WORK RELATED STRESS IN MIDDLE AGED WHITE COLLAR WORKERS: FOCUS ON CARDIO METABOLIC PARAMETERS.

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Abstract: **Background:** Stress, an integral part of our lifestyles to some extent improves management skills, job performance but when crosses the limit results adversely on physical and mental health. Work related stress has been known to cause many ill-effects on the body. **Objectives:** The present study was carried out, to find out the stress levels among working middle-aged males through a questionnaire based analysis and to study the effects of work related stress on Blood Pressure (BP), Obesity markers like Body Mass Index (BMI) Waist-Hip ratio (W/H), Blood parameters like Blood glucose and Lipid profile. **Methods:** Based on the analysis of job stress levels from a validated questionnaire, sixty male bank employees (35–60 years) were divided into non-stressed and stressed group. Their age, work experience, BP, BMI, Waist/Hip ratio were recorded. Their RBS and Lipid profile parameters were analyzed. **Results:** The results showed that stressed group had more BP, BMI, W/H, RBS, LDL, Triglyceride, TG/HDL levels and Atherogenic Index compared to the non-stressed. **Conclusions:** Work stress results in the derangement of the cardiometabolic parameters. While addressing the complications of job stress, a more aggressive working health policy has to be implemented at all work places. **Key words:** Body Mass Index, Blood Pressure, Lipids, Stress, Waist-Hip Ratio.

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Introduction:

Stress has become an active part of work. Stress to some extent improves management skills, job performance but when crosses the limit of sanity results adversely on health-physical and mental. Work related stress has been known to cause many ill-effects on the body or accentuate already existing morbidities. There is no standard procedure to track back and pin-point the causation and underlying mechanism of ill health as "Stress"[1]. But a rough estimate can be done by observing the health of people conditioned under stress. Such knowledge will help us to classify stress as an 'etiologic agent' or a 'predisposing factor'. By this we can confer jobs with work related stress as potentially health damaging.

Job stress has been known to potentiate the onset and the progress of diabetes mellitus, hypertension, bronchial asthma and metabolic syndromes[2,3]. Of all the morbidities, hyperacidity, obesity, cardiovascular manifestations and depression are the most common complaints of stressed workers.

World Health Organization's (WHO) defines work-related Stress as, "is the response people may have when presented with work demands and pressures that are not matched to their knowledge and abilities and which challenge their ability to cope"[4].

Banking sector forms an important contributor in the growth of country's economy. India had 14 nationalized banks in 1969 which have increased to 129 with over 72,170 branches as registered in 2007 that now includes scheduled commercial banks, private banks, public sector banks, regional rural banks and foreign banks. Number of employees working in this sector has increased as well as the competition and associated stress.

    Such organizational stress along with sedentary lifestyle of a bank employee has made him our ideal candidate for studying cardio-metabolic risk factors which have been conditioned under work

stress. This study mainly focuses to assess the health of bank employees under organizational stress.

World Health Organization report shows that 17.3 million deaths per year globally are due to cardiovascular disease[5]. There has been an emerging trend of cardiovascular disease leading to mortality in developing nations[6,7]. In developing countries, 80% of deaths are due to cardiovascular disease[8]. Work place stress has a major impact on personal, professional, organizational and National development. According to Botnia study in a population of Western Finland, finance, work and social relationships had a direct effect on the prevalence of insulin resistance, obesity and altered lipid levels[9]. Work stressed employee suffers psychological strain and is more prone to develop cardiovascular disease according to a German study[10]. It was observed that work duration, work load, and mental stress alter the functioning of cardiac[11] and autonomic nervous system[12].

Stress can be observed in all fields of work big or small[13]. Earlier what was observed in heavy workers involving more of stressful activities at work places has now become a common entity observed even in sedentary work atmospheres. Due to rapid changes in globalization, economic liberalization, financial progress, technological advancements, stress has entered banking industry. As there has been a rapid spurt of private banks into the arena in the recent years, occupational stress in these employees is crippling their performance and health. Levels of stress depend on working conditions, work load, management, leadership, strict deadlines to achieve ambitious targets and also on the type of banks whether Government or private. It has been observed that stress levels are more in the employees of non-nationalized banks compared to those working in Nationalized banks[14]. Long hours of working conditions in the banking sector creates a stressed mind that adversely affects their health and performance according to Jamshed et al[15].

A clear understanding of stress, its pathophysiology and its effects on the health of a bank employee will help us find better remedies to manage work stress in banking sector effectively and add more years to the lives of the human resource of our country.

