A STUDY OF WORK STRESS AND RISK OF CARDIOVASCULAR DISEASES AMONG EMPLOYEES OF MAJMAAH UNIVERSITY, MAJMAAH, SAUDI ARABIA.

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ABSTRACT

Background: Cardiovascular diseases (CVD) are diseases that involve the heart or blood vessels. Among the many conditions that make up CVD are coronary heart disease, stroke and other diseases of the heart such as arrhythmia, cardiomyopathy, and heart valve problems. CVD is the leading cause of death in the United States. **Objectives**: To study the prevalence of work related risk factors associated with cardiovascular diseases. Majmaah University, Majmaah, Saudi Arabia. **Methods**: This is an institutional based cross – sectional studycarried out among a sample of 127 employees, male (79, 5%) and female (20,5%), Saudi (65,9%) and non Saudi (34,1%), aged between 20 and 64 years old. We used a self-administered pre-tested questionnaire. The data were entered and analyzed using SPSS version 22**. Results**:
The studied subjects were suffering from various health problems known as elevating the cardiovascular diseases risk (diabetes mellitus, HBP …). Similarly, several factors and practices related to the working environment were found to be significantly associated with the high cardiovascular risk (sitting continuously for a long time in workplace (54,3%, p=0,007), snaking (36,2%, p=0,016), sugary drinks consumption (17,3%, p=0,001), sleep disorders (get tired and drowsiness at work) (31,7%, p=0,000), sleep less than 7 hours/day (31,5%, p=0,005), bad food habits (24,4%, p=0,014), feel stress at work (17,3%, p=0,000), overweight (7,9%, p=0,027), eat non-vegetarian food every day (26,2%, p=0,019), stress about job security (28,6%, p=0,000), unhappy with the job (14,2%, p=0,000).

Research Problem and Motivation

CVD was the leading cause of mortality until the turn of the 21st century, when deaths caused by tumours surpassed deaths caused by CVD in France. The ranking of causes differs markedly according to sex, as CVD is the second cause of mortality in men after tumours, whereas this order is reversed for women[7] Three major groups of determinants are usually identified for cardiovascular morbidity and mortality: personal determinants (age, sex); biological determinants; and behavioural determinants. In France, primary prevention mainly focuses on the 'classic' risk factors, i.e. bioclinical and behavioural determinants.[8,9] These factors are, primarily, high BP, dyslipidaemia, smoking, diabetes and metabolic syndrome.

Justification

- Most adults spending around half of their waking hours at work, the workplace is an important setting to promote health and well-being.
- CVD is the leading cause of death worldwide
- There has been a significant increase in the incidence of CVDs in industrialized countries over the last 40 years. CVD is the second cause of mortality
- changes in behavior and lifestyle, such as diminished physical activity, sedentary employment, poorer dietary habits, and increased psychosocial stress. In part because of these emerging risk factors, over 80% of the global burden of cardiovascular disease (CVD)

Research Objectives

General Objective

To study the prevalence of work related risk factors associated with cardiovascular diseases.

Specific Objective

a. To study the association between demographic characteristics and high risk of cardiovascular diseases among employees of Majmaah University

b. To assess the knowledge, attitude and practice of employees in preventing the occurrence of cardiovascular diseases at work.

   To provide health education to the employees in the prevention and control of risk factors associated with cardiovascular diseases.

Literature Review

Cardiovascular diseases (CVD) are diseases that involve the heart or blood vessels. Among the many conditions that make up CVD are coronary heart disease, stroke and other diseases of the heart such as arrhythmia, cardiomyopathy, and heart valve problems. CVD is the leading cause of death in the United States[1,2] and worldwide.[3] Health behaviors and factors that define cardiovascular health have been characterized.[4] While it has been shown that more than half of those with CVD (53%) are less than 60 years old, and circulatory diseases are a leading cause of death and permanent disability among workers.[5,6]

There has been a significant increase in the incidence of CVDs in industrialized countries over the last 40 years. CVD was the leading cause of mortality until the turn of the 21st century, when deaths caused by tumors surpassed deaths caused by CVD in France. The ranking of causes differs markedly according to sex, as CVD is the second cause of mortality in men after tumors, whereas this order is reversed for women.[7] Three major groups of determinants are usually identified for cardiovascular morbidity and mortality: personal determinants (age, sex); biological determinants; and behavioral determinants. In France, primary prevention mainly focuses on the 'classic' risk factors, i.e. bio clinical and behavioral determinants.[8,9] These factors are, primarily, high BP, dyslipidemia, smoking, diabetes and metabolic syndrome.

