

## Determination of prevalence of being overweight and its association with hypertension in patients referred to the healthcare centre in Jandaq in 2014

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### ABSTRACT

**Background and aims:** Obesity and overweight is a major public health problem and, alongside hypertension, is one of the risk factors of cardiovascular diseases incidence. The aim of this study was to determine the prevalence of overweight and its association with hypertension in the patients referred the healthcare center in Jandaq.

**Methods:** This cross-sectional study was conducted on 400 patients (168 men and 232 women) referring to urban healthcare centers in Jandaq. By means of necessary instruments, the individuals' weight and height were measured, and body mass index (BMI) was calculated. Also, the individuals' blood pressure was measured and classified in accordance with the standard manual, and after filling out the questionnaires, the data analysis was done by SPSS.

**Results:** The prevalence of overweight was 29.3% in men and 35.7% in women. The prevalence of hypertension was 29.1% in men and 35.3% in women. Family history of hypertension and cardiovascular disease was effective on the individuals' acquiring hypertension. With the increase in the patients' age, both BMI ( $P < 0.035$ ) and blood pressure ( $P < 0.001$ ) increased. Also, increase in BMI in the individuals was significantly associated with blood pressure rate ( $P < 0.001$ ).

**Conclusions:** The prevalence rate of overweight and obesity in Jandaq is high. There was an association among the individuals' BMI, blood pressure and age. Therefore, it is necessary to develop health education programs and to inform the public regarding the increase of mobility and improvement of the nutrition, and to implement effective interventions in health planning in this center.

**Keywords:** Overweight, Prevalence, Blood pressure, Body mass index.

### INTRODUCTION

The prevalence of obesity in all age groups in both developed and developing

countries is growing rapidly. The disease is growing in the Persian Gulf and

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especially in Iran. Obesity is one of the most important public health problems in developed countries.<sup>1,2</sup> Type 2 diabetes, cardiovascular disease (including hypertension) and cancer, all of which are among the world's most deadly diseases, are all associated with being overweight and obese.<sup>3</sup> Obesity is a problem that comes from lifestyle changes. Imbalance between consumption of high-calorie foods and lack of physical activity are the main causes of obesity.<sup>2</sup>

Most developed countries have entered a phase of epidemiological transition with high prevalence of obesity and according to the World Health Organization, one billion people worldwide are overweight and 3 hundred million are obese, increasing the risk of high blood pressure.<sup>4</sup>

Hypertension, due to its high prevalence and associated with cardiovascular diseases, is a major health problem in developing countries. Knowing the factors which cause high blood pressure or helping to prevent, it is necessary to reduce its prevalence.<sup>5</sup> The World Health Organization considers hypertension to be among preventable common diseases that if not treated properly, can cause numerous complications. Hypertension puts the walls of the arteries and heart under pressure and therefore increases the chances of having a heart attack, stroke and kidney diseases. About one billion people worldwide are suffering from high blood pressure,  $\frac{2}{3}$  of which live in developing countries.<sup>6,7</sup> Hypertension causes 46\$ billion loses in direct medical costs in the U.S. and a further \$6.3 billion in losses is caused by loss of productivity and performance of individuals in this country.<sup>8</sup> The prevalence of hypertension is different for each country; some studies suggest an increased prevalence in different parts of the world. Furthermore, internal and external studies show a

relationship (correlation) between high blood pressure and an increase in age and body mass index.<sup>9</sup> Some studies have reported that there is no direct correspondence between obesity and hypertension, while most studies have shown that hypertension is more common among obese patients compared with non-obese individuals and that there is a positive correlation between these two variables.<sup>9-13</sup> A study carried out by Wildman and colleagues on 15540 Chinese adults showed that with increase in body mass index as a continuous and independent variable, the chances of high blood pressure and metabolic syndrome increases.<sup>14</sup> Another study titled the relationship between obesity and cardiovascular risk factors in adults living in central Iran "Isfahan Healthy Heart Program Results", which was carried out in 2008, showed that an increase in body mass index (Body Mass Index= BMI) had a direct correlation with an increase in blood pressure.<sup>15</sup>

Due to complications, problems and costs imposed on the society because of obesity and high blood pressure, knowledge about the prevalence and different degrees of these 2 diseases and factors associated with them can be very helpful in the process of national development in order to plan for health care. Thus, given the importance of this topic, this study aims to analyze the prevalence of being overweight and its relation with high blood pressure in health center of Jandagh city.

