Research Article

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Prevalence of obesity and overweight among office workers of pars special economic energy zone, Assaluyeh, Iran

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Objective: The obesity-related costs imposed on the society are astounding. In this study, we aimed to investigate the prevalence of overweight and obesity among office workers of Pars Special Economic Energy Zone in Assaluyeh, Iran.

Methods: This descriptive study was conducted on 294 office workers. We applied a questionnaire to collect demographic factors, Beck's questionnaire was also administered to measure physical activity, and finally, the FFQ questionnaire was applied to determine the calorie intake of participants. Then, some anthropometric indices of BMI, WHR, WC, and BFP were measured and evaluated.

Results: The overall prevalence of obesity and overweight among the studied office workers was 79.6% (26.2% obese and 53.4% overweight). Low percentage of employees had normal weight with waist circumference (WC) of 20.7% and waist-to-hip ratio (WHR) of 20.4%. After adjusting for other variables, age (OR=31.82, 95% CI 1.046 – 968.26, p<0.047), marriage status (OR=0.020, 95 % CI 0.001–0.752, p<0.035), calorie consumption (OR=1.023, 95% CI 1.012–1.033, p=0.001), and physically activity (OR=0.245, 95% CI 0.074–0.810, p=0.021) were significantly associated with obesity and overweight.

Conclusion: Although the study did not include the whole staffs, obesity and overweight were very prevalent among office workers of Pars Special Economic Energy Zone. So, a detailed and comprehensive plan is needed to identify the related causes of such diseases and educate individuals to change their lifestyles. We recommend individuals to have a proper diet and to do regular physical activity as effective solutions to reduce the prevalence of overweight and obesity.

Keywords: Obesity, Overweight, Office workers

Introduction

Overweight and obesity are defined as the excessive accumulation of fat and represent a health risk [1]. Obesity is one of the most dangerous challenges among the developed countries [2]. It is also considered as the second main cause of preventable disease and death in the United States [3]. As the literature shows, obesity has an association with increased risk of several medical conditions, such as type 2 diabetes mellitus, coronary heart disease, stroke, hypertension, gallbladder disease, some types of cancer, sleep apnea, and osteoarthritis [4]. In 2013, the American Medical Association indicated that physicians are required to pay more attention to obesity as a disease [5]. World Health Organization (WHO) reported that the worldwide prevalence of obesity increased greatly since 1980 [6]. The high prevalence of obesity among populations, especially the working forces has also put a great economic burden on governments, because the health costs of this group are high and they have more frequent absences from work [7]. In fact, obesity reduces active participation among the workers [8], increases absence from work, disability, and health costs [9], which consequently leads to lower salaries [10] and reduced productivity [11]. Some studies showed that obesity caused a 13-fold higher loss of working days and an 11-fold greater number of compensation claims [7,12]. Several ways have been suggested for measuring obesity. Assessments of body weight (anthropometry), for instance are applied in order to show body fat in clinical situations because these assessments suggest a rapid and cheap method to calculate the body fat [13]. Numerous studies have compared the appropriateness of various anthropometric indices in order to measure obesity and predict the obesity-related health risks, such as BMI, waist-to-hip ratio (WHR), and waist circumference (WC) [14,15]. Regarding obesity, there are different effective factors or causes. The metabolic disorder has caused obesity in a few cases, but in most cases, energy disbalance is the basic problem [16]. The main

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factors that promote obesity include the decreased levels of physical activity and energy expenditure, along with the increased amounts of energy intake [17].

There are about one billion employed people in the world and more than half of them are from Asia, yet we are faced with a paucity of information on the health of working populations in Asia [18]. Certain occupations lead to sedentary lifestyles and some of them are characterized by long periods of sitting in a day [19]. For instance, Oil and Gas Industry staffs in Iran spend greater part of their working hours sitting due to the nature of their jobs. Finally, these people will spend the greatest part of their working lives engaged in sedentary activities in the case that they do not involve themselves consciously in physical activities during their free time. So, employees in these places are predisposed to developing obesity and overweight that makes them susceptible to chronic diseases such as cardiovascular diseases and type-2 diabetes. This may in turn leads to an increase in the prevalence of obesity and overweight in the country and cause health implications [20]. But, there is lack of adequate research in Asian and Middle East countries on the factors affecting workforce [21-23].