First of all, according to various studies[10], these 'classic' factors can explain 50 to 80% of cases of CVDs. The INTERHEART study, which measured the association of nine modifiable risk factors with myocardial infarction in 52 countries, revealed that PSFs (stress at home or at work, financial stress, life events) accounted for 32.5% of the population attributable risk for myocardial infarction, putting them in third place behind risks associated with lipids and cigarette smoking.[11] This means that proper management of the PSFs in primary prevention could, in theory, reduce the number of infarctions by 32%.

Research Methodology

- **Study design**

A community based cross-sectional study; to detect the work stress and risk of cardiovascular diseases among employees of Majmaah University, Majmaah, Saudi Arabia.

- **Study area**

This study will be conductedin Majmaah city in Sudair area in the north of Riyadh region, which includes " Hawtah Sudair, Rawdat Sudair and surrounding villages. Sudair is located in the middle of Najed heights.

Almajmaah city which is an area of 30,000 km^2 and has a population of 133 thousand people. It is the capital city of the province.

The study will concern on Majmaah University in Majmaah city. It serves different city in the region like, Majmaah, Zulfi, Hawtah Sudair, Ghat, and Rumah. Total number of employees is…….

- **Study population**

All the employees of the Majmaah University will be included in the study.

- **Sampling**

Total were the following: self-reported stress for individual workplaces.

- **Data collection**
- **Variables**

- Personal and socio demographic data

- Family income

- academic year

- Lifestyle: number of sleeping hours, smoking and exercise

- Diet and Food Habitsand Nutritional status (BMI).

- Stress, Anxiety, and Depression

- Chronic diseases

- **Tool of data collection**

Pre-tested, questionnaires will be used in data collection. The respondents will be the employees themselves.

- **Inclusion**

Male and female employees in Al Majmah university.

- **Exclusion**

1. Any non - employees

- **Data analysis**

Data will be analyzed by computer using Statistical Package for Social Sciences (SPSS) version 22.

Ethical concern

The ethical approval will be obtained from the ethical committee of the Basic Health Research Centre of Majmaah University. Informed consent will be obtained from the students.

RESULTS

Demographics of the studied subjects

The socio-demographic characteristics are shown in Table 1.

Table 1: Demographic characteristics of the participated (n=127).

		Frequency	Percent (%)
Age (mean, min -max)	**32,33 (20-64)**		
Gender	**Male**	101	79,5
	Female	26	20,5
	Total	127	100,0
Occupation			
	Working	126	100,0
	Not working	0	0
	Housewife	0	0
	Total	126	100,0
Marital Status			
	Married	94	76,4
	Divorced	1	0,8
	Single	28	22,8
	Total	123	100,0
Ethnicity			
	Saudi	83	65,9
	Non Saudi	43	34,1
	Total	126	100,0

Our study included 179 employees resident in Majmaah city (KSA), Saudi (65, 9%) and non Saudi(34,1%) (Figure 3). The mean age of participants was 32, 33 years old. About 80% of subjects were of male gender and 20,5% were female (Figure 1). More than three-quarters of

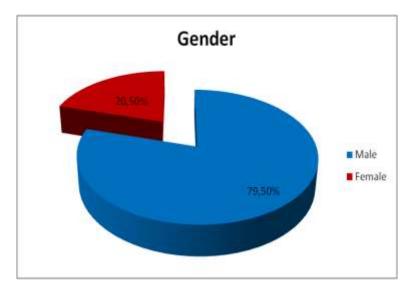workers (76,4%) were married while about the quarter of participants (22,8%) were single (Figure 2).

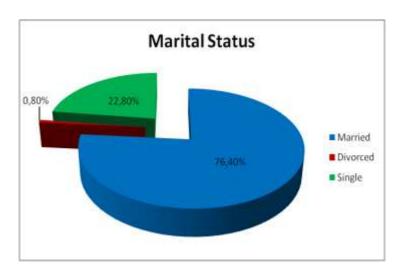**Figure 1: Distribution of sample by gender.**

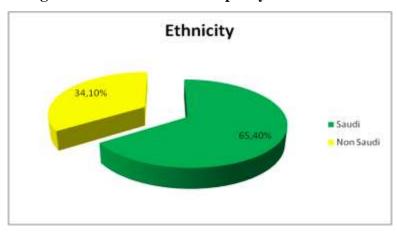**Figure 2: Distribution of sample by Marital Status.**

Figure 3: Distribution of sample by Ethnicity.

