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Evaluation of Leucocyte and Platelet Count between Cigarette Smoking and Non-Smoking Healthy Young Men

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ABSTRACT

Background: The study was undertaken to estimate and relate the Total Leucocyte count (TLC), Differential Leucocyte Count (DLC) and Platelet Count in age-matched cigarette smoker and non-smoker young men.

Material and Methods: Age-matched 120 young male subjects were selected for the study. Out of 120 subjects, 60 subjects were cigarette non-smokers i.e control group and remaining 60 subjects were cigarette smokers with mean age of 25 years. Total Leucocyte Count (TLC), Differential Count (DLC) and Platelets count was recorded. The data collected was statistically analyzed by using paired t-test.

Result: Smoker group has shown significantly higher Total leucocyte Count (TLC) (p<0.0001), Neutrophil (p=0.0005), Eosinophil Count (p<0.0001) than control group. However, no significant difference in Lymphocyte, Monocyte, Basophil and Platelet Count was found in control and cigarette smoker group.

Conclusion: Cigarette smoking causes elevation in Total Leucocyte count, Netrophil and Eosinophil count. Raised count might be the suggestive of pulmonary infection. Although, raised count but was within the physiological range.

Keywords: Cigarette Smoking, Differential Leucocyte Count (DLC), Platelet Count, Total Leucocyte Count (TLC).

INTRODUCTION

Smoking is an addiction that has been accepted by the community despite the fact that smoking represents the most extensively documented cause of disease ever investigated in the history of biomedical research [1]. The habit of smoking is extensively practiced among world population from time immemorial. Recent research has shown that the hazards of prolonged cigarette smoking are even greater than to be supposed. The total of smokers expected to rise to 1.6 billion during 2020's [2]. At present, tobacco use cause death of 3.5 to 4 million people globally and expected to increase about 10 million during 2020's [2]. As per the world health statistics-2006 42.3% of males and 8.3% of females of age group more than 15years are smokers in India (2003) [3]. According to a nationwide survey, 184 million used tobacco, of which 112 million smoked tobacco. It kills 8 lakh people every year according to Indian Council of Medical Research (ICMR) which amounts to 2200 people dying every day from tobacco related diseases. Also a study conducted by ICMR revealed that each patient suffering from tobacco related disease costs the country Rs. 2.5 million through direct medicinal costs, absenteeism, for treatment and loss of income due to premature death [4].

The prevalence of cigarette smoking varies with region, educational level, occupation and race.

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Cigarette smoking reduces smoker life expectancy by 15 to 25 years and is the single most preventable cause of death. The smoke is the most dangerous component of cigarette, as it contains nitrogen oxide and carbon monoxide which are harmful gases. When people inhale they also bring tar into their lungs which include 4000 harmful chemicals [5].

Although there has been number of studies relate the smoking and blood cells but relation of habitual cigarette smoking and leucocytes and platelets in healthy young men was relatively less assessed. Therefore, the present quantitative observational study was undertaken to evaluate and compare the effect of cigarette smoking on the counts of blood cells viz. Total & Differential Leucocyte Count (DLC) and Platelet count.

MATERIALS AND METHODS

The study was conducted in Department of Physiology, Chalmeda Anandrao Institute of Medical Sciences, Karimnagar, Telangana State. The study was approved by the institutional ethical committee. Written consent was obtained from all the study participants.

Altogether, age matched healthy young male subjects (n=120; Mean Age=25 years) were recruited for the study by employing inclusion and exclusion criteria. Out of total 120 subjects, 60 subjects were non-smokers and therefore labeled as 'Control Group' and remaining were habitual cigarette smokers hence labeled as 'Smoker Group'. All the study subjects were selected from general population.

Inclusion and Exclusion Criteria

Control Group: Healthy non-smoker male within age range of 20 - 40 years. Smoker Group: Healthy age matched habitual cigarette smoking (1 to 10 cigarettes per day) male for ≥ 1 year.

Exclusion Criteria

Cigarette/Bidi smoker and/or non-smoker young male with any systemic disease or mental disorder, under any drug treatment and who have recently received or donated blood.

Blood sample (5ml) was collected at 7 a.m. before first cigarette smoke. Blood with anticoagulant EDTA was sent for the analysis. Total leucocyte count (TLC), Differential leucocyte Count (DLC) and platelet counts were done on automated cell counters.

