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Is Having a Permanent Job a Predictor of Metabolic Syndrome?

ABSTRACT

Objective: Many non-occupational and occupational metabolic syndrome risk factors have been identified. In this study, we examined some occupational risk factors of metabolic syndrome.

Methods: 3537 employees of Tehran University of Medical Sciences, (1388 male and 2139 female) participated in this cross-sectional study. The prevalence of metabolic syndrome was measured using the International Diabetes Federation criteria, and then we evaluated the association between some job variables such as work–family conflict, shift working, occupational groups and employment status, and metabolic syndrome.

Result: According to the International Diabetes Federation criteria, the prevalence of metabolic syndrome among employees of Tehran University of Medical Sciences was 22.1%, which was 25.3% and 20.0% for men and women, respectively. In the regression model without the presence of metabolic syndrome component, age, occupational groups, and having a permanent job were predictors of metabolic syndrome. In the model with the presence of metabolic syndrome components, in addition to the metabolic syndrome components, gender and having a permanent job were observed as metabolic syndrome predictors. The study found no association between work–family conflict and metabolic syndrome.

Conclusion: Having a permanent job is introduced as an occupational predictor of metabolic syndrome.

Keywords: Metabolic syndrome X, Occupational groups, employment status.

Introduction

Metabolic syndrome (Met-S) or metabolic syndrome X is one of the most common complications of inactivity and achievement of machine life in different societies. The prevalence of Met-S in adults is considerable in different countries. The total prevalence of Met-S among American workers is 18.7%, and among professional experts, this number is 11.6%.[1] Also, the prevalence of Met-S in Iranian healthcare workers is reported to be 22.4%.[2] In a meta-analysis study, the prevalence of total Met-S based on the International Diabetes Federation (IDF) criteria was reported to be 38% in the Iranian population.[3]

Some proponents of Met-S predictors are known, such as obesity, inactivity, hyperlipidemia, hyperglycemia, and blood hypertension. On the other hand, some studies have investigated the association of psychosocial risks such as work–family conflict and type of job with Met-S.

Chronic psychological stress, depressive syndrome, and increased abdominal circumference are predictors of Met-S.[4] Experiencing life events in work or daily life or dysfunctional social network in adult women is considered a risk factor for Met-S, and in men, stress reactions such as vital exhaustion and sleep medications play a more important role in the development of Met-S.[5] Psychological stress plays an important role in the development of Met-S, which may be associated with inflammatory processes in the vascular wall and lead to atherosclerosis and cardiovascular disease.[6] A systematic review of 39 studies confirmed the link between chronic stress and the development of Met-S.[6] The link between family problems and Met-S is moderated by gender; in all women, family conflict was associated with the prevalence of Met-S.[7] Job strain can act as a modifiable risk factor for Met-S and subsequent cardiovascular disease.[8] Work–family conflict with high blood pressure is directly related, but with diabetes and low high-density lipoprotein (HDL), it is inversely proportional.[9] Work stresses such as job strain and long working hours are associated with a relative increased risk of heart disease

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and stroke.[10-14] Work strain can be associated with an increased risk of ischemic heart disease and stroke.[15]

There are a few studies on the association of Met-S with work–family conflict; thus, in this study, we intend to investigate the association between work–family conflict and the prevalence of Met-S, as well as other variables such as the type of permanent or contractual employment.

Materials and Methods

This cross-sectional study conducted in 2019-2018 as a measure of enrollment data in the Tehran University of Medical Sciences' Employees Cohort (TEC) Study.[16] The study's participants had an average age of 41.4 (8.6) years, with 60.5% female and 39.5% male. Office employees, healthcare personnel, laboratory staff, service workers, and security guard personnel were among those who participated in this research. Their type of job is a permanent and contractual employee. The participants were also asked for information about their jobs, such as work and work experience. Blood samples were acquired from each participant after completing an informed consent form at the research center. Within a single working day, all exams and questionnaires have been gathered at the designated location.

Blood Samples

After a 12-hour fasting, blood samples were drawn between 8:00 AM and 9:00 AM. Blood samples were examined for fasting blood sugar, triglyceride (TG), and HDL and low-density lipoprotein cholesterol.