## METHODS

In this cross-sectional descriptive analytical study which was carried out in the autumn of 2014 in urban-rural health centers of Jandagh, those referred to the center were asked to take part with the consent and knowledge of the purpose of the study, with

the exception of those under 20 years of age and pregnant women. Simple sampling was used in this study. To determine the sample size, according to previous studies, using one hundred subjects the prevalence of being overweight in Jandagh was calculated to be 60%.<sup>1,2</sup> For a confidence of 95% with an accuracy of 0.05%, the minimum required sample size was equal to 365 which, taking into account the existing facilities, was increased to 400. First, the blood pressure of the patients was measured using the standard method described in the handbook of how to take blood pressure, published by the Ministry of Health, using mercury sphygmomanometer, and the first sound heard was noted as the systolic pressure and the diastolic pressure was recorded as the fifth voice heard. Then, the patients' weight and height were measured without their shoes and additional accessories with a precision measuring of 500g using an analog scale. Next, with a brief explanation on how to complete the questionnaire and ensuring confidentiality, a questionnaire containing questions about demographic information including age, sex, education level, family size and occupation was completed anonymously by the patients. Using the information obtained, their body mass index was calculated and using measurements of their blood pressure, they were classified in four categories of normal blood pressure (systolic<120 and diastolic<80 mm Hg), pre-hypertension (systolic 120-139 or diastolic 80-89 mm Hg), high blood pressure stage (systolic 140-159 or diastolic 90-99 mm Hg) and stage II hypertension (systolic>160 or diastolic>100 mm Hg).

Based on the calculation the body mass index, the patients were also classified in four categories of thin

(BMI<18.5), normal (18.5<BMI<24/9), overweight (25<BMI<29/9) and obese (30>BMI), respectively.

In the questionnaire, other than questions about blood pressure, height and weight, additional questions about any history of hypertension, diabetes and cardiovascular were also asked. Further questions regarding any family history of hypertension and diabetes, the daily consumption of fruits and vegetables, daily amount of physical activity and hours of sleep and the amount of salt intake (low, normal and high) were asked. In cases where the information of the questionnaire were incomplete, due to the fact that the patients in this study had family physicians in Jandagh GP health centers, information was taken on those cases from their archive files. The reliability and validity of the questionnaire were checked by Damirchi and Mehrbani.<sup>2</sup> Data on the standard questionnaire were analyzed using SPSS software to find descriptive statistics (mean and standard deviation) and Chi-square test.

## RESULTS

In this study, 400 people, 168 men (42%) and 232 females (58%) with a mean age of 44.3 were examined. The patients' average weight was 69.5 kg and the average height was 1.6 meters. The average body mass index was 27. The average systolic blood pressure of the subjects was 125 mm Hg and diastolic blood pressure was 78.6 mm Hg. In this study, demographic questions were asked from the subjects and frequency distribution of the gathered data was shown in Table 1. To determine the impact of lifestyle factors on blood pressure, questions regarding the amount of physical activity and sleep and dietary salt intake, fruit and vegetable consumption was asked, the frequency distribution of which was shown in Table 2.

**Table 1:** The frequency distribution of the subjects based on marital status, family size, education and occupation

Variable	Instance	Percentage
Marital status	Married	90.3
	Single	2.8
	Widowed/Widower	6.5
	Divorced	0.5
Family size	Single	26.5
	Two people	27.3
	Three people	32.5
	Four people	23.8
Education	Five or more people	13.3
	Illiterate	26.5
	Primary school	52
	Junior-high school	7
Occupation	High school	9
	University	5.4
	Laborer	12.5
	Office employee	8
	Self-employed	15
	Housewife/husband	48.8
	Student	0.8
	Retired	9.3
	Unemployed	5.8

**Table 2:** Frequency of distribution of the subjects referred to health centers Jandagh in terms of amount of Physical activity, sleep, salt intake, consumption of fruit and vegetables

Variable	Instance	Percentage
Physical activity	None	4.5
	Low	37.3
	Moderate	37.5
	High	20.8
Sleep	Irregular	10.8
	Less than 6	15.8
	6 to 8	60.5
Salt intake	More than 8	13
	Low	47.5
	Normal	43
Fruit and vegetables consumption	High	9.3
	None	2
	Low	22.3
	Moderate	55.8
	High	20

In this study, there was a significant correlation between the classification of blood pressure with the amount of daily exercise, amount of sleep, the amount of salt intake and fruit and vegetables consumption ( $P < 0.001$ ). The body mass index of the patients was classified as thin, normal, overweight and obese and their blood pressure was classified as normal, pre-hypertension and hypertension stage 1 and 2 as shown in Table 3.

