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Research Article

EPIDEMIOLOGY OF OVERWEIGHT AND OBESITY AMONG THE WORKERS OF SHIRAZ HOSPITALS

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ABSTRACT
Obesity is one of the leading causes of morbidity and mortality that detection of risk factors will lead to a reduction in its burden. The aim of this study was to estimate the prevalence of overweight and obesity and its determinants among Shiraz hospitals' staff. A random sample of 1023 hospitals staff were selected with classified random sampling method. Data were collected by questions of demographic/occupational/ GHQ28/ IHS (International Headache Society) and general physical examinations. The overall prevalence of overweight and obesity were estimated 27.8% and 7.0% respectively. Prevalence of overweight and obesity were: 28.5 and 6.7% in men and 27.5 and 7.1% in women respectively. Univariate and multiple linear regressions in SPSS vs 19 were used for analysis. In multiple linear regressions, BMI had direct relationship with age, having tension headache and systolic and diastolic blood pressure and indirect relationship with irregular sleeping and widow (er) status. Smoking, shift work and exercise were among the variables that showed no association with BMI. BMI status deserves more attention, especially concerning strategies leading to primary prevention and control.

Keywords: *Obesity, Overweight*

INTRODUCTION
Obesity is a medical condition where extra body fat has accrued to the degree that it may have an adverse effect on health, leading to decreased life expectancy and/or increased health complications (Haslam, 2005). Since 2008 the World Health Organization (WHO) declared that more than 1.4 billion adults, 20 and older were overweight and among whom over 200 million men and almost 300 million women were obese. WHO introduced obesity as a worldwide epidemic and called for a harmonious effort in the managing and prevention of that state of health.
Obesity raises the probability of several diseases, mainly heart disease, type 2 diabetes, obstructive sleep apnea, certain types of cancer, and osteoarthritis (Haslam, 2005). For this purpose, it is a most important preventable cause of global death and with growing prevalence that is one of the most critical public health problems in the 21 century (Barness, 2007). Obesity is projected to cause an above 111, 909 to 365, 000 deaths for every year in the United States (Haslam, 2005; Allison, 1999) as 1 million (7.7%) of deaths in the European are associate with extra weight (Tsigosa, 2008). Although in the beginning of 20th century, obesity was a public health problem in the developed countries, mainly in the United States and Europe but in developing countries such as Mexico, China, and Thailand increased too (Caballero, 2011). In developing countries more than 115 million people suffer from obesity associated with health status (Amegah, 2011). Risk factors for obesity include: 1) Caloric intake (kind of diet and eating habits) 2) Genetic factors (more than 300 genes, markers, and chromosomal regions have been known that are related to different obesity of human phenotypes) 3) Socio-economic status, cultural conditions and level of education 5) aging 6) pregnancy 7) Lack of sleep 8) Decreasing or Quitting smoking (as appetite put

down by smoking) 9) Certain medications 10) Old maternal age 11) Endocrine disruptors (environmental contaminants that obstruct lipid metabolism) 12) Psychological factors (Psychological status can affect eating habits, as most of people eat more in reaction to negative emotions) and 13) Lack of physical activity (Ali, 2009).

So far, no study has been conducted about the survey of obesity in Shiraz hospitals staff, hence conducting this survey seems necessary. The aim of this study is the survey of prevalence and determinants of overweight and obesity in the workers of Shiraz hospitals.

MATERIALS AND METHODS

The survey was conducted in 2006 between the staff of 24 hospitals of Shiraz having at least, one year record of service. A random sample of 1027 (20%) of hospitals personnel population were chosen. The method of sampling was categorical and carried out systematically. The categories included nursing workers (nurses, health workers and obstetricians) official workers and the menial workers. Data collected by questionnaire and body measurement examinations. Questionnaire included demographical, occupational and General Health Questions (GHQ28) that assessed mental conditions. A face to face interview was conducted for answering to questionnaire. All survey participants were eligible for the body measurement component. There were no medical, safety, or other exclusions for the body measurements protocol but the pregnant women were excluded from the analysis. The body measurement data were collected by trained health technicians. Body mass index (BMI) was used for measuring of underweight, overweight and obesity. BMI was calculated by dividing the subject's weight in kilograms by the square of his or her height in meters (BMI = kilograms/meters^2). By WHO definition a BMI less than 18.5 is considered as underweight, a BMI greater than 25.0–29.9 is considered overweight and above 30 is considered obese

BMI Measurements: height was measured without shoes and by a safe metal ruler and weight was measured in light clothing using calibrated scales. BP was measured after 6 minute rest in sitting position and recorded by trained researchers, according to WHO (World Health Organization) standardized criteria 26. The mean of two reading from right arm was used in analysis. High BP was defined according to JNC 7 (The Seventh Report of Joint National Committee) and WHO Guideline criteria (Sahebi, 2008).