Blood Pressure Measurement

Blood pressure was checked 3 times for each participant, and an accuracy of 1 mm Hg was used to report the average. After a 15-minute interval, we took the participants' blood pressure while seated. First- and second-round measurements were taken 30 minutes apart, while the second- and third-round measures were taken 2 hours apart. A clinical mercury manometer that was standardized and calibrated has been utilized to measure the blood pressure.

Anthropometry

While the participants were not wearing shoes and were dressed in light clothes, their weight and height were measured with a precision of 0.1 kg and 0.1 cm, respectively. Waist circumference has been measured with 0.1 cm accuracy at anatomical landmarks, including the center of the lower rib border, the iliac crest, and the largest part of the hip. Body mass index (BMI) has been calculated as the participant's weight (kg) divided by the square of height (m).

MAIN POINTS

- The prevalence of metabolic syndrome in university staff was estimated to be 22.1% according to the International Diabetes Federation criteria.
- Metabolic syndrome was 5% more common in males than in females.
- There was no association between work–family conflict and the prevalence of metabolic syndrome.
- Having a permanent job may be a predictor of metabolic syndrome.

Work–Family Conflict

To assess and determine the work–family conflict, we used a standard work–family conflict questionnaire consisting of 22 questions. This questionnaire assesses the effects of stress and time in the family on work interference and works into family interferences. The survey evaluates the following 4 criteria: time-based work interference into the family, strain-based work interference into the family, time-based family interference into work, and strain-based family interference into work. A greater score in every dimension denotes a higher level of Work Family Conflict (WFC). The validity of the questionnaire's Persian version is determined.[17]

Metabolic Syndrome and Its Components

Metabolic syndrome was determined in the research relying on the IDF basis. The IDF criteria for diagnosing Met-S are as follows:

- Obesity is a BMI of more than 30 kg/m^2 or an abdominal circumference of no less than 94 cm for males and at least 80 cm for females.

In addition, the criteria also include 2 of the items listed below:

- A blood TG level greater than 150 mg/dL indicates a lipid abnormality that necessitates medical intervention.
- High-density lipoprotein values below 40 mg/dL in males and below 50 mg/dL in females or a specific treatment for such lipid abnormality is advised.
- Raised blood pressure, Systolic blood pressure (SBP) more than 130 mmHg, or a diastolic blood pressure higher than 85 mmHg, or the therapy of already identified hypertension.
- When an individual has a fasting plasma glucose level of greater than 100 mg/dL, is on diabetes medicine, or has already received a type 2 diabetes diagnosis.

The criteria mentioned earlier were used to evaluate Met-S.

Statistics

It is vital to apply frequency and percentage, whereas quantitative data should be described utilizing mean and SD to explain the qualitative data. The Kolmogorov–Smirnov test was also used to ensure that all quantitative variables were normally distributed. In the case of quantitative data having a non-normal distribution, we used the mean, SD, median, and range to define the variable. We employed the chi-square test to connect 2 qualitative variables in univariate analysis. We also utilized the independent *t*-test, analysis of variance, Mann–Whitney *U*-test, Wilcoxon test, and Kruskal–Wallis test to examine the connection between qualitative and quantitative variables, taking into account the kind and normality of each variable. In addition, we applied the logistic regression to identify the traits associated with Met-S. The Chicago Statistical Package for Social Sciences-24 software was used to analyze the data. A *P*-value less than .05 is considered statistically significant.

Ethical Issue

Before beginning the research affairs Tehran University of Medical Sciences, all participants completed the consent form and voluntarily agreed to participate. In addition, the present study has a research ethics certificate from the ethics committee in research affairs Tehran University of Medical Sciences (Date: June 10, 2019, Decision No: IR.TUMS.VCR.REC.1398.246).

