International Journal of Multicultural and Multireligious Understanding

http://ijmmu.com
editor@ijmmu.com
ISSN 2364-5369
Volume 8, Issue 5
May, 2021
Pages: 162-169

Comparison of Anthropometric Indicators, Blood Pressure, and Level of Happiness in Athletic and Non-Athletic Female Staff in Universities of Medical Sciences in Fars Province

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http://dx.doi.org/10.18415/ijmmu.v8i5.2646

Abstract

The aim of this study was to compare a number of anthropometric indicators, blood pressure and level of happiness in athletic and non-athletic female staff members of universities of medical sciences in Fars Province. This is a cross-sectional descriptive study, in which 237 athletic women and 241 non-athletic women participated. The data included weight, waist circumference, waist-to-hip ratio, body mass index, and systolic and diastolic blood pressure.To calculate the level of happiness, the Oxford University Happiness Questionnaire was used. The data were analyzed using SPSS, version 13. The results showed that excess weight and obesity were prevalent among female staff members of the universities. The body mass index of athletic women was in a more normal range. The waist-to-hip ratio was lower in athletic women compared to non-athletic women. In happiness, athletic women were superior to non-athletic ones. However, no significant difference was observed between athletic and non-athletic women in their systolic and diastolic blood pressures. It appears that participating in physical exercise can be effective on psychological and physiological aspects of female staff members of universities of medical sciences.

Keywords: *Physical Activity; Anthropometric Indicators; Female Staff, Happiness*

Introduction

In modern technology-dependent societies, excess weight, obesity, hypertension, and unhappiness (depression) are considered as major issues to which people and health officials are faced with. In all societies, including developed and developing ones, urban and rural societies, and in all age groups and genders, excess weight and obesity account for many diseases including cardiovascular diseases, type 2 diabetes, hypertension, high blood lipids, heart attack and stroke, joint disorders, gallbladder diseases, some forms of cancer and psychological disorders, particularly depression (1-5). The prevalence of excess

weight and obesity is such that over half a billion people in the world suffer from it and this figure is on the rise. Iran is not exempted from this trend (6).

In a study conducted in 28 provinces in Iran in 2005, the prevalence of excess weight and obesity was reported to be 48 percent. Other multiple studies conducted in various cities and provinces of the country confirm the prevalence of excess weight and obesity in urban and rural women of the country (7-11). In Asian, American and European countries, the number of cases suffering from excess weight and obesity is on the rise, raising the alarm for these societies and health officials (12-15).

Measuring excess weight and obesity is possible both in the laboratory (MRI, CT Scan, and body composition analyzer) and in the field (Body Mass Index (BMI), Waist Circumference (WC), and Waist-Hip Ratio (WHR)). The field technique is extensively used for measuring obesity, particularly abdominal obesity, and predicting hypertension and type 2 diabetes, since it is more popular, quicker, and less expensive (16-19).

There are many factors involved in the occurrence of excess weight and obesity, including environmental, social and psychological factors; genetics; nutrition; sedentary lifestyle; and lack of physical activity (2). Sedentary lifestyle and lack of physical activity are the results of industrialization, development and expansion of technology and urbanization. Sedentary lifestyle affects excess weight and obesity and their induced diseases. Some studies claim that aerobic physical activities have positive effects on losing weight and preventing obesity, reducing cardiovascular diseases, type 2 diabetes, etc., and increasing the level of happiness (20-24).

As a multidimensional being, not only should humans be physically healthy, but also their psychological health is of paramount importance. A factor that affects the humans' physical and psychological health is happiness, which has been less taken into consideration. Happiness is important because it not only increases efficiency, but also increases positive emotions and decreases negatives emotions.

Psychologists consider happiness as a positive emotion that includes the three elements of pleasure, joy, and satisfaction with life (25, 26). It seems that there is a sort of interaction between physical activity, happiness and diseases. In other words, physical activity affects happiness, and higher levels of happiness affect the immune system and hormones, thus reducing the risk of infectious diseases, hypertension, heart attack, allergy, cancer, and even death (27-29). The aim of the present study was to investigate the effect of physical activity on anthropometric indicators and blood pressure as well as the effect of physical activity and anthropometric indicators on the level of happiness of the female staff at universities of medical sciences in Fars Provinces.

Materials and Methodology

This is a cross-sectional, descriptive-inferential study. In the part related to descriptive statistics, the mean and standard deviation were used for drawing tables and diagrams. To determine the relationship between physical activity and anthropometric indicators, systolic and diastolic blood pressures, and happiness, Pearson correlation coefficient was used. Moreover, in the part related to inferential statistics, independent samples t-test was used for comparing the differences between the two groups in terms of the variables in question. The confidentiality of the collected data was guaranteed.

The participants in this study included all the female staff at universities of medical sciences in Fars Province. They were selected in the following way:

A. All the female staff participating in the athletic competitions of the universities of medical sciences in Fars province in anational anniversary were selected as the athletic group provided that they had had physical activity at least four hours a week in the past three months. A few of the individuals were excluded from the study because they were not willing to participate in the study, they were not eligible

for the study, or they had not completed all the tests. Finally, 237 subjects with a mean age of 35 ± 3.5 years took part in the study as the athletic group.

