

Research Article

**Comparative study of the prevalence of metabolic syndrome in
intensive care unit(ICU) nurses and administrative staff of
Arak University of Medical Sciences in 2016**

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ABSTRACT

Metabolic syndrome is a complex of metabolic disorders that is associated with some increased risk factors such as high blood pressure, obesity, dyslipidemia and diabetes, which has challenged people in the advanced and developing countries and increased the diseases such as cardiovascular diseases or some other chronic ones. Stress, especially occupational stress, is one of the important factors in increasing the prevalence of metabolic syndrome components. Therefore, the aim of this study is to determine the prevalence of metabolic syndrome in nurses and university staff of Arak Medical Sciences in 2016. In this retrospective cohort study, two groups of 190 nurses and administrative staff of the University of Medical Sciences were randomly selected using random sampling. The data collection tool was a demographic questionnaire and a questionnaire related to the components of the metabolic syndrome based on the NCEP-ATP3 criteria (waist circumference, triglyceride, hypertension, HDL-C and fasting blood sugar). Information about the metabolic syndrome was extracted from health records of the subjects and analyzed by SPSS version 16 software. The subject's age range was 22 to 54 years old. The majority of participants were women N = 268 (70.5%) and the rest N=112(29.5%) with a mean age of 11.24 years. The prevalence of metabolic syndrome in nurses and administrative staff was N=34 (17.9%) and N=43(22.6%) respectively. Regarding the prevalence of this syndrome in nurses in intensive care unit and administrative staffs, administrative staff were affected with metabolic syndrome more than nurses, but this difference was not statistically significant ($P > 0.05$). The prevalence of metabolic syndrome among nurses and administrative staff of Arak University of Medical Sciences is lower than the prevalence of metabolic syndrome in the general population. The prevalence of this syndrome among administrative staff is higher than nurses in this center. It seems that administrative personnel Nurses need to increase awareness about metabolic syndrome preventative factors such as promoting lifestyle, increasing physical activity and improving nutritional status.

Keywords: Metabolic syndrome, Administrative staff, Nurses, ICU

INTRODUCTION

Metabolic syndrome is a collection of metabolic and non-metabolic disorders such as high fasting blood glucose, elevated triglycerides, high blood pressure, low HDL cholesterol and abdominal obesity. People with 3 or more disorders are known as the infected metabolic syndrome ones. (1,2). The metabolic syndrome is a collection of clinical and physical abnormalities increasing the risk of cardiovascular diseases and diabetes, which have been respectively the second and fourth causes of mortality in the world. In people with metabolic syndrome, there is a 2-fold chance of death and a 3-fold increase in the risk of stroke or heart attack than those who are not suffering from this syndrome (3). On the other hand, it is associated with some other diseases such as distal nephropathy, cholesterol gallstones, asthma, sleep disorders and some forms of cancer, also imposes heavy costs on the health system and, in general, reduces the quality of life (4,5). Metabolic syndrome is not a disease by itself, but it is a combination of undesirable characteristics due to the bad habits in life. This syndrome and its constituent parts are the most important health problems of the 21st century and are growing rapidly in the developed and developing countries. Unfortunately, the prevalence of this syndrome is increasing in the world (6). Some of the suggestive studies consider the role of environmental stress on the prevalence of metabolic syndrome (7). Metabolic syndrome affects 25% of the American adult population and 9.2% of American adolescents. Although the causes of metabolic syndrome are not well known so far, some genetic factors such as age, motility, pro-inflammatory status and hormonal changes indirectly affect the disease, while central obesity and insulin resistance are two important factors. The syndrome is confirmed and sometimes insulin resistance is considered as the basis (3, 8). Stress and especially occupational stress is one of the important factors in increasing the prevalence of metabolic syndrome components (9). Because of their occupational nature, nurses face a variety of stresses in the workplace. As they work irregularly