RESULTS

Of 1027 eligible subjects, 313 subjects (30.5%) were male and 417subjects (69.5%) were female that were over 19 years and the Mean age of male and female were 35.37 and 33.27 years, respectively. The overall Prevalence of underweight, overweight and obesity was 5.5% (56 case), 27.8% (286) and 7.0% (72 cases). The prevalence of underweight, overweight and obesity in the male staff was 5.1%, 28.8% and 6.7% respectively and in the female staff was 5.6%, 27.5% and 7.1%, respectively (Table 1). The prevalence of BMI status based Socio-demographic and clinical characteristics are presented in Table 1. The proportion of Overweight (37.2%) and obesity (17.9%) in collegiate staff was higher than the other education groups (Table 1). In married status, widow (er) & died spouse staff had a much higher proportion of obesity and Overweight than Married and Single staff (Table 1). In job groups, the highest prevalence of overweight and obesity followed by menial workers, Clerical & Managerial workers and Nurses and the highest proportion of underweight followed by Nurses, Clerical & Managerial workers and menial workers (Table 1). In work status, the prevalence of obesity in seating status was the highest (9.8%) (Table 1). Respondents that drank tea and those having second job and having any chronic disease had a higher proportion of obesity and overweight compared to their having tea, having second job and having any chronic disease counterparts (Table 1). Respondents who did not drink coffee had a higher proportion of obesity (7.3% vs.4.5%) and underweight (5.6%vs.4.5%) than those who drank coffee. None of the subjects that smoked was obese and the prevalence of overweight and underweight in smoking staff was 22.0% (13 subjects) and 8.5% (5 subjects) respectively (Table 1). Respondents who did not exercise had a high proportion of obesity than their counterparts who did exercise (7.6%vs.5.6%) (Table1). Subjects who did not have shift works had a higher prevalence of obesity than Subjects who had shift works (9.2% vs. 3.8%) (Table1). The proportion of obesity and underweight in subjects that had tension headache was greater than who did not have tension headache (5.5% vs. 3.9 and 11.1 vs. 5.8%) (Table 1). About shift work, the highest prevalence of obesity followed by fixed night, fixed evening, morning-evening, fixed morning, regular rotation and irregular rotation (Table1). The proportion of obesity and overweight followed by systolic hypertensions (23.3% & 50%) and pre hypertension (9.7% & 32.1%) and diastolic hypertensions (11.5% & 37.2%) and pre hypertensions (8.5% & 33.9%) (Table1). Univariate Linear regression analysis, the recognized predictors of BMI status were tension headache (B.814, SE.383, P<.034), age (B.149, SE.012, P<.000), Systolic Blood pressure (B.078, SE.010, P<.000), Diastolic Blood pressure (B.079, SE.013, P<.000), having tea (B.623, SE.306, P<.042), Amount of tea based average of cup per day (B.132, SE.033, P<.000), smoking (B -1.27, SE.513, P<.014), Average of cigarette use per day (B -.083, SE.037, P<.025), Having chronic disease (B 1.18, SE.291, P<.000), rate of sleep per day (B -.390, SE.076 P<.000), having shift work (B -.838, SE.242, P<.001) single status (B -2.41, SE.246, P<.000), married status (B.906, SE.121, P<.000), widow (er) & died spouse status (B.693, SE.179, P<.000), Nurse job groups (B -.559, SE.239, P<.020), menial job groups (B.251, SE.092, P<.007), Collegiate education status (B 2.001, SE.448, P<.000), Elementary & diploma education status (B.337, SE.123, P<.006), Lower & equal primary education status (B -.401, SE.079, P<.000), Sleeping status (regular vs. irregular) (B.577, SE.245, P<.019) (Table2). In multiple linear regressions, variables with p≤.2 entered into model. Independent predictors of BMI status were age (B -.15, SE.01, P<.000) Systolic Blood pressure (B.05, SE.02, P<.000), diastolic Blood pressure (B.02, SE.02, P<.005), widow (er) & died spouse dummy (B -.13, SE.23, P<.000), having tension headache (B.45, SE.33, P<.041), Sleeping status (regular vs. irregular) (B -.09, SE.37, P<.007) (table 3).