B. From all the female staff at universities of medical sciences in Fars Province, 241 members with a mean age of 35 ± 3.76 years were randomly selected as the non-athletic group. The number of the subjects selected from each town was equal to the number of non-athletic women of that town. The research tools used in this study included the following:

1. Mercury blood pressure monitor

2. Medical body tape measure

3. Digital scale made in Germany for weight measuring

4. Wall mounted height rods for height measuring

5. Oxford happiness questionnaire short form

After five minutes of rest, blood pressure was measured by a general practitioner while the patient was in a sitting position. The patient's height was measured using a wall mounted height rod made in China with a height of two meters from the surface of the ground and an accuracy of 0.5 cm, and the patient's weight was measured using a digital scale made in Germany with an accuracy of 0.5 kg while the patient had light clothes on but wearing no shoes. The BMI was calculated by dividing the patient's weight in kilograms by her height squared in meters. The criteria for measuring excess weight or obesity using the BMI was based on the instructions provided by the World Health Organization (WHO) (19). To measure the waist circumference and hips, a plastic tape measure was used. Waist circumference (WC) was measured on the wide area of the iliac crest and the lowest rib and the hip circumference was measured on the bulgiest area of the hip. To calculate the WHR, we divided the waist circumference by the hip circumference.

To calculate the level of happiness, a short questionnaire developed by psychologists at the University of Oxford in 1989 was used. The questionnaire has already been used in Iran (24, 25). The questionnaire contains 10 questions and each question has four options. Using Cronbach's alpha, the reliability of the questionnaire was calculated to be 0.88.

The data collected were analyzed using the statistical software SPSS, version 13. To compare the anthropometric indicators including body weight, waist circumference, waist-to-hip ratio, BMI, systolic and diastolic blood pressures, and happiness of the athletic and non-athletic female staff, independent samples t-test was used by assuming the level of significance to be $p < 0.5$.

Findings

According to Table 1, 4% of the female staff had a weight lower than normal, 75 percent had a normal weight, 11.5 percent were overweight, and 9.5 percent were obese.

Table 1. Percentage of athletic and non-athletic staff members based on BMI

Index	Group	Number	Percent	Total Percent
Less than 18.5	Athletic	12	5	4
	Non-Athletic	7	3	
18.5 – 24.9	Athletic	189	80	75
	Non-Athletic	169	70	
25 – 29.9	Athletic	19	8	11.5
	Non-Athletic	36	15	
30 – 34.9	Athletic	17	7	9.5
	Non-Athletic	29	12	

The mean and standard deviation scores related to anthropometric indicators, blood pressure, and the level of significance have been given in Table 2 for both groups. The results indicated that there was no significant difference between athletic and non-athletic female staff in terms of their body weight, BMI, and systolic and diastolic blood pressures.

Table 2. Anthropometric indicators and blood pressure in the athletic and non-athletic groups

Parameter	Status	Number	Mean ± SD	F	t	df	Sig
Weight	Athletic	237	60.60 ± 8.96	8.77	0.76	476	0.22
	Non-Athletic	241	61.26 ± 10.18				
BMI	Athletic	236	25.45 ± 3.32	4.27	0.89	475	0.18
	Non-Athletic	241	25.83 ± 3.70				
WC (cm)	Athletic	236	76.53 ± 8.24	15.07	4.40	475	0.00
	Non-Athletic	241	80.27 ± 10.21				
WHR	Athletic	235	0.78 ± 0.07	0.97	1.60	472	0.05
	Non-Athletic	239	0.79 ± 0.07				
Systolic Blood Pressure (mmHg)	Athletic	237	109.66 ± 11.58	0.21	0.37	476	0.36
	Non-Athletic	241	110.04 ± 11.40				
Diastolic Blood Pressure (mmHg)	Athletic	236	73.13 ± 9.09	0.04	0.50	476	0.30
	Non-Athletic	239	72.70 ± 9.36				
Height	Athletic	237	1.62 ± 0.08	-	-	-	-
	Non-Athletic	241	1.6 ± 0.07				

In addition, the results suggest that there is a significant difference between athletic and non-athletic groups in their waist circumference, waist-to-hip ratio, and level of happiness. The analysis of the data related to happiness in the questionnaire showed that the difference between the two groups was significant. The mean level of happiness was 2.74 ± 0.44 in athletic women and 2.62 ± 0.40 in non-athletic women ($t = 2.76$, $df = 476$, and $p = 0.00$).

There was a negative correlation between physical activity and anthropometric indicators. Physical activity was positively correlated with happiness, while anthropometric indicators were negatively correlated with happiness (Tables 3 and 5).