Objectives:
The present study was carried out, A)To find out the stress levels among working middle-aged males through a questionnaire based analysis. B) To study the effects of work related/organizational stress exclusively on health.(On Blood Pressure, Obesity markers like Body Mass Index and Waist-Hip ratio, Blood parameters like Blood glucose and Lipid profile)

Materials and Methods:
Sixty male employees working in a Co-operative Bank of a city in South Karnataka, India, in the age group of 35–60 years were included in the study. Ethical Approval was obtained for this study from the Institute's Ethical review committee. Written informed consent was taken from each participant after describing in full detail the procedure and purpose of the study.

A validated self administered Likert Scale questionnaire on work stress was used for the study. Responses were collected from the participants. The questionnaire consisted of 20 questions; each with a minimum score of 0 and maximum of 4 per question, scores 0 to 25 indicates that the person is probably coping adequately with his job. If 26 to 40, there is job stress and a need to take preventive action. If scores are 41 to 55, employee needs to take appropriate action to avoid job burnout. And any score from 56 to 80, requires a comprehensive job stress management plan to be started at the earliest.

Based on the analysis of their job stress levels, study group was divided into control (Non-stressed) and test/experimental group (Stressed). Their age, Blood pressure (BP), Body Mass Index (BMI) and Waist-Hip Ratio (WHR) were recorded. General physical examination, complete systemic examinations were done. A detailed history which included the work history, diet history, family and drug history were taken.

Inclusion Criteria

35-60 year old male bank employees with stress level score 26 and above formed the test group.

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Healthy, non-stressed bank employees formed the controls.

Exclusion Criteria

Those with history of smoking, alcohol consumption, with neurological disorders and any systemic illness were excluded.

Blood sample was collected under all aseptic conditions and blood glucose levels were measured by Glucoseoxidase-peroxidase end point by Trinder's method using glucose reagent. (Transasia Bio-Medicals Ltd, Solan, Himachal Pradesh, India). Their lipid profile parameters; Total Cholesterol (TC), High Density Lipoprotein (HDL), Low Density Lipoprotein (LDL), Triglycerides (TG), Very Low Density Lipoprotein (VLDL) were measured. Lipid ratios TG/HDL, TC/HDL, LDL/HDL, Atherogenic index in Plasma (AIP) by Log (Triglycerides/HDL-Cholesterol) were calculated. AIP values of -0.3 to 0.1are associated with low, 0.1 to 0.24 with medium and above 0.24 with high Cardio Vascular risk.

Data were analyzed for normal distribution. Age, BP, BMI, Waist-Hip ratio, Blood glucose and Lipid profile parameters among stressed and non-stressed middle aged males were analyzed statistically by using the statistical software SPSS & MS Excel. All tests were two-tailed and p< 0.05 is considered as significant.

Results:

Based on the analysis of the questionnaire, there were 21 stressed and 39 non stressed males in the study group. Stressed group had a mean stress score of 34 where as in the non stressed group it was 22. Mean age of the stressed and non stressed males were 50.71±7.03 and 50.36±8.04years respectively. (Table I) 30.8% of the stressed were aged below 50 years. 38.2% were above 50 year old. (Table I) The most common responses from questionnaire analysis showed that 78% are callous nature about others' problems, 68% have dissatisfaction, 61% suffer from forgetfulness, 56 % are irritable/impatient and 55% have lost their time, energy.

Systolic Blood Pressure and Diastolic Blood Pressure were significantly more in stressed individuals. (p=0.035 and 0.031 respectively) (Table I) BMI was statistically more in test group. (p=0.04) Mean RBS in the stressed group was 139.62±37.45.

Non-stressed males had 121.43±24.78 with a significance value of p 0.02. Waist/Hip ratio was not significant among the study group. Lipid parameters like Total Cholesterol, HDL, VLD Lipoprotein levels were not significantly altered except the Triglyceride and LDL levels which were elevated with p value of 0.034 and 0.037 respectively. (Table I) TG/HDL was highly significant with p 0.0004. Atherogenic Index, a predictor for cardiovascular risk was significant p value of 0.0002.

Table I: Baseline and cardio-metabolic risk parameters of stress and non-stressed groups.

