

Hematological manifestations of occupational stress: A cross sectional study on middle aged bank employees

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Abstract

Background: Stress is ubiquitous in life. Stress when crosses the limits of sanity, can adversely alter a person's well being. Work related stress has been known to cause many ill-effects on the body. Stress can be observed in all fields of work big or small.

Objectives: The present study was carried out to assess stress levels among working middle-aged males through a questionnaire based analysis and to study the effects of work related/organizational stress exclusively on blood cells.

Methods: Sixty male employees of a Co-operative Bank of a city in South Karnataka, India (35–60 years) were included in the study. Based on the analysis of their job stress levels using a validated self administered Likert Scale questionnaire on work stress, study group was divided into Non-stressed and Stressed. Their Red Blood Cells (RBC), White Blood Cells (WBC), Platelets, Differential Leucocyte counts and Hemoglobin levels were estimated. These parameters were analyzed statistically.

Results: The present study showed a significant fall in the lymphocyte count in the stressed individuals while there being a significant rise in the eosinophil and monocyte count. The total leukocyte count, platelet count and hemoglobin levels showed a fall, but were statistically insignificant.

Conclusions: Stressful conditions can lead to various endocrine derangements. The changes in hormone levels, mainly corticosteroids lead to alterations in blood cell count. These alterations will cause a fall in immunity with increased occurrence of infections.

Keywords: Bank employees, Blood cells, Stress, Corticosteroids, Immunity

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Introduction

Stress is simply a response to external or internal stimuli that disturbs our physical or mental equilibrium. It is ubiquitous part of life. In this present age, stress is becoming an active part of everyday work. Stress to some extent can improve management skills and job performance, but when crosses the limits of sanity, can adversely alter a person's well being. Work related stress has been known to cause many ill-effects on the body or accentuate already existing morbidities. Stress by itself may not show a gross symptom of its own. And also, 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 that jobs with work related stress is potentially health damaging and focus on finding ways to alleviate stress.

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."² Stress can be classified as organizational and non-organizational. Organizational stress includes all the burdens borne by the person at his workplace. Non-organizational stress refers to the stress involving family and social relationship issues.

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 include scheduled commercial banks, private banks, public sector banks, regional rural banks and foreign banks with more than 1000000 employees.³ India's gross domestic saving in 2011–12 as a percentage of GDP (Gross Domestic product) stood at 76%. Indian banking system has made impressive stalk in resource mobilization, geographical reach, covering wide population, financial stability and growth. Number of employees working in this sector has increased as well as the competition and associated stress.

Stress can be observed in all fields of work big or small.⁴ Earlier what was observed in heavy workers involving more of strenuous 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.⁵ 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.⁶

World Health Organization report shows that 17.3 million deaths per year globally are due to cardiovascular disease.⁷ There has been an emerging trend of cardiovascular disease leading to mortality in developing nations.^{8,9} In developing countries, 80% of deaths are due to cardiovascular disease.¹⁰ 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.¹¹ Work stressed employee suffers psychological strain and is more prone to develop cardiovascular disease according to a German study.¹² It was observed that work duration, work load, and mental stress alter the functioning of cardiac¹³ and autonomic nervous system.¹⁴

High levels of 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. With large number of population involved in the banking sector, and having a direct relation between mental stress and somatic manifestations in the form of cardiovascular diseases, the task of taking special measures to boost their mental health becomes indispensable.

The present study was carried out to assess stress levels among working middle-aged males through a questionnaire based analysis and to study the effects of work related/organizational stress exclusively on blood cells.

Materials and Methods

A cross sectional study on male employees of a Co-operative Bank of a city in South Karnataka, India, in the age group of 35–60 years was undertaken. Sixty participants (Minimum 57) were included in this study

to detect a minimum difference of 10% of effect of stress on blood cells with alpha of 0.05 and power of 80%. 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 (Table I).