in shifts in the morning, evening and night, they are among those exposed to insomnia and stress. Their pattern of the irregular sleep and awakening leads to disruption of synchronous periods in different days, falling sleep time and decreasing labor power. When the cycle of sleep and awakening is impaired (for example, shifting), other physiological functions of the nurses may also be changed, for example, they may experience sleep disturbances, appetite loss, or weight gain or loss (10). During their duties, nurses face many problems and problems inevitable in all individuals' occupations and lives. Job stresses can cause social problems in addition to health and physical and mental problems. Forced to work at night and at bedtime, one can turn the job away from family life, friends, the usual marital relationship, and attending social events. The work schedule and timetable of working hours, especially night work, due to disturbing physiological coordination and disturbing sleep-awake cycles, can have potential negative biological, psychological and social consequences. Several physiological, psychological and behavioral parameters such as body heat, electrolytes, serum and urinary corticosteroids, cardiovascular function, gastric enzyme secretion, blood leukocyte count, muscle consistency, mood, and immediate and long-term memory of circadian rhythms (11,12,13). Several factors such as crowded sections, physical and mental stress, fatigue, high work pressure, multiple stimuli in the environment and sleep deprivation can cause stress in nurses (14). Regarding the fact that nursing occupation is a disadvantage, and on the other hand, the association between metabolic syndrome and cardiovascular diseases, diabetes, stroke, asthma, nephropathy, cancer, sleep disturbance, distal nephropathy, cholesterol gallstone, asthma, and others, we have tried to investigate the prevalence of metabolic syndrome in intensive care unit(ICU) nurses and administrative staff in Arak University of Medical Sciences, Arak, Iran.

MATERIAL & METHODS

In this retrospective cohort study, two groups of 190 nurses and administrative staff of Arak University of Medical Sciences were selected using random sampling method and inclusion criteria: Membership in Arak University of Medical Sciences for staff and for nurses and outcomes: Cushing's syndrome, Pregnant women, certain diseases (liver, kidney, types of cancers and under the chemotherapy), people who have been diagnosed since the date of the tests and their measurements by the hospital's clinical governance office for more than three months, and those who are being treated with psychosocial drugs (Due to various types of psychiatric disorders) started studying. The data collection tool was a demographic questionnaire and a questionnaire related to the components of the metabolic syndrome based on NCEP-ATP3.(National Cholesterol Education Program-Adult Treatment Panel III) (waist circumference, triglycerides, hypertension, HDL-C and Fasting blood sugar).In this study, the metabolic syndrome conditions are considered according to the American National Cholesterol Education Program (NCEP-ATP3), which has the following conditions:1)Abdominal Obesity (Waist Size): Men (inch 40 <) cm102 <, Women (inch 35 <) cm88 <2)Triglyceride 150 mg / DL. or receiving antihyperlipidemic drugs3) HDL-C Men 40 mg / DL> Women 50 mg / dL or receiving Drugs and Medications to Treat Low HDL Cholesterol4) Blood pressure 130/85 mm Hg <Anti-hypertensive medication5.fasting blood glucose

110 mg / DL or receiving antidiabetic drugs Having three or more of the above criteria means having a metabolic syndrome. (15).After collecting the questionnaires, the data were entered into SPSS software version 16, demographic variables and study objectives were analyzed using descriptive tests, chi-square and logistic regression tests.

RESULTS

The age range of the subjects was between 22 to 54 years old with an average age of 35.88 with a standard deviation of 6.91. Half of the subjects (190) were in the clinical staff and the other half (190 persons) in the administrative staff group. The two groups did not differ significantly in terms of age, work experience and marital status. The majority of women N = 268(70.5%) and the rest N = 112(29%) were female. 33.2% were married and 66.8% were single. The work experience was between 2 and 25 years old, with the majority of working experience aged 10 to 13 years N = 99(26/1%). The average work record was 11/24. 22.1% had graduate degrees, 76.1% had a degree Degree and Postgraduate Degree degrees and 8.1% had a Master's Degree or higher. In the case of night work, 88.9% of nurses and 3.7% of office workers had night work. In all subjects, the mean systolic pressure was 117 and diastolic was 75. The mean of laboratory parameters in all staff was: BMI = 24.9, WC = 92.33, FBS = 94.90mg/dl, HDL = 46.82 mg/dL, TG = 103 mg/dL, Total cholesterol = 178.42 mg/dL and LDL = 101/42 mg/dL, respectively.