**Table 3:** Frequency distribution of patients by gender and classification body mass index

Gender	BMI ranking				Total	P
	Thin	Normal	Overweight	Obese		
Male	10(6.0%)	65(38.7%)	68(40.5%)	25(14.9%)	168(100%)	P<0.001
Female	6(2.6%)	59(25.4%)	83(35.8%)	84(36.2%)	232(100%)	
Total	16(4.0%)	124(31.0%)	151(37.8%)	109(27.2%)	400(100%)	

There was a significant relationship between body mass index and the gender of

the subjects ( $P < 0.001$ ). As shown in Table 3, increase in body mass index in females is

far more than males. The rising trend of body mass index and blood pressure in people with a family history of cardiovascular disease and hypertension were reported to be more than those with no family history of cardiovascular disease and hypertension. However, there was no significant relationship between hypertension and gender (P=0.21).

In this study, 145 subjects (36.3%) had a history of hypertension and 299 patients (75%) had a history of hypertension in their immediate family (parents or children).

Also, 54 patients (13.5%) had a history of cardiovascular disease and 178 patients (5/44%) had a family history of cardiovascular disease.

Regarding diabetes, 60 patients (15%) had individual diabetic records and 149 (37.3%) had a family history of diabetes.

Also, 64 subjects had a history of tobacco use with an average of 13 years. However, there was no significant difference between the classification of blood pressure and family history of diabetes (P=0.4) and smoking (P=0.19) (Table 4).

**Table 4:** Frequency distribution of patients by gender and classification blood pressure

Gender	Blood pressure ranking				Total	P
	Normal	Pre-blood pressure	Stage 1	Stage 2		
Male	89(53.0%)	30(17.9%)	35(20.8%)	14(8.3%)	168(100%)	P=0.213
Female	120(51.7%)	30(12.9%)	49(21.1%)	33(14.2%)	232(100%)	
Total	209(52.2%)	60(15.0%)	84(21.0%)	47(11.8%)	400(100%)	

As, it was seen from the above table, 65% of people had vararious degrees of obesity or were overweight and the rate of being overweight or obese was higher in females than males. Percentage of males who were in the thin and normal group was more than females. However, the percentage of obese females was more than twice obese men.

The percentage of females in the first and second hypertension group was more than

males. The prevalence of hypertension in males and females was 29.1 and 35.3, respectively. The prevalence of hypertension was reported to be 32.8% in total. In this study, body mass index increased as the patients' age increased (P<0.001).

Table 4 shows that when age increases, the patient's body mass index increases. In all age groups, the highest percentages of individuals were in the overweight and obese body mass index group (Table 5).

**Table 5:** Frequency distribution of body mass index based on age groups (P<0.035)

Age group	BMI				Total	P
	Thin	Normal	Overweight	Obese		
20 to 34 years old	5 (3.5%)	55 (38.7%)	49 (34.5%)	33 (23.2%)	142 (100%)	P=0.035
35 to 49 years old	2 (1.7%)	36 (30.8%)	48 (41%)	31 (26.5%)	117 (100%)	
50 to 64 years old	5 (6%)	17 (20.5%)	28 (33.7%)	33 (39.8%)	83 (100%)	
65 years old and older	4 (6.9%)	16 (27.6%)	26 (44.8%)	12 (20.7%)	58 (100%)	
All	16 (4%)	124 (31%)	151 (37.8%)	109 (27.2%)	400 (100%)	

In the age groups above 50 years of age, the prevalence of hypertension increased.

Distribution of blood pressure according to age groups is shown in Table 6.

**Table 6:** Distribution of blood pressure according to age (P<0.001)

Age group	Classification of hypertension				Total	P
	Normal	Pre-hypertension	Stage one hypertension	Stage two hypertension		
20 to 34 years old	114(80.3%)	17(12%)	10(7.0%)	1(0.7%)	142(100%)	P<0.001
35 to 49 years old	63(53.8%)	17(14.5%)	21(17.9%)	16(13.7%)	117(100%)	
50 to 64 years old	23(27.7%)	13(15.7%)	27(32.5%)	20(24.1%)	83(100%)	
65 years old and older	9(15.5%)	13(22.4%)	26(44.8%)	10(17.2%)	58(100%)	
All	209(52.2%)	60(15%)	84(21%)	47(11.8%)	400(100%)	

Table 7 shows that a quarter of the subjects suffered from high blood pressure, being overweight and obesity. As

body mass index increased, the number of people with high blood pressure increased too (P<0.001).

