family history is that the genetic variations had an effect on metabolism, tolerance to physical activity and appetite which cause a strong argument for their role in current conductive environments of obesity which played a significant and consistent contribution to BMI at all ages ⁽²⁹⁾.

Conclusion

Socio-demographic characteristics like age, occupation, residence are significantly associated with obesity in the study group. Frequency of eating of different kinds of food or drinks were significantly associated with changes in BMI categories of the participants.

There was a statistically significant relationship between BMI classes and the moderate physical and vigorous activity frequency. Other variables like sleeping hours per day and family history of obesity showed a significant statistical relationship with BMI classes of the patients.

The following variables showed an effect on the odds of overweight and obesity: age, no job or retirement, farming, laboring, business, rural residency, eating fruit, skipping breakfast, eating carbohydrates like; sweet, chocolate, TV watching more than 4 hrs per day, moderate physical activities, and family history of obesity.

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