Table 1: The prevalence of BMI status based Socio-demographic and clinical characteristics

variable	Cofactor	Under weight		Normal		Over weight		obesity	
		N	%	n	%	n	%	n	%
sex	male	16	5.1	186	59.4	90	28.8	21	6.7
	female	40	5.6	427	59.8	196	27.5	51	7.1
Job groups	Nurse	32	5.9	336	62.0	149	27.5	25	4.6
	Clerical & Managerial	13	5.6	139	59.9	62	26.7	18	7.8
	menial	11	4.3	138	54.5	75	29.6	29	11.5
Work status	Walking	35	6.3	332	59.7	155	27.9	34	6.1
	seating	5	4.1	72	58.5	34	27.6	12	9.8
	Walking & seating	16	4.6	209	60.1	97	27.9	26	7.5
Having tea	Yes	42	5.0	490	58.8	242	29.0	60	7.2
	No	14	7.3	123	63.7	44	22.8	12	6.2
Having coffee	Yes	5	4.5	70	62.5	32	28.6	5	4.5
	No	51	5.6	543	59.3	254	27.8	67	7.3
smoking	Yes	5	8.5	41	69.5	13	22.0	0	.0
	No	51	5.3	572	59.1	273	28.2	72	7.4
Having migraine	Yes	6	4.0	87	58.4	47	31.5	9	6.0
	No	15	5.1	166	56.7	83	28.3	29	9.9
Having tension headache	Yes	13	5.5	127	54.0	69	29.4	26	11.1
	No	8	3.9	126	60.9	61	29.5	12	5.8
Having* chronic disease	Yes	7	3.2	114	52.5	73	33.6	23	10.6
	No	49	6.0	499	61.6	213	26.3	49	6.0
Having second job	Yes	3	2.5	74	61.2	35	28.9	9	7.4
	No	53	5.8	539	59.5	251	27.7	63	7.0
sporting	Yes	16	5.0	197	61.4	90	28.0	18	5.6
	no	40	5.7	416	58.9	196	27.8	54	7.6
Having shift work	Yes	29	6.9	262	62.4	113	26.9	16	3.8
	no	27	4.4	351	57.8	173	28.5	56	9.2

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Type of shift	Regular rotation	10	6.3	96	60.0	48	30.0	6	3.8
	Fixed morning	19	4.2	268	59.0	127	28.0	40	8.8
	Fixed evening	0	.0	4	57.1	2	28.6	1	14.3
	Fixed Night	0	.0	0	.0	1	50.0	1	50.0
	Irregular rotation	19	7.4	166	64.3	64	24.8	9	3.5
	Morning-evening	8	5.5	79	54.1	44	30.1	15	10.3
Married status	Single	32	9.8	241	73.5	47	14.3	8	2.4
	Married	24	3.7	349	54.0	220	34.1	53	8.2
	widow (er) & died spouse	0	.0	23	43.4	19	35.8	11	20.8
Education groups	Collegiate	2	2.6	33	42.3	29	37.2	14	17.9
	Elementary &diploma	18	4.7	212	55.5	119	31.2	33	8.6
	Lower & equal primary	36	6.3	368	64.9	138	24.3	25	4.4
Systolic Blood pressure	Normal	46	6.7	436	63.3	172	25.0	35	5.1
	pre hypertension	10	3.2	169	54.9	99	32.1	30	9.7
	hypertension	0	.0	8	26.7	15	50.0	7	23.3
diastolic Blood pressure	Normal	40	6.3	405	64.3	149	23.7	36	5.7
	pre hypertension	15	4.7	169	53.0	108	33.9	27	8.5
	hypertension	1	1.3	39	50.0	29	37.2	9	11.5