Health disorders of the studied subjects

The health disorders characteristics are shown in Table 2.

Table 2: Distribution of sample according to health disorders characteristics.

	Frequency	Percent (%)
Diabetes Mellitus	10	7,9
High Blood Pressure (HBP)	9	7,1
Cardiovascular Diseases	3	2,4
Anxiety	9	7,1
Epilepsy	0	0,0
Bronchitis or Asthma	7	5,5
Muscular or joint problems	8	6,3
Long term neck or back complaints	12	9,4
Insomnia	18	14,2
Skin diseases	10	7,9

Table 2 shows that the studied employees were suffering from various health disorders exposing to cardiovascular diseases: diabetes mellitus (7,9%), HBP (7,1%), cardiovascular diseases (2,4%), anxiety (7,1%), bronchitis or asthma (5,5%), muscular jointpr diseases (7,9%) (Figure 4).
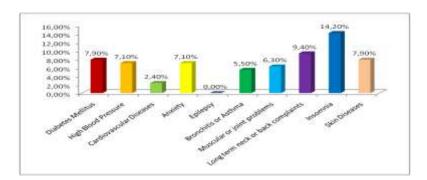

Figure 4: Distribution of sample by Health disorders.

Table 3: Proportion of employees exposed to each risk factor.

Risk factor	High risk N (%)	Moderate risk N (%)	Low risk N (%)	p-value
Do you sit continuously for a long time in your workplace	69 (54,3)	41 (32,3)	17 (13,4)	0,007
Do you take any medications for any health disorders	24 (18,9)	10 (7,9)	93 (73,2)	0,351
Do you regularly eat some snacks/nuts etc while working	46 (36,2)	36 (28,3)	45 (35,4)	0,016
Do you regularly drink carbonated drinks/fruits juice at work	22 (17,3)	27 (21,3)	78 (61,4)	0,001
Do you mostly feel tired and drowsy at work	40 (31,7)	49 (38,9)	37 (29,4)	0,000

Do you get more than 7 hours sleep everyday	40 (31,5)	45 (35,4)	42 (33,1)	0,005
Are you a cigarette smoker?	34 (27,0)	9 (7,1)	83 (65,9)	0,305
Do you mostly eat foods from the restaurants?	31 (24,4)	53 (41,7)	43 (33,9)	0,014
Do you consider your job as very stressful?	22 (17,3)	86 (67,7)	19 (15,0)	0,000
Did you visit a cardiologist within the last one year?	117 (92,9)	2 (1,6)	7 (5,6)	0,105
Are you overweight?	10 (7,9)	48 (37,8)	69 (54,3)	0,027
Do you exercise regularly?	58 (45,7)	46 (36,2)	23 (18,1)	0,093
Do you eat non-vegetarian food every day?	33 (26,2)	59 (46,8)	34 (27,0)	0,019
Do you stress out about your job security?	36 (28,6)	33 (26,2)	57 (45,2)	0,000
Do you feel happy with your current job?	18 (14,2)	28 (22,0)	81 (63,8)	0,000

Table 3 Shows that several practices adopted by employees were found significantly associated with high risk of cardiovascular diseases: sitting continuously for a long time in workplace (54,3%, p=0,007), snaking (36,2%, p=0,016), sugary drinks consumption (17,3%, p=0,001), sleep disorders (get tired and drowsiness at work) (31,7%, p=0,000), sleep less than 7 hours/day (31,5%, p=0,005), bad food habits (24,4%, p=0,014), feel stress at work (17,3%, p=0,000), overweight (7,9%, p=0,027), eat non-vegetarian food every day (26,2%, p=0,019), stress about job security (28,6%, p=0,000), unhappy with the job (14,2%, p=0,000), (Figure 5).
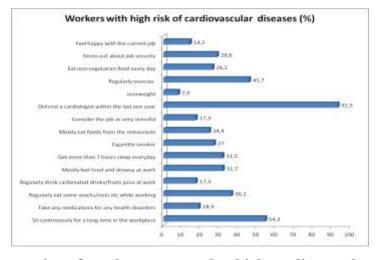

Figure 5: Proportion of employees exposed to high cardiovascular risk factors.

Distribution of sample by Cardio-vascular risk levels.

	Frequency	Percent (%)
High risk	12	9,4
Moderate risk	97	76,4
low risk	18	14,2
Total	127	100,0

Overall, the majority of participants (76,4%) were likely to have moderate risk of cardio vascular diseases, followed by only 14,2% of workers with low cardiovascular risk and 9,4% of workers identified with high risk of cardiovascular diseases occurrence. From the tables below no significant relation was found between cardiovascular risk levels and the socio-demographic factors of the sample.