Although studies have been conducted on the prevalence of obesity and overweight, prevalence of overweight in male staffs of Oil and Gas Industry of Iran has been studied less. On the other hand, employees' health must be considered; they are required to be productive and help for the development of their country. This study determined the prevalence of obesity and overweight and factors associated with obesity among male office workers working in Pars Special Economic Energy Zone in Iran.

Materials and Methods

In this cross-sectional descriptive study was conducted in Assalouyeh, Iran from August to December 2016.

So, two centers were randomly selected from 30 administrative centers of the Special Economic Energy Zone of Pars, Assalouyeh, Iran. Among the whole administrative staffs, 294 employees were selected purposefully; they volunteered to participate in the study and also had the inclusion criteria. The inclusion criteria consisted of being in the age range of 20-60 years, lack of specific diseases, lack of using dietary supplements or diuretics, as well as having enough physical fitness to do the physical activities. In order to collect the participants, the researcher referred to two centers in person and explained the study goals and methods to all employees (about 1000 people) of these centers. Later, the individuals were asked to complete demographic information questionnaire and Beck physical activity questionnaire to determine their level of physical activity indirectly and by self-reporting. After collecting the completed questionnaires, the following formula was applied and 294 individuals were selected to participate in the study. In order to take into account the ethical considerations, the participants were asked to sign the written consent forms.In this study, based on the research conducted by Fallahzadeh et al. in Iran [24], N=1000, z=1.96, p=0.22, d=0.04 were considered.

$$n = \frac{NP(1-P)Z^2_{1-\frac{\alpha}{2}}}{d^2(N-1)+P(1-P)Z^2_{1-\frac{\alpha}{2}}}$$

In the next step, a demographic characteristic questionnaire was completed by the staff's to measure the research variables. Further, in order to determine participants' physical activity level Beck's physical activity questionnaire was administered. This questionnaire evaluates the physical activity level and contains three factors of job place, leisure, and exercise which should be answered on a Liker scale. Food Frequency Questionnaires (FFQ) was also distributed to determine participants' energy intake. The study was conducted in Assaluyeh from August to December 2016. The population included 294 male office workers of Pars Special Economic Energy Zone. This study is a part of the Ph.D. thesis and was approved by the Research Ethics Committee in Shahid Sadoughi University of Medical Sciences, Yazd, Iran.

Anthropometric measurements

Anthropometric measurements were taken at the baseline of the study. Participants were asked to remove their footwear's and stand while putting their feet together and arms at the sides. Their heels, buttocks, and upper back should also rest against the straight edge in a complete upright position. Then, height in centimeters was measured to the nearest 0.1 cm. an electronic bathroom scale (Seca model) was later used to determine the body weight to the nearest 0.1 kg with a maximum capacity of 150 kg. BMI (in kg/m^2) was calculated accordingly. Participants with BMI values of <25 kg/m^2 were classified in normal weight category, those with BMI values in the range of 25 - 29.9 kg/m^2 were classified in overweight group, and individuals with BMI values of 30 kg/m^2 or more were classified as obese [25]. Skin fold method and Slim Guide Skinfold Caliper (made in the USA) were applied to estimate the body fat percentage (Caliper can measure subcutaneous fat of 80 mm diameter). It is suitable for non-athletic adults that may be needed. It also can be read to the nearest 0.5 mm. subcutaneous fat was measured in the following body sites: abdominal fat, triceps, and suprailiac. For more accurate measurement, each point was calculated three times and then the average of these three measurements was recorded. Later, the recorded mean scores were put into the Jackson and Pollock formula (as represented below) and participants' body fat percentage was calculated.

% Body Fat = (0.39287 × sum of three skinfolds) – (0.00105 × [sum of three skinfolds] 2) + (0.15772 × age) – 5.18845 [26].

In order to measure the abdominal obesity, waist-to-hip ratio (WHR) as the ratio of waist circumstance to hip circumstance was applied. Men were abdominally obese with WHR>0.90.