Parameter	STRESSED	N	Mean±SD	P
Age (Years)	YES	21	50.71±7.03	1.534
	NO	39	50.36±8.04	1.288
Stress score	YES	21	34	
	NO	39	22	
Systolic BP mmHg	YES	21	137.33±12.17	0.035*
	NO	39	128.29±20.15	
Diastolic BP mmHg	YES	21	87.69±9.24	0.031*
	NO	39	81.14±11.76	
BMI kg/m²	YES	21	29.62±7.45	0.04*
	NO	39	26.43±4.78	
WHR	YES	21	0.93±0.05	0.703
	NO	39	0.93± 0.05	
RBS	YES	21	139.62±37.45	0.02*

mg/dl	NO	39	121.43±24.78	
TC mg/dl	YES	21	211.44±34.70	0.259
	NO	39	200.86±33.54	
TG mg/dl	YES	21	258.95±80.72	0.034*
	NO	39	220.18±57.12	
HDL mg/dl	YES	21	46.97±12.78	0.492
	NO	39	49.48±14.41	
LDL mg/dl	YES	21	117.31±37.59	0.037*
	NO	39	101.24±21.08	
TG/HDL	YES	21	5.50±1.41	0.0004***
	NO	39	4.44±0.88	
TC/HDL	YES	21	4.50±2.71	0.5116
	NO	39	4.06±2.32	
LDL/HDL	YES	21	2.49±0.94	0.21
	NO	39	2.04±1.46	
Atherogenic index	YES	21	0.74±0.14	0.0002***
	NO	39	0.64±0.05	

*(P<0.05), **(P<0.01), ***(P<0.001).

Discussion:
This study revealed the impact of job stress on cardio- metabolic risk factors in middle aged males.

Stressed participants had elevated BP, BMI, glucose and lipid levels. It has been shown from the earlier works that prolonged exposure to work stress affects autonomic, cardiovascular[16] and neuroendocrine activity directly, contributing to the development of various disorders.

Obesity, hypertension, diabetes mellitus, hyperlipidemia form important components of metabolic syndrome. Various factors like genetic, environmental, biological play interconnecting role in its pathogenesis. Stressful condition whether personal or professional leads to the activation of the hypothalamo-pituitary-adrenal (HPA) axis, leading in turn to endocrine abnormalities, such as high cortisol, low sex steroid levels, increase in visceral adiposity. High cortisol stimulates gluconeogenesis and glycogenoloysis in skeletal muscle which inhibit insulin sensitivity and glucose uptake contributing to insulin resistance[17]. Our results are in accordance with the studies by Chandola et al. that showed that stressful work results in hypertension, obesity, hyperlipidemia and coronary vascular diseases[18].

Stressed workers had significantly high BP both systolic and diastolic. Job stress is more prevalent under 50 years of age further developing cardiovascular diseases[19]. Autonomic dysfunction in stressed workers was observed as a result of sympathetic predominance and vagal withdrawal that increases the BP[20]. Earlier studies have shown that stress induces the activation of sympathetic system releasing catecholamines which increases Blood Pressure[21]. Obesity leading to insulin resistance has also been linked to the dysfunction of autonomic system and sympathetic predominance acting through the hypothalamus that increases Blood Pressure[22].

Our study showed that BMI, an important obesity marker is elevated in stressful work atmosphere. Whitehall II study has depicted the association between work stress, autonomic activity, cortisol levels, weight again, blood glucose levels and hence the emergence of metabolic syndrome[23].

Lipid parameter, LDL, Triglyceride levels, TG/HDL levels were elevated in the stressed individuals as per the present study. Qureshi et al, have discussed the role of routine mental stress in

cardiovascular derangement, lipolytic changes even in healthy young individuals in the age group of 18-23 years. There were increased BP, Heart rate and lipid levels in 114 medical students[24].

Young men had increased lipid levels like TG, LDL, VLDL and elevated Total cholesterol count as a result of stress[25]. Job stress has been associated with altered cholesterol, HDL and LDL levels[26]. Cortisol and epinephrine have been linked in the pathogenesis of dyslipidemia[27]. Sympathetic nervous system innervating the adipose tissue activates the process of lipolysis. Elevated LDL, Triglyceride levels promote the development of atherosclerosis. Atherogenic Index is a better marker to test the atherogenic dyslipidemia and can identify increased coronary artery disease risk compared to cholesterol ratios. The atherogenic index of plasma was calculated to predict cardiovascular risk. The value should be below 0.1[28].

Limitations of not including middle aged female employees as the sample size was limited as this was a cross sectional study. Hence form the future scope of the study. Further, with a larger sample, across different work atmosphere, age group, in both the genders, correlating with hormonal analysis the effect of stress and de stress activities on the above discussed parameters will be studied.

Conclusion:
Work stress affects autonomic and cardiovascular activity directly as well as indirectly, contributing to the development of various disorders. Stressful conditions can lead to various endocrine derangements.

This study indicates that while addressing the complications of job stress, a more aggressive working health policy has to be implemented at all work places. Well planned awareness programmes to prevent development of risk factors and complications in working employees should be encouraged.

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