Relation with socio-demographic factors

*Age

	N	Mean	Std. Deviation	p-value
High risk	8	33,88	8,149	
Moderate risk	61	31,62	8,965	0,516
Low risk	16	34,25	9,581	
Total	85	32,33	8,979	

*Gender
Crosstab

			Cardio-vascular risk levels			Total
			High risk	Moderate risk	Low risk	
Gender	Male	Count	9	74	18	101
		% within Cardio-vascular risk levels	75,0%	76,3%	100,0%	79,5%
	Female	Count	3	23	0	26
		% within Cardio-vascular risk levels	25,0%	23,7%	0,0%	20,5%
Total		Count	12	97	18	127
		% within Cardio-vascular risk levels	100,0%	100,0%	100,0%	100,0%

p-value=0,067

*Marital status

Crosstab						
			Cardio-vascular risk levels			Total
			High risk	Moderate risk	Low risk	
MS	Married	Count	9	71	14	94
		% within Cardio-vascular risk levels	75,0%	76,3%	77,8%	76,4%

			High risk	Moderate risk	Low risk	Total
	Divorced	Count	0	1	0	1
		% within Cardio-vascular risk levels	0,0%	1,1%	0,0%	0,8%
	Single	Count	3	21	4	28
		% within Cardio-vascular risk levels	25,0%	22,6%	22,2%	22,8%
Total		Count	12	93	18	123
		% within Cardio-vascular risk levels	100,0%	100,0%	100,0%	100,0%

p-value=0,986

*Nationality
Crosstab

			Cardio-vascular risk levels			Total
			High risk	Moderate risk	Low risk	
Ethnicity	Saudi	Count	9	59	15	83
		% within Cardio-vascular risk levels	75,0%	61,5%	83,3%	65,9%
	Non Saudi	Count	3	37	3	43
		% within Cardio-vascular risk levels	25,0%	38,5%	16,7%	34,1%
Total		Count	12	96	18	126
		% within Cardio-vascular risk levels	100,0%	100,0%	100,0%	100,0%

p-value=0,156

I. Detailed Budget

1. Section 1: Assistants Compensations.

Assistant Type	Number	Number*Compensation*Duration	Total
Laboratory Tech.			
Statistician			
Other			
Total of Section (1)			

Important Notes

1- The role of theassistants should be defined and their participation in the project should be for a limited period of time and should not be more than half of the duration of the project.

2- Assistants' compensations must be calculated according to the Scientific Research Bylaws; where master degree holder gets monthly compensation of SR800, bachelor degree holder gets monthly compensation of SR600and university students and technicians get monthly compensation of SR400.

2. Section 2: Equipment and Materials.

	Equipment and Materials	Number	Cost	Total Cost
1				
2				
3				
4				
5				
6				
Total of Section (2)				

Important Notes

1- You must clearlyspecifyall the required equipment and materials that will be needed to complete the research project and you have to provide the estimated cost for each of them. Laptops, statistical software, and stationary should not be included in this section as Majmaah University provides each factuality member with a laptop and the other things will be provided by the college or the research centers.

2- In cases, where this section is not filled, this means that your research do not needs any materials, then materials and equipments will not be provided. Furthermore, if the estimated costs of the required equipments and materials are not inserted on the specified columns, this may lead to reject ion of supporting the research project.

3. Section 3: Transportations and other Expenses.

	Type of Expense	Cost
1	Miscellaneous	
2	Publication cost	
3	Other	
Total of Section (3)		

Important Notes

1- The principal researcher must provide accurate description for the nature of these expenses. Additionally, he must provide official receipts/vouchers that support each expense and no compensations will be paid to this section without providing such receipts (bills).

2- The research center and the Deanship of Scientific Research may estimate the expenses based on justifications provided by the principal researcher.

4. Section 4: Total Budget of the Research Project.

	Items	Cost
1	Total of Section (1)	
2	Total of Section (2)	

3	Total of Section (3)	
Total Budget of the Research Project		

Important Notes

The total budget of the research project do not includes the equipments and non-consumable materials, where such items will be returned to the research center upon the research completion.

RESEARCH TIMETABLE

Starting Date: 6/6 / 1438 H.

