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CIRCULATING LEUKOCYTES;
RELATION WITH ACUTE MENTAL STRESS & CORONARY ARTERY DISEASE

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ABSTRACT... Objective: Evaluating circulating leukocytes in acute mental stress & relation with coronary artery disease. **Design:** Descriptive study **Setting:** Muhammad Medical College Mirpurkhas, **Duration:** from March 2007 to August 2007. **Methods:** Two hundred young healthy adults were studied for stress experiment. Venous blood samples were drawn before and after stress for estimation of leukocyte counts. Values were presented as mean ±standard error of mean (SEM). **Results:** The difference in Pre and during stress results of variables were TLC = -4630.85 ± 140.65, N % = -11.8 ± 0.36, L% = 4.03 ± 0.14, M %= 5.48 ± 0.37, E % = 1.18 ± 0.07, B % = 1.11 ± 0.022. Highly significant p-values ($\leqslant$ 0.001) were found among various parameters, in both groups of subjects. **Conclusion:** An increase in the number of circulating leukocytes was an important unexpected observation that was noted. We suggest that the real life stress induced leukocytes changes may warrant further investigation about its relation with the coronary artery disease (CAD).

Key words: Mental Stress Leucocytes Coronary Artery Disease.

INTRODUCTION

Considerable progress has been made towards identifying personal and environmental characteristics that predispose to or predict the occurrence of coronary artery disease (CAD)[1]. The risk factors that have been confirmed include increased positive family history, male gender, age, hypertension, hypercholesterolemia, diabetes mellitus, cigarette smoking, stress, physical inactivity, obesity and genetic prediposition[2-4].

However, there is still much to be learned about the prediction of CAD. The frequency of CAD in different parts of the world has been found to be related to the mode of life[5]. Consequently, in recent years many investigators have sought to unravel the complex relationship between

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the incidence of CAD and emotional stress. Extensive evidence suggests that the most characteristic trait of the young coronary victim is his emotional stress[6].

At present there is a clear understanding of the manner in which emotional stress may lead to CAD. A recent study suggests that the stress induced circulating catecholamine's can increase the leukocytes count[7]. The leukocytosis has been consistently shown to be an independent risk factor and prognostic indicator of future cardiovascular outcomes, regardless of disease status. The leukocyte count is inexpensive, reliable, easy to interpret, and ordered routinely in inpatient and outpatient settings[7]. In order to confirm this fact, we have carried out this study by using extensive data from young healthy adults of this well known medical college of Sindh province.

SUBJECTS & METHODS

Two hundred young healthy adults were studied. Informed consent was obtained from all the subjects before their entry. Stress experiments were performed according to highly standardized procedure[8]. Subjects were instructed to avoid heavy exercise and to be fasting for two hours before examination. About 2 ml of venous blood samples were drawn from antecubital vein under ascepic conditions, during their class test examination (as stress condition) and after their test examination during pres-stress condition (controls), for estimation of leucocytes counts, which were determined according to Dacie and Lewis[9]. Standard statistical methods were used. Values were presented as mean ±standard error of mean (SEM). Differences between means were evaluated by Students t-test for paired comparisons[10].

RESULTS

When results were summed up and test parameters were compared , it was seen that (Table) the difference in Pre and During stress results of variables were TLC = -4630.85 ± 140.65, N % = -11.8 ± 0.36, L% = 4.03 ± 0.14, M %= 5.48 ± 0.37, E % = 1.18 ± 0.07, B % = 1.11 ± 0.022. When compared statistically, the differences were found highly significant (p- value $\leqslant$ 0.001) among various parameters in both groups of subjects (Table-I).

Table-I. Leukocyte variables, the paired "t" test with p-value significance.

	TLC(: L)	N%	L%	M%	E%	B%
Pre-stress	7218.15	57.2750	7.2000	32.4850	1.9300	1.1100
During stress	11849	69.0750	3.1700	27.0050	.7500	.0000
Mean difference*	-4630.85	-11.8	4.03	5.48	1.18	1.11
P-value	≤0.001	≤0.001	≤0.001	≤0.001	≤0.001	≤0.001

**Mean differences of pre-stress minus during stress.*

DISCUSSION

Mental stress, acting through cerebral cortex, causes physiological stimulus which is similar to the defense alarm mechanism. The changes may be contributed through neurohormonal and hormonal mechanisms, which cause initiation and progression of physiological changes. Present study has shown by a rise in the leukocytes during acute mental stress, which is in agreement with the previous reports[7,11-13]. Our results are similar to that of a recent study done by Jern et al, who conducted the study on twenty healthy adults[6]. We found a significant increase in leukocyte count during class test examination. The relative increments were significantly greater. This is perhaps because of elevated catecholamines levels during this condition. Another clinical study done by Jern et al suggests that persons with higher leukocyte counts have greater risk of myocardial infarction. They concluded that this increase in risk of myocardial infarction associated with increased blood leukocytes was similar to that found for cholesterol

and blood pressure[13]. Therefore, our results approach to be an important clinical suggestion that total leukocyte counts may be useful in screening the risk of CAD, since the leukocyte count is so frequently detrimental and so economical to measure that it may be helpful in assessment of CAD, as it seems to provide an additional information; i.e., the leukocytes may possess an additional predictive power as indicated by Unern et al. Another recent study has demonstrated strong relationship between circulating monocyte-platelet aggregates (MPA) and acute myocardial infarction. This study demonstrated that MPA may appear in the circulation earlier than routine markers of myocardial necrosis such as CK-MB. Thus MPA may be a marker of plaque instability and intracoronary dynamics of thrombosis and inflammation[14].

Another study has shown the leukocyte count as a risk factor for coronary artery bypass graft mortality[15]. Another more recent study has shown the high leukocyte count was associated with increased CAD morbidity and mortality in various patients' population and clinical settings. It also appears to be an independent risk factor, regardless of atherosclerotic disease status[7]. Therefore, present study warrants about this relation to conduct further studies, with specific attention to all components of the circulating leukocytes, which may reflect this important pathophysiological association between leukocytes and CAD, which is still unclear.

CONCLUSION

An increase in the number of circulating leukocytes was an important unexpected observation that was noted. We suggest that the real life stress induced leukocytes changes may warrant further investigation about its relation with the coronary artery disease (CAD).

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