Table 1: Distribution of Metabolic Syndrome in Administrative and Clinical Staff Based on Demographic Variables

Variable		Metabolic syndrome in Nurse		Metabolic syndrome in administrative staff	
		Yes	Percent	Yes	Percent
Sex	Male	5	14.7	17	39
	Female	29	85.3	26	60.5
	P.Value	0.126		0.311	
Age	20-29	3	8.8	5	11.6
	30-39	14	41.2	27	62.8
	40-49	15	44.1	9	20.9
	50≥	2	5.9	2	4.7
P. Value		0.01		0.762	
marital status	single	27	79.4	37	86
	Married	7	20.6	6	14

	P. Value	0.04		0.003	
	Normal walking	22	29.9	32	39.5
Physical activity	Relaxed exercises	12	15.4	11	11.8
	Sever like karate,....	0	0	00	
	P. Value	0.06		0.000	
	1-4	1	3.9	5	11.6
	5-8	7	20.6	6	14
History	9-12	6	17.6	14	32.6
work	13-17	7	20.6	8	18.6
	18≥	13	38.2	10	23.3
	P. Value	0.007		0.32	
	diploma	2	5.9	19	44.2
Degree	Undergraduate and Bachelor	32	94.1	24	55.8
	Masters and higher	0	0	0	0
	P. Value	0.75		0.04	
Night shift	Yes	29	85.3	2	4.7
	No	5	14.7	41	95.3
	P. Value	0.007		0.32	

The highest incidence of metabolic syndrome among people aged 40-49, female, undergraduate, single and graduate Work 18 years and older. Nurses have the highest incidence of metabolic syndrome among nurses, normal physical activity, history of hypertension and previous history of pregnancy. In administrative staff, physical activity is more commonly associated with this syndrome than normal.

Table 2.Frequency distribution of the components of the metabolic syndrome based on the NCEP-ATP3 criterion.

Variable		Clinical staff(nurse)		Administrative staff		P. Value
		Total	Percent	Total	Percent	
HTN(Systole>130, Diastol≥85)	Yes	45	23.7	78	41.1	0.001
	No	145	76.3	112	58.9	
Hyperglycemic	Yes	16	8.4	20	10.5	0.45
	No	174	91.6	170	89.5	
Hyperlipidemia	Yes	6	3.2	15	7.9	0.03
	No	184	96.8	175	92.1	
Hyperlipidemia	Yes	50	26.3	42	22.1	0.33
	No	140	37.7	148	77.9	
Obesity	Yes	15	7.9	23	12.1	0.17
	No	175	92.1	167	87.9	
Waist obesity	Yes	82	43.2	83	43.7	0.09
	No	108	56.8	107	56.3	

HTN=Hypertension, waist, LDL=Low-density lipoprotein, WC=waist Circumference, F=female=

male The rate of nurses' involvement in hyperlipidemia is based on Total cholesterol assessment more than the administrative staff. In the remaining studies, the incidence is higher in the administrative staff.

Table3:Logistic regression

Variable	OR	P. Value	Confidence Interval		B
			Lower	Upper	
Group	75%	44%	1.540	370%	-281%
Married	61%	32%	1.624	228%	-492%
Age	1.05	071%	1.108	996%	049%
BMI	1.44	000%	1.629	1.273	365%
BP	1.69	149%	3.340	827%	530%
Diabetes	1.82	125%	3.921	847%	60%
Pregnancy	1.57	258%	3.449	718%	453%
Physical activity	2.53	03%	5.971	1.079	931%

This analysis has been done to eliminate the effect of all the disrupters. In this study physical activity and BMI were significantly associated with metabolic syndrome ($P = 0/000$ and $P = 0.03$)