Waist circumference (WC) and hip circumference were measured at the level of the umbilicus and greater trochanter using an in elastible tape measure [27]. The anthropometric indices were measured in an indoor sport club with a temperature of 25 to 35°C. Data were collected from 16 PM to 20 PM in the evening.

Statistical analysis

Statistical analyses were conducted through IBM SPSS v.20. Mean and standard deviation were calculated for quantitative variables, while frequencies and percentiles were measured for qualitative variables. Chi-square was later used to analyze the difference among the categorical variables of age, marital status, WC, WHR, and BMI. The level of significance was set at α=0.05 and a 95% confidence interval. Logistic regression was used to investigate the strength of association among these risk factors and obesity or overweight.

Dietary assessment methods

In this study, the Diet History Questionnaire was used to assess dietary intake. Initially, three-day food record questionnaires (2 normal days and 1 holiday) were completed to determine the intake energy. In order to have precise data, some information regarding how to fill the questionnaire, the measurement units, and selection

of suitable days were given to participants. The listed food values were converted into grams based on the home-help scales, they were then coded according to N4 food analysis software instructions, and the amount of energy intake was calculated [28].

Results

To conduct the study, 294 office workers of Assaluyeh Pars Special Economic Energy Zone participated. Overall, the majority of participants were overweight or obese; only 20.4% (60 cases) had a BMI <25, whereas 53.40% (157 cases) were overweight, and 26.2% (77 cases) of workers were mildly and moderately or extremely obese. In the lowest BMI group, only two workers were underweight (BMI<18.5), and the results were essentially the same when these two participants were excluded from the analysis (**Table 1**).

The mean age of participants was 37.18 years (± 7.06) that ranged from 25 to 58 years. The mean height of respondents was 174.3 (± 6.30) cm, mean weight was 84.6 (±12.36) kg, and mean BMI was 26.4 (±2.74) kg/m^2. Mean WHR was 0.92(± 0.06), mean WC was 93.2 (± 9.11), mean BFP (%) was 24.6 (± 8.34), mean of Total physical activity score was7.93 (± 1.12), and mean of calorie intake was 2903.09 (± 364.30) (**Table 2**).

Table 1

Distribution of BMI in the study population

Classification BMI(Kg/m^2)	Frequency	Percentage (%)
Normal	60	20.4
Overweight	157	53.4
Obese	77	26.2
Total	294	100

As **Table 3** shows, 91.5% of participants were married and 8.5% of them were single. The results showed that married staffs had a much higher proportion of obesity and overweight than single individuals. With WHR criteria, 53.4% of men had central obesity. The overweight/obese groups were physically more inactive (79.6%) than the underweight/normal group (20.4%). Chi-square test indicated that age (p<0.01), marital status (p<0.05), WHR (p<0.001), and WC (p<0.001) had statistically significant association with normal weight, obesity, and overweight (**Table 3**).

Multivariate logistic regression analyses of normal weight, overweight, and obesity are represented in relation to age, marital

Table 2

Anthropometric and descriptive statistics of participants

Variables		Mean ± SD (N=294)
Anthropometric Variables	Age (years)	37.18 ± 7.06
	Height (cm)	174.3 ± 6.30
	Weight(kg)	84.6 ±12.36
	BMI(kg/m2)	26.4 ± 2.74
	WHR(cm)	0.92 ± 0.06
	WC(cm)	93.2 ± 9.11
	BFP (%)	24.6 ± 8.34
Physical Activity	Sports physical activity score	2.9 ± 0.70
	Works physical activity score	2.37 ± 0.45
	Leisure physical activity score	2.32 ± 0.57
	Total physical activity score	7.93 ± 1.12
Calorie	take calorie	2903.09 ± 364.30

Table 3

Descriptive statistics for administrative staffs participating in this study (N=294)