**Table 7:** Frequency distribution of classifications of body mass index with bloody pressure

BMI ranking	BP ranking				Total	P
	Normal	Pre-bp	Stage 1	Stage 2		
Thin	9(56.2%)	1(6.2%)	4(25.0%)	2(12.5%)	16(100%)	P<0.001
Normal	88(71.0%)	11(8.9%)	15(12.1%)	10(8.1%)	124(100%)	
Overweight	69(45.7%)	30(19.9%)	32(21.2%)	20(13.2%)	151(100%)	
Obese	43(39.4%)	18(16.5%)	33(30.3%)	15(13.8%)	109(100%)	
Total	209(52.2%)	60(15.0%)	84(21.0%)	47(11.8%)	400(100%)	

To assess the effects of BMI, age and gender simultaneously on systolic blood pressure, a general linear model was used. The results showed that blood pressure was significantly related to BMI and age, but not with gender.

## DISCUSSION

This study aimed to determine the prevalence of being overweight and its relationship with high blood pressure. The prevalence of being overweight and obese in

men was 40.5% and 14.9%, respectively and in women it was 35.8% and 36.2%. The prevalence of being overweight and obesity in the total population was 65%. In Damirchi et al., the prevalence of obesity and being overweight was 14.5% and 54% among men and 32.5% and 50% among women, respectively. The prevalence of hypertension (stage one and two hypertension) was estimated to be 32.8%, which is not significantly different from the study carried out in Yazd in 2010. The prevalence of hypertension in Yazd was

reported to be 38.1%.<sup>16</sup> In a study that was carried out to assess the disease burden of hypertension in the world, 26.4% of adults had high blood pressure.<sup>17</sup> A review study of the prevalence of hypertension reported that India had the lowest rate (3.4% in men and 6.8% in women) and Poland had the highest rate (68.9% in men and 72.5% in women).<sup>18</sup> This difference in prevalence may be due to different social, economic, cultural, and genetic makeup of a person's lifestyle. Several other studies also confirmed this findings.<sup>19-21</sup>

This study showed that increasing body mass index increased the number of people with high blood pressure ( $P < 0.001$ ). In a study that was conducted in Kermanshah similar results were obtained and a direct correlation between obesity and blood pressure was observed.<sup>22</sup> Another study was carried out abroad aiming to investigate the association between body mass index, hypertension and dyslipidemia showed that there is a strong correlation between these.<sup>23</sup>

In this study, blood pressure increased with age and body mass index also increased. Other studies were also consistent with the findings of this study, in that there were abnormal changes in blood biochemical parameters and body mass index as age increased.<sup>23,24</sup>

In this study, the increase in body mass index in females was far more than males. The results of the study conducted by Kearney et al., showed that the prevalence of high blood pressure in females is more than in males.<sup>18</sup> Other national and international studies investigating the relationship between gender and hypertension show that the prevalence of hypertension is more common among males than females.<sup>22,23,25</sup> Most national and international studies show a direct positive relationship between hypertension and aging.<sup>22,26</sup> There was also a clear relationship between the classification of

hypertension with personal and family history of cardiovascular disease used in this study. Another study reported a significant relationship between the history of cardiovascular disease on an individual basis or other family members with the number of sleeping hours.<sup>2</sup> Many studies confirm the relationship between a family history of hypertension with the increase risk of hypertension in the individual. Among the males in this study, 23.2% were overweight or obese, whereas this number was 41.7% among the women. This difference between the weights of both genders is also shown in a study titled investigating blood pressure and its relationship with obesity and central obesity.<sup>13</sup>

## CONCLUSION

In the present study, the prevalence of being overweight and hypertension was high in the community under investigation. Although these two diseases are considered to be dangerous, changes in lifestyles and altering unhealthy habits can improve the community's public health. Hence an increase in health education and an increase in public awareness to have more physical activity and improving nutrition and effective interventions in health planning are recommended. It is also recommended that in future studies multiple risk factors in different populations are investigated to determine the factors associated with hypertension.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

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