Result

According to the results which were a study on 3573 Iranian adults, including 1398 males and 2139 females, the mean (SD) age of the

Table 1. General Characteristics of the Study Population and Frequency of Met-S

	Total (n = 3537), mean (SD)	Male (n = 1398), mean (SD)	Female (n = 2139), mean (SD)	*P*	Prevalence*, %
Age (years)	41.4 (8.6)	42.1 (8.9)	41.0 (8.3)	<.001	–
TG (mg/dL)	122.1 (67.7)	147.8 (81.2)	105.4 (50.6)	<.001	28.4
HDL (mg/dL)	46.8 (10.3)	43.3 (8.7)	49.1 (10.6)	<.001	50.8
FBS (mg/dL)	86.1 (18.5)	89.1 (22.2)	84.2 (15.4)	<.001	16.7
Systolic BP (mmHg)	112.6 (13.5)	118.0 (13.1)	109.1 (12.5)	<.001	23.9
Diastolic BP (mmHg)	75.0 (8.4)	77.6 (8.3)	73.3 (8.0)	<.001	
WC (cm)	88.2 (11.6)	95.3 (9.5)	83.5 (10.3)	<.001	57.5
BMI (kg/m^2)	26.8 (4.3)	27.6 (3.9)	26.4 (4.4)	<.001	–

*According to IDF criteria.
BMI, body mass index; BP, blood pressure; FBS, fasting blood sugar; HDL, high-density lipoprotein; Met-S, metabolic syndrome; TG, triglyceride; WC, waist circumference.

participants was 41.4 (5.6) (42.1 ± 8.9 and 41.0 ± 8.3 in men and women, respectively). The overall prevalence of Met-S based on the IDF criteria was 22.1%. The prevalence of Met-S by gender was 25.3% and 20% in men and women, respectively. Table 1 shows the Met-S components as a whole and by gender. Also, the prevalence of each indicator is reported according to the IDF criteria. The most prevalent indicators in the development of Met-S observed in this study were waist circumference and HDL.

Table 2 shows the prevalence of Met-S in different occupational groups, including office workers, clinical staff, service workers, laboratory staff, and guard staff. The most prevalence of metabolic syndrome was observed among security personnel, all of whom were men.

Table 2. Prevalence of Met-S Among Different Occupational Variable Groups

		Total, n (%)	Met-S Prevalence	*P*
Shift worker	Yes	898 (25.4)	189 (24.2)	.006
	No	2639 (74.6)	456 (58.5)	
Occupational groups	Office workers	1542 (43.6)	363 (23.5)	<.001
	Clinical staff	1291 (36.5)	222 (17.2)	
	Service workers	428 (12.1)	122 (28.5)	
	Laboratory staff	134 (3.8)	20 (14.9)	
	Guard staff	142 (4.0)	53 (37.3)	
Employment status	Permanent job	1522 (43.0)	409 (26.9)	<.001
	Contract job	2015 (57.0)	371 (18.4)	
Work–family conflict	Mild	1207 (34.1)	263 (21.8)	.964
	Moderate	2208 (42.4)	490 (22.2)	
	Severe	122 (3.4)	27 (22.1)	
Smoking status	Current smoker	428 (12.1)	91 (11.7)	.674
	Former smoker	1029 (29.1)	225 (25.8)	
	Pack year*	5.7 ± 12.7	5.1 (12.0)	.606

*Mean ± SD.
Met-S, metabolic syndrome.

In Table 3, we compared work–family conflict and their subgroups, including work interfere family score, family interfere work score, work interfere family stress, work interfere family time, family interfere work stress, family interfere work time, work–family conflict stress, work–family conflict time between male and female participants.

In Table 4, we compared job variables including work experience and permanent job and subscales of work–family conflict in 2 groups with and without Met-S.

Given that the outcome variable in this study was a Met-S, we used a logistic regression analysis to determine its predictors. The dependent variable in this study was to have a Met-S based on the IDF criteria. Based on this, we present 2 regression models.

In the first model, we entered occupational and demographic variables in the model, and based on Table 5, the variables age, occupational group, and permanent job were predictors of Met-S.