Based on the analysis of their job stress levels, study group was divided into control (Non-stressed) and test/experimental group (Stressed). General physical examination and complete systemic examinations were done. A detailed history which included the work history, diet history, family and drug history were taken.

35-60 year old male bank employees with stress level score 26 and above formed the test group. Healthy, non-stressed bank employees formed the controls. 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 cells; Red Blood Cells (RBC), White Blood Cells (WBC), Platelets, Differential Leucocyte counts and Hemoglobin levels were estimated. Data were analyzed for normal distribution. Age, blood cell counts among stressed and non-stressed middle aged males were analyzed statistically by using the statistical software SPSS and MS Excel. Chi-square test was used to compare the data. All tests were two-tailed and $p < 0.05$ was 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 whereas 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 ± 8.04 years respectively (Table I). Table II shows the distribution of study group based on their age.

Table I: Age and Stress score of the study group.

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	

Table II: Age distribution of the study group.

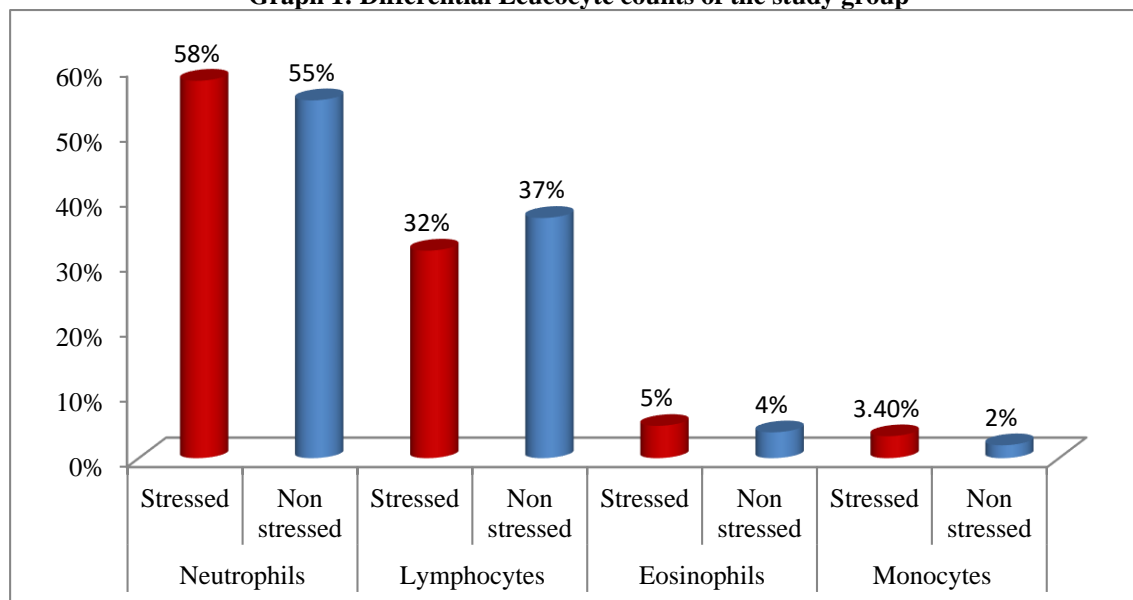
AGE	STRESSED				Total	
	NO		YES		N	%
	N	%	N	%	N	%
<50 years	18	69.2	8	30.8	26	100
≥50years	21	61.8	13	38.2	34	100
Total	39	65	21	35	60	100

P=0.595

The present study showed a significant fall in the lymphocyte count in the stressed individuals ($p=0.0001$) while there being a significant rise in the eosinophil and monocyte count ($p=0.0058$ and 0.0001 respectively). The neutrophil count showed a rise, but was not statistically significant. RBC Counts showed no difference. The total leukocyte count, platelet count and also the hemoglobin levels showed a fall, but were not statistically significant. (Table III and Graph 1)

Table III: Blood cell counts of stress and non-stressed group.