DISCUSSION

Among the demographic variables in our study in clinical staff, there was a significant relationship between age, work experience and physical activity with the prevalence of metabolic syndrome. In general, the metabolic syndrome was more in women than men among the clinical and administrative staff. However, this difference was not so significant in the sex of the two groups in affecting the metabolic syndrome. Also, the elements gender, marital status, history of hypertension, diabetes, cancer, smoking, and night work had no significant relationship with the prevalence of metabolic syndrome in nursing staff. In contrast, the only factor which had a significant relationship with the prevalence of metabolic syndrome in administrative staff was the physical activity of employees. Amongst the administrative staff, there was no statistically significant difference in the metabolic syndrome through different age groups with different work history. Similar to the results of our study (there is a significant relationship between the age increase and work experience with the prevalence of metabolic syndrome in clinical staff) in a 2011 study entitled "The Prevalence of Metabolic Syndrome and Its Related Factors in Female Nurses in Malaysia"(14), it was found that there is a significant relationship in the prevalence of metabolic syndrome between the demographic variables studied in this study and the history of work and the time length of nurses from home to hospital Shafei et al(16). They also state that in nurses who have more than 10 years of experience the chance of getting a metabolic syndrome is twice as many.

According to Anahi, increased work experience, increased exposure to occupational hazards increases the prevalence of metabolic syndrome in individuals. These findings are similar to those of Demiral et al. in Turkey, which expresses the same. The issue is that the prevalence of metabolic syndrome in municipality employees who have worked more than 10 years is more than

others (17). However, Ahmad Farsi et al in a study entitled "Metabolic Syndrome and Occupational Risk Factors in Health Care Workers," showed that there is a significant relationship between work experience and metabolic syndrome, while there is no relationship between metabolic syndrome and nursing work shifts (18). In this study, no affinity was shown between occupational stress and metabolic syndrome in health care staff, although it was shown that work shifts were a stressful factor, but there was no relationship between metabolic syndrome and work shifts. Similar to the findings of Farsi et al, Demiral et al stated that there is no significant relationship between labor pressure and metabolic syndrome (17,18).

The results of our study, such as Ahmed Farsi et al, Dimeral et al. are contradicted with the results of a cohort study in London who reported the doubling of the metabolic syndrome in employees with stressful work compared to those who have jobs without stress (19). In our study, there was no significant relationship between gender and prevalence of metabolic syndrome in both clinical and administrative staffs, but in general, there were more cases of women with metabolic syndrome in both groups than men. In 2006, in a study entitled "Chronic stress in work and metabolic syndrome", Tarani and his colleagues stated that compared with low stressed job, metabolic syndrome in men with stressful occupations is more prevalent, while this proportion in women is five times more. He concludes that stress is one of the most important risk factors associated with metabolic syndrome (19).

Although there was no statically vital difference between the two groups in the clinical staff (nurses) and the administrative staff in the levels of metabolic syndrome and their education, none of the educated people did not get the metabolic syndrome, due to their awareness and information, which had affected the style and quality of their lives. Similar to our study, Puttonen et al, in a

study entitled “The relationship between routine work shift and circulating shift with metabolic syndrome in aviation company staff”, showed that participants with a lower educational level of 1.8 to 2.1 had a higher risk of developing metabolic syndrome compared to people with higher education (20). There was no significant difference between the prevalence of metabolic syndrome and physical activity in the nursing staff group. But there was an important discrimination between the incidence of this syndrome and physical activity in the administrative staff group. It was reported that the prevalence of metabolic syndrome is more in the hiking persons than those who exercise regularly. Daily physical activities generally include a series of occupational, home and recreational activities which have been significantly reduced in recent decades. one reason is the sedentary life style which may be caused by the mechanization of life and the increasing use of technology, and consequently affecting the physical fitness.