**The mean of chronic disease in having cardio vesicular disorder, cancerous, diabetic and renal disorder*

Table 2: Univariate linear regression analysis to determine predictors of BMI status

Predictors	B	SE (Std. Error)	sig
Age	.15	.01	.000
Sex	-.2	.26	.440
single dummy	-2.4	.25	.000
Married dummy	.91	.12	.000
widow (er) & died spouse Dummy	.69	.18	.000
Lower & equal primary education dummy	-.4	.08	.000
Elementary &diploma education dummy	.34	.12	.006
Collegiate education dummy	2.0	.45	.000
Walking work status dummy	-.27	.24	.273
Seating work status dummy	.29	.18	.112
W &S status dummy*	.01	.08	.95
Having tea	.62	.31	.042
Amount of tea (average of cup per day)	.13	.03	.000
Smoking	-.3	.5	.014
Average of cigarette use per day	-.08	.04	.025
Having coffee	.13	.38	.73
Amount of coffee (average of cup per day)	.13	.14	.36
Sleeping status(regular vs. irregular)	.58	.25	.019
Rate of sleep (per day)	-.39	.08	.000
Nurse job groups	-.56	.24	.020
Clerical & Managerial job groups	-.001	.14	.993
Menial job groups	.25	.09	.007
Having second job	.29	.37	.43
Physical activity	-.36	.29	.17
Having shift work	-.84	.24	.001
Having chronic disease **	1.18	.29	.001
Having migraine	-.35	.41	.39
Having tension headache	.81	.38	.034
Having mix headache	.6	.73	.41
Mental health status	.01	.03	.64
Anxiety	.04	.04	.15
Society activity status	.03	.04	.45
depressing status	.01	.03	.84

General health status	.01	.01	.359
Systolic Blood pressure	.08	.01	.001
diastolic Blood pressure	.08	.01	.001

* *Walking and Seating work status dummy*
***The mean of chronic disease in having cardio vesicular disorder, cancerous, diabetic and renal disorder*

Table 3: Multiple linear regression analysis to determine predictors of BMI status

Predictors	B	SE (Std. Error)	sig
Age	.14	.02	.000
Systolic Blood pressure	.05	.02	.000
diastolic Blood pressure	.02	.02	.005
Amount of tea (average of cup per day)	.07	.05	.373
Having chronic disease	.36	.39	.178
Rate of sleep(per day)	-.12	.12	.352
Single dummy	-1.42	.40	.307
widow (er) dummy	-.13	.23	.000
Collegiate education dummy	1.76	.86	.553
Having tension headache	.45	.33	.041
Having tea	-.96	.51	.184
Smoking	-.97	1.44	.061
Average of cigarette use per day	-.12	.09	.501
Having Shiftwork	-.09	.43	.165
Nurse job groups	.75	.54	.828
menial job groups	.03	.22	.172
Elementary &diploma education dummy	.58	.22	.900
Sleeping status(regular vs. irregular)	-.09	.37	.007
Anxiety	.05	.04	.817
Sport	-.004	.38	.158
Seating work status dummy	.69	.3	.992

DISCUSION

In the present study, the prevalence of underweight, overweight and obesity was 5.5%, 27.8% and 7.0%, respectively in Shiraz hospitals staff. In comparison with the general population in Shiraz, the prevalence of overweight and obesity in staff was lower (Overweight: 37.1% and obesity: 17.9%) (Tohidi, 2008). Males had highest proportion of Underweight (5.6% vs. 5.1%) and obesity (6.7% vs. 7.1%) while females had highest proportion of Overweight (28.8% vs. 27.5%) However, this difference was not statistically significant. In Tohidi studies, the prevalence of overweight and obesity in males was about twice compared to the present study (42.7% and 10.5%) also for women similar result was obtained (34.1% and 21.9%) (Tohidi, 2008). However the prevalence of overweight in male staff Ahvaz university (2005) was almost equal to our study, (26%) but the prevalence of obesity (52%) was much more (Sharifi, 2008), also among female staff of Shahid Beheshti Tehran university (1999), the prevalence of overweight (39%) and obesity (11%) was higher than present study (Tohidi, 2008). Compared with workers in other countries, the proportions of our study were less, such as Mexico (1996) that the prevalence of overweight and obesity in a staff general hospital was 37.45% and 17.2% (Fanghänel, 2001), among the Employees of Universities, Health and Research Institutions of Pakistan (2003), the overall prevalence of underweight, overweight and obesity was 5.4%, 29.6 and 8% respectively (Khan, 2003), In the Kuwait Oil Company employees, the overall prevalence of overweight and obesity was 75% (Taysir, 2003). Comparing the prevalence of overweight and obesity in hospital employees in our study with general population of some other countries, the proportions were lower than general population. The prevalence of overweight and obesity in the Canada population (2004) was found in 58.8 and 23.4, respectively.