Variable	Participants	BMI(kg/m^2)			Chi-square	(p- value)
	N (%)	Normal range (18.5 - 24.99) N (%)	Overweight (≥ 25.00) N (%)	Obese (≥ 30.00) N (%)		
		Age				
20-29 years	25 (8.5)	9 (36)	10 (40)	6 (24)		
30-39 years	184 (62.8)	34 (18.5)	112 (60.9)	38 (20.7)		
40-49 years	64 (21.5)	13 (20.7)	27 (14.2)	24 (37.5)	16.078	0.01
50-60 years	21 (7.2)	4 (19)	8 (38.1)	9 (42.9)		
Total	294	60 (20.4)	157 (53.4)	77 (26.2)		
		Marital status				
Single	25 (8.5)	9 (36)	8 (32)	8 (32)		
Married	269 (91.5)	51 (19)	149 (55.4)	69 (25.7)	5.95	0.05
Total	294	60 (20.4)	157 (53.4)	77 (26.2)		
		WHR (cm)				
excellent <0.85	36 (12.2)	15 (41.7)	17 (47.2)	4 (11.1)		
good 0.85-0.90	74 (25.2)	25 (33.8)	41 (55.4)	8 (10)		
average 0.90-0.95	92 (31.3)	17 (18.5)	56 (60.9)	19 (20.7)	73.821	0.001
High 0.95-1.00	69 (23.5)	3 (4.3)	38 (55.1)	28 (40.6)		
extreme >1.00	23 (7.8)	0	5 (21.7)	18 (78.3)		
Total	294 (100)	60 (20.4)	157 (53.4)	77 (26.2)		
		WC (cm)				
Very low <80	15 (5.1)	15 (100)	0	0		
Low 80 - 99	216 (73.5)	45 (20.8)	145 (67.1)	26 (12.0)	181.58	0.001
High& very high >100	63 (21.4)	0	12 (19.0)	51 (81)		
Total	294 (100)	60 (20.8)	157 (53.4)	77 (26.2)		

Table 4

Factors significantly associated with obesity and overweight

Variables	Over weight/obese Crude OR (95 % CI)	p value
Age (years)		p<0.047
<30	1	
30-60	31.82 (1.046 –968.26)	
Marital status		p< 0.035
Single	1	
Married	0.020 (0.001–0.752)	
Take calorie		p=0.001
Normal	1	
Up Normal	1.023 (1.012–1.033)	
Physical activity		p=0.021
Inactive	1	
Active	0.245 (0.074 –0.810)	

status, takes calorie and physical activity in **Table 3**. Logistic regression was performed to determine the strength of association between each of these risk factors and obesity or overweight (**Table 4**).

Age was still significantly associated with being obese or overweight (Crude OR=31.82, 95 % CI 1.046–968.26, p<0.047). Married participants showed an increased risk of obesity or overweight in comparison to singles (Crude OR=0.020, 95% CI 0.001–0.752, p< 0.035). Individuals who took more calorie were at a higher risk of becoming obese or overweight (Crude OR=1.023, 95% CI 1.012–1.033, p=0.001). Physically active respondents had a 60% reduced risk of obesity/overweight compared to physically inactive employees (Crude OR=0.245, 95% CI 0.074–0.810, p=0.021). Age, being married, high-calorie consumption, and Total physical activity score were significantly associated with obesity and overweight in the multivariate logistic regression analysis.

Discussion

Prevention from or reduction of overweight and obesity essentially involve lifestyle modification using behavioral change. In order to achieve this goal, we need to use measures other than policy, since policy only acts as a facilitator in this process. However, many barriers exist in changing the situation, for instance, the global application of information technology in all situations, including the home or work settings, can greatly reduce the physical activity [29,30]. Therefore, almost every human being is faced with the challenge of counterbalancing this reduction in physical activity with the technology revolution. Furthermore, the snack consumption habit has predisposed people to overweight and obesity [31,32].

Obesity is a multifactorial disease caused by the interaction of many socioeconomic factors, such as sedation, increased calorie intake, excessive consumption of alcohol, intake of certain medications and biological agents such as genetics, age, and gender [33]. Several studies in Iran estimated the prevalence and incidence of obesity and overweight in different populations and each reported different measures. This discrepancy in the results may suggest that changes in obesity and overweight are different in various societies. In a study conducted in Iran, the prevalence of obesity and abdominal obesity in individuals over 18 years of age was reported as 15.1 percent [34].