Table 3. Comparison of Work–Family Conflict and Its Subscales Between the 2 Gender Groups

	Total, mean (SD)	Male, mean (SD)	Female, mean (SD)	*P*
Work–family conflict total score	54.5 (13.8)	53.3 (13.6)	55.3 (13.9)	**<.001**
Work interfere family score	29.9 (8.7)	28.8 (8.5)	30.6 (8.7)	**<.001**
Family interfere work score	24.6 (7.8)	24.5 (7.4)	24.7 (8.0)	.474
Work interfere family strain	15.4 (4.8)	14.9 (4.7)	15.7 (4.8)	**<.001**
Work interfere family time	14.5 (5.5)	13.9 (5.4)	14.9 (5.4)	**<.001**
Family interfere work strain	14.3 (5.2)	14.4 (5.1)	14.3 (5.3)	.563
Family interfere work time	10.2 (4.5)	10.1 (4.2)	10.4 (4.7)	.055
Work–family conflict strain	29.7 (8.2)	29.3 (8.1)	30.0 (8.2)	**.021**
Work–family conflict time	24.8 (7.7)	24.0 (7.6)	25.3 (7.8)	**<.001**

Significant *P*-values less than .005.

Table 4. Comparison of Job Variables and Work–Family Conflict Subscales Between 2 Groups With and Without Metabolic Syndrome

	Met-S (n = 780), mean (SD)	Non Met-S (n = 2757), mean (SD)	*P*
Age (years)	44.9 (8.4)	40.4 (8.4)	<.001
Work interfere family time	14.1 (5.4)	14.6 (5.5)	.023
Work interfere family stress	15.6 (4.9)	15.3 (4.7)	.145
Family interfere work time	10.8 (4.5)	10.1 (4.5)	<.001
Family interfere work stress	14.2 (5.3)	14.4 (5.2)	.371
Work experience	18.7 (7.4)	15.2 (7.9)	<.001
Permanent job, n (%)	409 (52.4)	1113 (40.4)	<.001

Met-S, metabolic syndrome.

Table 5. Model 1 of Met-S Occupational Predictive Factors

				95% CI for Odds Ratio	
Variable	*B*	Odds Ratio	*P*	Lower	Upper
Age	0.066	1.068	<.001	1.095	1.042
Gender	0.146	1.157	.193	1.441	0.929
Permanent job	0.394	1.482	.001	1.86	1.181
Occupational groups	0.279	1.322	.008	1.623	1.077
Work–family conflict	0.004	1.004	.307	1.011	0.997
Work experience	−0.011	0.989	.439	1.016	0.963
Constant	−4.54	0.011	<.001		

Nagelkerke $R^2 = 0.097$.
Met-S, metabolic syndrome.

In the second model, in addition to occupational and demographic variables, we also entered the Met-S components in the model. As Table 6 shows, in the presence of the Met-S components, gender and permanent jobs were also predictors of Met-S.

Discussion

Metabolic syndrome is a complex risk factor for atherosclerosis and cardiovascular disease. It doubles the risk of cardiovascular disease and increases the risk of type 2 diabetes 5-fold.[17] Among the known risk factors for Met-S, the main components of Met-S criteria include elevated waist circumference, elevated TGs, reduced HDL-C, elevated blood pressure, and elevated fasting glucose.[18]

In addition to the Met-S components, some other general and non-occupational risk factors are also known, including high BMI,[19-23] higher percent of body fat,[19] elevated uric acid,[19,24] elevated alanine aminotransferase,[24] sedentary life style,[24,25] physical inactivity,[22,26] smoking,[20-22,27,28] alcohol use,[20,28,29] age,[28] sex,[28] sleep quality,[30] body shape,[31] and TG/HDL ratio.[32] So far, many efforts have been made to control this risk of non-occupational factors in order to prevent Met-S. Known occupational and work-related risk factors for predicting

Table 6. Model 2 of Met-S Predictive Factors Present in the IDF Criteria

				95% CI for Odds Ratio	
Variable	*B*	Odds Ratio	*P*	Lower	Upper
Age	0.012	1.012	.509	0.977	1.048
Gender	−2.4	0.091	<.001	0.06	0.136
Abdominal circumference	0.107	1.113	<.001	1.094	1.132
FBS	0.035	1.036	<.001	1.025	1.047
TG	0.016	1.017	<.001	1.014	1.019
HDL	−0.093	0.911	<.001	0.896	0.927
Hypertension	3.369	29.044	<.001	20.6	40.951
Work–family conflict	0.001	1.001	.813	0.991	1.011
Work experience	−0.021	0.979	.29	0.943	1.018
Occupational groups	−0.11	0.896	.466	0.666	1.204
Permanent job	0.402	1.495	.014	1.084	2.061
Constant	−12.828	<0.001	<.001		

Nagelkerke $R^2 = 0.63$.
FBS, fasting blood sugar; HDL, high-density lipoprotein; IDF, International Diabetes Federation; Met-S, metabolic syndrome; TG, triglyceride.