Items	Planned processes of major tasks	Duration	Months											
			1	2	3	4	5	6	7	8	9	10	11	12
1	Finalization of the proposal	1st – 3rd week												
2	Questionnaire development	4th week	*											
3	Pre test	4th week	*											
4	Data collection	5th –9th week		*										
5	Data analysis	10th – 11th week			*									
6	Report writing	11th – 15th week				*								
	Dissemination of research	16th week				*								

DISCUSSION

Our study illustrates the prevalence of work related risk factors associated with cardiovascular diseases. Based on our calculated score, only about 15% of workers have low cardiovascular risk, on the other hand, the majority of employees have a medium risk of developing cardiovascular diseases and about 10% of workers seem highly exposed To cardiovascular diseases.

In the current study, socio demographic factors (age, gender marital status and nationality) were not found significantly associated with high risk of cardiovascular diseases. However, previous studies showed that socio-demographic factors could be identified as occupational risk factors for cardiovascular diseases. In their study conducted in Bangladesh, Rahman M. et al. have reported that the risk of cardiovascular diseases occurrence was higher among female, urban citizens, overweight/obese subjects and old persons >=55 years old. Raghavendra Nagammanavar et al.[1] published in 2015 a work that suggested that among a population of bank employees, demographic factors (males, older subjects, married subjects) as well as other factors (overweight, stress, tobacco and alcohol consumption, sedentary…)

were significantly associated with a high prevalence of hypertension. Age was identified as a non-modifiable risk factor in cardiovascular diseases and particularly in hypertension(1). The male sex beyond age 55 and the female sex beyond age 65 were also cited as a cardiovascular risk factor. But obesity was found more prevalent in women in several studies.[2] Some employments such as bankers are considered as highly exposing to hypertension and cardiovascular diseases, in Surat city, among a sample of bank workers, Mohmmedirfan H Momin et al.(2) have found that proportion of hypertension was more elevated among older individuals (>=50 years old), male workers, divorced ones and among subjects with higher income and higher position.

Findings of our survey suggest that inadequate behaviors adopted by workers including sedentarity, nibbling, sweetened beverages consumption, unhealthy food consumption, insufficient sleeping hours, and the maintain of unhealthy lifestyle including overweight, stress at work and job dissatisfaction were significantly labeled as risky practices for the cardiovascular diseases. While smoking and physical inactivity were not found significantly associated with cardiovascular diseases.

Different epidemiological studies have progressively shown the importance of the links between certain nutritional modalities and the emergence of cardiovascular diseases.
The seven countries study[3] revealed correlation of the percentage of saturated fats contained in the diet with total plasma cholesterol and the mortality rate from ischemic heart disease.

Data fromseveral studies allow us to situate the impact of lifestyle on the risk of myocardial infarction (MI) as a whole. The INTERHEART study compared over 13,000 patients with IDM to controls in 52 countries.[4] It has identified four lifestyle factors as protecting or inducing IDM. In fact, eating abundantly fruits and vegetables was found to reduce the MI risk of 30%, according to the study, this protection would rise to 80% if tobacco abstinence and physical exercise are added. The HALE study.[5] examined the effect of lifestyle on mortality at 10 years, in a cohort of 2300 subjects over 70 years of age: Mediterranean diet type was associated with about 20% reduction of risk, Smoking cessation with 35%, moderate alcohol consumption with about 20%, and physical exercise with 37%.

The association of anti-atherogenic attitudes was very beneficial because individuals combining all four characteristics had a 75% reduction of the risk of death from MI.

Many studies exist on the impact of shift/night work (TPN) on health. More specific to cardiovascular risk, based on an inventory of studies carried out on this subject in previous years, Knutsson and Boggild(3) concluded that, in the end, shift work may be associated with an increase in cardiovascular diseases in the order of 40%. But this increased degree for shift workers can have several sources, some of which are not specific to work situations in lagged hours (lack of physical activity, smoking, nutrition). But there is one quite specific: the weakness of the duration of daily sleep times.

A general population longitudinal study on work stress and risk of coronary heart disease and stroke in Swedish men was conducted in 2014(4). The aim of this study was to examine whether psychosocial stress from the model Demand / latitude (JDC) increased the risk of coronary artery disease (CHD) and stroke.

In a population of 6070 men with no history of CHD and stroke initially, no increase in the risk of stroke was observed in any of the JDC model categories, while exposure to occupational psychosocial stress defined by professional constraints or low latitude increased the risk of CHD, especially in smokers and blue-collar workers. A meta-analysis conducted among 83014 workers (5) have also suggested that work stress among employees was associated with an increase of CHD risk about 50%.

A limitation of this study is that the estimation of cardiovascular risk was not based on a well-known and well-defined score.

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