In the Nigeria (2006), the proportion of overweight and obesity was seen in 53.3% and 21.0% respectively (Wahab, 2011). In Ghana (2011), the prevalence of obesity was 17%, though the prevalence of overweight was less than our study (21%) (Amegah, 2011) In consistent with some studies in Iran

(Tohidi, 2009; Sharifi, 2008; Abdollahi, 2010; Maddah, 2012) and other countries (Amegah, 2011; Santos, 2003; Ko, 2007; Maennig, 2008; Poulioun, 2010) results of analyses displayed that BMI level increased with increasing age.

Systolic Blood pressure and diastolic Blood pressure independently had direct linear relationship with BMI level. Several studies have revealed an association between BMI and blood pressure in Iran (Sahebi, 2010; Ansari, 2003; Rahmati, 2005; Salem, 2007; Zarifyegane, 2010) and other countries (Santos, 2003; Ko, 2007; Poulioun, 2010; MertensIlse, 2000; Lucas, 1985).

Widow (er) staff showed probability of lower BMI level in compared with single and married staff. In comparison with single and married variables found result of various studies followed: In Ghana displayed married people were more overweight and obese than single people (Amegah, 2011), in USA study married men were fatter than single or previously married men (Sobal, 1992). Some other studies reported the same results too (Maddah, 2012; Young, 1996; Santos, 2003; Woo, 1999; Tzotzas, 2010; Janghorbani, 2008; Mazloomzadeh, 2006; Azad-bakht, 2003; Nagashpoor, 2011).

In headache effect on BMI, subjects with tension headaches showed higher levels of BMI although the relationship between migraine headaches or mixed with BMI was not significant. In most studies, there was a significant relationship between migraine headaches and BMI levels (Bigal, 2006; Peres, 2005). These results were inconsistent with the present study's findings that probably because of type of studding model and control of different variables.

In the current study, with the presence of possible confounding variables, subjects with Irregular sleep had lower BMI levels, but there was no significant relationship between sleep hours and BMI levels. While in some studies, an inverse relationship had been observed between sleep hours and BMI levels (Ko, 2007; Vioque, 2000; Vorona, 2005; Nishitani, 2012). In multiple linear regressions analysis of present study, there was no significant relationship between smoking and level BMI. Previous Studies Provided Conflicting results in this field (Santos, 2003; Maennig, 2008; Poulioun, 2010). However, consistent with the results of some studies in single variable linear regression, an inverse relationship between education level and BMI level were observed (Santos, 2003; Poulioun, 2010) but this relationship was not maintained in multiple linear regression in present study. Unexpectedly, in our study, physical activity did not show any effect on the BMI level. Whereas most studies found that people with physical activity showed a lower level of BMI (Amegah, 2011; Santos, 2003; Maennig, 2008). In the multiple regressions, having shift work showed no effect on the BMI level. While some studies had reported people with shift work had a higher level of BMI that still was being unrevealed (Eberly, 2010) that further studies are needed in this area.

Conclusion

Although our findings suggested that the prevalence of overweight and obesity within the hospital staff in Shiraz, in comparison with other groups and the general population was lower, but the prevalence ratio is significant and requires consideration. While obesity is easily preventable, if not controlled, it would have chronic and irreversible complications. This study was estimated on the multiple linear regression models, and showed new findings of determining factors associated with BMI. In addition to the factors of age, systolic and diastolic blood pressure had direct relationship with BMI; there was an indirect relation to BMI and irregular sleep and widow (er) status. In other words, poor living conditions had the negative impact of the increase in BMI level. This is required to justify that unlike other studies, physical activity in this study did not have any effect on BMI levels. Consequently, in order to improve the physical activity, intervention programs appears to be necessary.

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