Met-S include shift working,[33-37] sedentary work,[35,38] job stress,[27,35,37,39] task type,[28-30,40] chemical exposure,[41,42] long work hours, and high fatigue.[39]

This study was conducted to investigate the association between variables and occupational risk factors, especially work–family conflict with Met-S on Tehran University of Medical Sciences' staff. The prevalence of Met-S based on the IDF criteria was 22.1%. The prevalence of Met-S by sex was 25.3% and 20.0% in men and women, respectively. In a study in Sweden with10 803 participants, the prevalence of Met-S was 17.9% (21.5% for male and 9.7% for female).[43] The prevalence of Met-S among Nigerian health workers was 15.4%[44] almost like our results.

In our study, the most prevalent factors in the development of Met-S were waist circumference and HDL. The results of the present observations are similar to the study of Al-Lawati et al[45]: the prevalence of Met-S based on The US National Cholesterol Education Programme Adult Treatment Panel III (NCEP ATP III) criteria in Omani adults is 17.0% and 21% with and without adjustment for age, respectively (19.5% for men and 23% for women). The most prevalent (75.4%) component of Met-S was low HDL.

In this study, we observed no association between work–family conflict and its subscales with the prevalence of Met-S. These observations contradict the results of a study by Versey et al[46]: negative work–family spillover significantly predicted BMI and higher glucose levels in the next decade; significantly the benefit is the connection between WFC and Met-S.

In the multivariate analysis, we looked at predictors of Met-S in 2 sections. First, we examined only the basic and occupational variables without the presence of Met-S components. As shown in Table 5, the age and having a permanent job and occupational group are predictors of the Met-S (Nagelkerke $R^2 = 0.097$). In order to make sure that

the basic and occupational predictors are also predictive factors in the presence of the Met-S components, we made a new regression model and we entered Met-S components with occupational factors. Table 6 shows the results of this model. As you see in Table 6, logistics binary regression revealed that gender and permanent job, even in the presence of the Met-S components, are predictors of Met-S. Interestingly, gender is a predictor of Met-S only in the presence of Met-S components (Nagelkerke $R^2 = 0.63$). In both regression models, having a permanent job is presented as a predictor of Met-S.

We intend to examine the occupational risk factors of Met-S in order to control them in the workplace. According to previous studies, having a permanent job is not known as a risk factor of Met-S. In the present study, based on both models with and without the presence of Met-S components, it was observed that having a permanent job is a predictor of Met-S. Metabolic syndrome was associated with shift working, occupational groups, and having a permanent job based on univariate analysis. These observations were compatible with the study of Berkman et al[47]: work–family conflict is directly associated with cardiometabolic risks. But in our regression analysis, this association was not observed. Also, having a job with lower levels was associated with an increased risk of cardiometabolic disease, but marriage and having a small child acted as a protective factor.

The question is whether having a permanent job is an independent or dependent predictor of Met-S. There are some hypotheses for understanding the role of employment status as a risk factor of Met-S. The people with a permanent job may have easier jobs or more sedentary jobs, or they may have a different quality of life or be psychologically different from people with a temporary job.

One of the theories that may be justified by the connection between having a permanent job and its association with Met-S is burnout. There is evidence of the association between burnout and Met-S.[48-52] Having a permanent governmental job in Iran is very durable due to being safe from dismissal and guarantees a very high level of job security. This can cause them to lose their creativity and effort to improve and lose the motivation to progress among these employees, and they inadvertently suffer from burnout. This could be a theory for the association between having a permanent job and a Met-S, which should be considered in future studies.

Conclusion

We introduce permanent job as a new risk factor for Met-S.

Ethics Committee Approval: Ethical committee approval was received from Research Ethics Committees of Vice-Chancellor in Research Affairs-Tehran University of Medical Sciences, (Date: June 10, 2019, Decision No: IR.TUMS.VCR.REC.1398.246).

Informed Consent: Written informed consent was obtained from all patients who participated in this study.

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