The results achieved in this study showed that prevalence of obesity and overweight among the office workers of Pars Special Economic Energy Zone was 79.6%. In other words, majority of staffs had excess body weight (BMI>25) (26.2% obese and 53.4% overweight). These results were against the local reports showing high prevalence of overweight and obesity provided from reports on the Demographic Information and Health status of Iranians [32,33] and other Middle Eastern countries [34,35]. The mean age of the respondents in this study was 37.18 ± 7.06 years. Participants in the age group of 40 years and older had higher obesity percentage (38.8%) than the participants who were younger than 40 years (20%). Age increase was significantly related with the increase in prevalence of obesity and overweight. As mentioned in the literature, in developing countries obesity increases with age and is more frequent among people with low physical activity or sedentary life style. This result is in agreement with analysis of documents on the prevalence of obesity from the WHO's Global Database on BMI which indicated an increasing tendency in prevalence of obesity and overweight with increase of age in adults. The culmination of this process is estimated to be in 40–50 years in many developing countries, contrary to 50–60 years in most developed countries [36]. A study carried out in the United States on prevalence of obesity showed that obesity increased by age in women but these changes in prevalence of obesity by age was not observed in men [37]. It seems that age is one of the most important risk factors influencing development of obesity and overweight in most communities [38]. Findings from this research indicated that obesity was significantly associated with being married. The results of another study reported a higher risk of obesity and overweight among married men than single men. It was also indicated that obesity related behaviors were stronger among married people who had lived together for 2 years or more [39]. The findings of a study showed that overweight and obesity were more frequent among the married individuals in comparison with the single persons, after adjusting other the confounders. This indicates the fact that marriage, especially among men reduces the physical activity and leads to changes in their dietary pattern. Married men are less concerned with their attractiveness and body fitness [40]. Findings from our study showed that obesity and overweight were significantly associated with calorie intakes. It was observed in the current study that overweight and obesity had a direct and significant relationship with the amount of received calorie.

Age, gender, weight, height, and activity level of individuals determine their needed amount of energy in order to maintain a healthy weight. Consumption of calories higher than the energy expenditure leads to weight gain. Sweats, fat, and fast foods can also increase the risk of weight gain because they provide high calories [41]. It can therefore be noted that by correcting the ratio of received energy to the consumed energy, weight can be maintained in the appropriate range. Having physical activity and exercise are two ways to change the amount of energy consumption. In the present study, we found a higher prevalence of obesity and overweight among staffs with sedentary jobs. Sedentary behavior increases the risk of obesity and overweight, which adversely affects health outcomes. Many studies showed that the number of overweight and obese people increased with the decrease of physical activity levels. They indicated that obesity and physical activity had an opposite relationship. Work-related sitting time was also introduced as an important factor of obesity in staffs [42]. In agreement with the WHO, a study reported that the energy imbalance between calories consumed and calories expended was the main cause for the excess of weight among the populations. This energy imbalance is the result of increased consumption of high-energy foods and decreased levels of physical activity attributed to the recent sedentary life-styles, increased urbanization, and easy ways of transportation [43]. Considering Sacks'

framework, policies influence behaviors directly; consequently, they cause a direct effect on the living settings, such as home environment, workplaces, and community. In the same regard, policies affect the eating habits and physical activity behaviors directly [44]. Final conclusion is that obesity and overweight were prevalent among most male staffs participating in this study. Ultimately, in order to prevent and reduce overweight and obesity, we need to change our lifestyles and nutrition behaviors [45]. Further studies are then required to motivate people regarding behavior changes in dealing with the obesity [46,47].

The results of this study can be helpful for health authorities to plan for lifestyle changes and improve the health behavior of employees in industrial and occupational settings.

Among the limitations of this study we can mention lack of control over the nutrition, medications, and supplements consumed by participants, which could have affected their calorie intake. Furthermore, lack of women's participation in this study was another problem.

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Conflict of Interest

The author declares no conflict of interest with regard to the content of this article.

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