By decreasing overall physical activity, the prevalence of obesity, hypertension, type 2 diabetes, and metabolic syndrome increase dramatically (21). Also, due to the direct relationship between obesity and metabolic syndrome, the role of physical activity in preventing metabolic syndrome, regarding the body mass index (BMI) and waist circumference can be justified. Pham and colleagues state that many researches have been done on the connection between physical activity and metabolic syndrome on different people. These studies may be different in the definition of the metabolic syndrome, physical activity measurement, the confounding factors, and the age varieties in the cases (22). For example, in a survey, done on 4811 Iranian children and adolescents with the age range of 6-18 years, it was shown that physical activity has an inverse relationship with metabolic syndrome (23). In contrast to a research in 2010, 693 high school students in Vietnam, it showed that a moderate to severe physical activity was parallel to a reduction in the chances of developing a metabolic syndrome. The study also concluded that the

socioeconomic status has a vital role on the relationship Nguyen et al. According to another study, increasing physical activity in order to prevent the abdominal obesity, could be an effective way of controlling the metabolic syndrome (Moreira et al., 2010). The results of the study by Pham et al (22), entitled Physical Activity Relationships with Metabolic Risk Factors in Adolescents, similar to the results of our study, showed that the prevalence of metabolic syndrome in overweight / obese groups was higher than those with normal weight (35% In contrast, there was no significant difference between the prevalence of metabolic syndrome and night work in both nurses and administrative staff ($P > 0.05$). The shift caused a lack of coordination between the internal rhythms of the body and overnight rhythm, which it causes symptoms such as sleep disorders and fatigue by itself. Based on the studies, shift switching can affect the cardiovascular and metabolic systems, which can increase body weight, blood pressure and increase the incidence of metabolic syndrome (24,25). In epidemiological studies, it has also been shown that switching can lead to metabolic disturbances; in other studies, the increase of the serum glucose and lipid levels have been reported in shifters (26). Similar to our findings, the lack of a relationship between the prevalence of metabolic syndrome and work shift in Shafi'i et al. (16), they reported a significant relationship between the metabolic syndrome and its related factors in the female nurses of a teaching hospital in Malaysia. There was no relationship between work shift and prevalence of metabolic syndrome in female nurses, and the only effective factors were about work experience and distance from their home to work (16). MOHEBI and his colleagues declared the relationship between shift work and the indicators of the metabolic syndrome in his study on 2012. Compared shift workers with the normal day workers, there is no meaningful connection between hypertension and metabolic syndrome among other effective factors, though a considerable effect of work shift on the metabolic syndrome can be observed (27). In their study, Pietroiusti and colleagues considered that working

at night has a forceful effect on the metabolic syndrome. In a prospective study of nurses working day and night for 4 years, it was reported that the incidence of metabolic syndrome among night work nurses and labor day was 9% and 1.8%, respectively. The rate of occurring metabolic syndrome was 2/9% for each year of work experience at night, and 5% in the nurses working days (28). According to the ATP3 (WC) and (BMI) criteria, 43 (22.6%) and 20 (10.5%) patients had metabolic syndrome in Arak Medical University, respectively. Regarding the prevalence of metabolic syndrome in both clinical and administrative criteria ATP3 (WC), administrative personnel were effected with metabolic syndrome more than the nurses, but the difference was not statistically so important. Regarding the prevalence of metabolic syndrome in two groups of nursing staff and administrative criteria (obesity Metabolic is in the Malaysian community (16), it was proved that the number of cases is more, comparing with Malaysia. In the study of Shafi et al, the prevalence of metabolic syndrome in female nurses was 24%, while the prevalence of metabolic syndrome in the Malaysian general population was 16.5% (29). Shafei et al., In Malaysia, used the definition of WHO in Malaysia to survey the prevalence of metabolic syndrome in nurses in 2011, while Ten et al (29,30) used the definition of IDF, as in the study of Zabetian et al., 2007. In the study of the prevalence of metabolic syndrome, according to the IDF definition in Iran, it is 32%, while in WHO definition, it is 18.4%. There is approximately 14% variation, according to the definition of the metabolic syndrome.

CONCLUSION

The prevalence of metabolic syndrome among nurses and administrative staff of Arak University of Medical Sciences is lower than the prevalence of metabolic syndrome in the general population. The prevalence of this syndrome among administrative staff is higher than that of nurses. There is a need to increase awareness about the metabolic syndrome preventive factors such as changing lifestyle, increasing physical activity and improving nutritional status.

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