Parameter	Stressed	N	Mean±SD	P
RBC Count (Millions/mm ³)	YES	21	5.00±0.412	0.576
	NO	39	5.06±0.383	
Hb (g/dl)	YES	21	14.40±1.772	0.075
	NO	39	15.14±1.333	
WBC_TC	YES	21	7.41±1.295	0.391
	NO	39	7.75±1.512	
Platelet Count (Lakhs/mm ³)	YES	21	263.71±44.768	0.783
	NO	39	268.62±74.030	

Graph 1: Differential Leucocyte counts of the study group

Discussion

The present study showed the effect of job stress on blood cell counts among middle aged employees. Stressed employees had lower lymphocytes and significantly elevated eosinophils and monocyte counts. Job stress is a type of chronic stress. Under normal conditions, stress leads to stimulation of the Hypothalamo-Pituitary-Adrenal axis (HPA), thus in turn leads to increased production of glucocorticoids. The glucocorticoids by feedback inhibition inhibits its own production and decreases its levels. But the behavior of the HPA axis changes in case of chronic stress. The sensitivity to the feedback action of glucocorticoids is slightly to markedly reduced in long term stress. Experimental studies in rats have shown increased levels of Arginine Vasopressin in Corticotrophin Releasing Hormone (CRH) synthesizing neurons, thus amplifying corticotroph response to CRH and AVP secreted.¹⁵ One of the other changes also seen in studies include down-regulation in the corticosteroid receptors which mediate negative feedback regulation of the HPA axis.¹⁶

The rise in glucocorticoid levels alters the leukocyte count in different ways. The effect of its rise on lymphocyte count includes a fall in the cell count. Similar findings were seen in a meta analysis done by Herbert TB et al, where there was a drop in lymphocyte count following exposure to chronic natural stress.¹⁷ This decrease is because of glucocorticoid induced apoptosis in lymphoid cells as shown in studies which are in accordance with our observed results.¹⁸ Nithishani et al who studied the association of stress response with White Blood Cell Count in 101 male daytime workers showed that there were significant elevation of neutrophils in stressed workers with normal leucocyte counts.¹⁹

A similar study conducted by Ribbas VR et al on effects of stress on blood cells in 45 air traffic controllers of northeastern Brazil showed a significant reduction in hemoglobin, mean corpuscular hemoglobin concentration, platelet, leukocyte levels with an increased cortisol concentrations. They also had lower phagocytosis rate of monocytes, lowered hemoglobin levels, platelet, leukocyte and basophil cell counts.²⁰

We didn't include 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. In 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

Occupational stress affects various systems of the body directly as well as indirectly, contributing to the development of various disorders. Stressful conditions can lead to various endocrine derangements. The

changes in these hormone levels, mainly corticosteroids lead to alterations in blood cell count. These alterations will cause a fall in immunity with increased occurrence of infections. The alterations can be not only to immunity but also cardio respiratory systems with severe decrement to quality of life. Hence jobs with high stress levels should be identified early and necessary measures taken to decrease work stress in these places 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.

Conflict of Interest: None

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S. Job Stress – Questionnaire items

No

1. Less interest in doing present job.
2. Tired even with adequate sleep working here.
3. Frustrated in carrying out responsibilities at work.
4. Irritability over small inconveniences.
5. Withdraw from the constant demands on time and energy.
6. Depressed about my job and feel negative about it.
7. Decreased decision-making ability.
8. I am not as efficient as I should be.
9. The quality of my work is less than it should be.
10. Physically, emotional or spiritual depletion.
11. Lowered resistance to illness.
12. Lowered interest in sex.
13. Changed eating habits, increased smoking, consumption of alcohol or drugs to cope with the stress.
14. Feeling emotionally callous about the problems and needs of others.
15. Communication with my boss, co-workers, friends, or family seems strained.
16. Increased Forgetfulness in the recent period.
17. Difficulty concentrating due to work stress.
18. Feeling bored, don't feel like doing anything
19. Have sense of dissatisfaction and feel something wrong or missing.
20. I think only for money I am doing this job and I don't have personal satisfaction

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