Table 3. Pearson correlation coefficient between physical activity, anthropometric indicators, blood pressure and happiness in the athletic group

Physical Activity	Pearson Correlation Coefficient	Weight	WC	Systolic Blood Pressure	Diastolic Blood Pressure	WHR	BMI	Happiness
		- 0.477	- 0.529	- 0.295	- 0.255	- 0.655	- 0.531	+ 0.632

As Table 3 shows, there was a significant negative correlation between physical activity, on the one hand, and anthropometric indicators and systolic blood pressure, on the other hand, while there was a significant positive correlation between physical activity and happiness.

Table 4. The level of happiness in athletic and non-athletic staff

Happiness/Group	Very Low Happiness		Low Happiness		Acceptable Happiness		High Happiness		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Athletic	22	9	45	19	71	30	99	41	237	100
Non-Athletic	46	19	62	26	83	34	50	21	241	100
Total	68	14	107	22	154	32	149	31	471	100

Table 4 suggests that 41 percent of the athletic female staff members and 21 percent of non-athletic ones were happy.

Table 5. Pearson correlation coefficient between happiness and anthropometric indicators

Happiness		Weight	WC	WHR	BMI	Systolic Blood Pressure	Diastolic Blood Pressure
	Correlation Coefficient	** - 0.432	** - 0.535	** - 0.469	** - 0.515	** - 0.245	-

** Correlation coefficient is significant.

Table 5 suggests that there was a significant and negative correlation between happiness and anthropometric indicators.

Discussion and Conclusion

The results of this study showed that 80 and 70 percent of the athletic and non-athletic female staff members of universities of medical sciences were in the normal range and their body mass indexes were 25.45 and 25.83, respectively. In addition, 8 and 7 percent athletic subjects and 15 and 12 percent of non-athletic subjects were overweight and obese, respectively. The results of this study were compatible with those of other studies conducted in various parts of Iran as well as in Asian, European, and American countries (8-10 and 30-35) although the percentages of excess weight and obesity in this study were mostly less than those in the studies conducted in Iran (8-10 and 30-35). This difference could be due to previous studies conducted on different social groups, particularly the urban ones. However, the samples in the present study belonged to a particular group from various parts of Fars Province. Furthermore, it is expected that the treatment staff should be aware of the adverse effects of excess weight and obesity, should have information on nutrition, and thus should control their own weight. Nonetheless, even this level of excess weight and obesity is alarming and can indicate lack of appropriate physical activity, sedentary lifestyle, shortage of gyms that are particular to female staff, eating habits, cultural factors, and hereditary factors. The blood pressure of both athletic and non-athletic groups was mostly in a normal range and there was no significant difference between the two groups. This could be due to short duration and low intensity of physical activity of athletic women or because of their age, since they were mostly younger than 40 years of age.

Waist circumference and waist-to-hip ratio in athletic and non-athletic women were 76.53, 80.27, 0.78 and 0.80, respectively, which indicated that the difference was significant. It also indicated that the percentage of fat was lower in athletic women compared to non-athletic ones. This could probably be due to the effect of physical activity on the increase in fat-free body mass and decrease in the body fat mass. Since the present study indicated that these indexes were related to risk factors (1, 3), it is possible that non-athletic women are more vulnerable to hypertension and type 2 diabetes because of having higher abdominal fat compared to athletic women. It has been claimed that abdominal obesity is related to hypertension because of various factors, including adipose tissue density and pressure on capillaries, their obstruction, and sodium retention through an increase in renal clearance of natriuretic peptides that result from adipose tissues (36- 38).

As to the relationship between physical activity and anthropometric indicators, on the one hand, and happiness, on the other, the results indicated that physical activity and indicators affected the level of happiness and athletic women were happier than non-athletic ones. The reasons for the effect of physical activity on happiness are probably the relationship between the level of some neurotransmitters in the brain, including serotonin, epinephrine and dopamine. By stimulating the sympathetic nervous system, physical activity increases the density of these neurotransmitters (39). In addition, serotonin interacts with brain-derived neurotrophic factor (BDNF) and increases the stimulation of BDNF (40). Therefore, the

presence of these neurotransmitters causes a state of happiness, joy and vigor. Furthermore, physical activity stimulates and increases the release of endorphin. Endorphin is a chemical that is released in response to pain and stress by the pituitary gland and causes a sense of relaxation, tolerance of strenuous exercise and a feeling of happiness and joy during activity (41, 42).

There was a significant negative correlation between happiness, on the one hand, and anthropometric indicators and systolic blood pressure, on the other. In the athletic group, a reduction in anthropometric indicators and systolic blood pressure increased the level of happiness. It appears that physical activity attracts the attention of an individual from negative points to positive and relaxing ones and having a body that is well-shaped and fit because physical activity boosts the individual's self-confidence and body image. All these factors reduce the level of depression and increase the level of happiness (43, 44).

According to the results, athletic female staff members were happier and more joyful than non-athletic ones and they were in a better condition in terms of some anthropometric indicators compared to non-athletic subjects. This could be the result of physical activity. Considering that this group of employees are exposed to job stressors because of the nature of their career, and given that happier and more energetic employees have a higher degree of efficiency, it is suggested that exercise programs for staff members should be increased and physical activity should be considered as part of their working program.

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