Statistical Analysis

The collected data was analyzed by paired t-test. P (probability) value < 0.05 was considered for statistical significance.

RESULTS

There TLC, Neutrophil and Eosinophil count were found to be elevated significantly in smoker group compared to control group. However, interestingly there was no statistical significant difference found in case of Lymphocyte, Monocyte, Basophil and Platelet count among control and cigarette smoker group (Table 1).

DISCUSSION

Results in the present study showed that cigarette smoker young men and control group differed significantly on the basis of TLC, Neutrophil and Eosinophil counts. The results related to Total Leucocyte Count (TLC), Differential leucocyte Count (DLC) and Platelet Count in control group was observed to be within the physiological limits [6].

In the present study, Total Leucocyte Counts (TLC) was found elevated in cigarette smoking young men compared with that of non-smoking age-matched young men. R. W. Howell in 1970 reported mean white cell count in heavy smokers to be strikingly higher than in non-smokers [7]. This type of findings of high white cell counts in heavy smokers has been confirmed in France [8] and in the U.S.A. [9]. Similar findings were observed in pregnant women in England by McGarry in 1974 [10]. Elevated Total Leucocyte Count (TLC) in smoker in this study is in agreement with the findings of other investigators like Burney S W, L Bonus (1972) [11]; Corre F.J., Lellouch, and D. Schwartz (1971) [8]; Sutek K., and W Jedrzejczak (1973) [12].

In the present study it was noticed that, there was significant (P < 0.0005) increased Mean Neutrophil (%) count in smoker group compared to that in control group. Robert C. Nobel and Barbara B. Penny in their comparative study of Total Leucocyte Count (TLC), Differential Count (DLC) in smoking and non-smoking group found that the number of neutrophils was significantly higher (P < 0.03) in the active smokers [13]. In addition, Corre et al. and others have also examined the percentage counts of leucocyte types in smokers and found increases in the

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percentage of neutrophil and decreases in the percentage of lymphocyte [8]. However, RG Taylor et al. observed that the percentage of neutrophil count did differ significantly between smokers and nonsmokers [14].

In the present study, it was observed that the eosinophil count in smoker group was significantly higher than the non-smoking control group. Schoen I, Pizer M have studied the relation between cigarette smoking and eosinophil count. They observed higher eosinophil counts in smokers compared to non-smokers [15].

RG Taylor,et.al. in their study showed higher eosinophil counts in smoker [14]. According to them the mean white cell count was higher in smoker group than non-smoker group. The percentage of neutrophils, lymphocytes, and monocytes did not differ significantly between control and smoker group. They also have found that, the basophil percentage was higher in smokers (0.30%) than in non-smokers (0.19%, P=0.03) [14].

In the present study it was observed that, though Mean TLC had increased in smoker group than nonsmoker there is no proportionate increase in all types of white cell count except neutrophil and eosinophil. Mean Lymphocyte (%), Mean Monocyte Count (%), mean Basophil Count (%) did not differ significantly in control and smoker group.

Butkiewicz AM et al. reported that, the platelet count in female non-smokers was statistically significantly higher compared to female smokers. However, no statistically significant difference was noted in platelet count between male smokers and nonsmokers [16].

Literature reports on the effects of smoking on platelet count seem to be controversial. Brumit et al. found no correlation between platelet count and smoking in healthy volunteers [17]. Dotevall reports that no change in platelet count in female smokers and non-smokers [18]. Suwansaksri et. al. observed no significant difference in platelet count in male smokers and non-smokers [19]. According to Blann et al. smoking two cigarettes a day by chronic smokers of both sexes does not affect the platelet count [20]. However, Chao et al. have revealed that chronic male smokers have elevated platelet count compared to male non-smokers [21].

In the present study it was observed that there was no significant difference in platelet count in smoker group compared to non-smoking control group. It was also observed that even within the smoking group platelet count did not differ significantly.

CONCLUSION

It is concluded that, habitual cigarette smoking in young men impacts the blood cell count. Elevated leucocyte count signifies the altered leucopoiesis process in general. It might be the suggestive of altered pulmonary physiology. Altered count might modulate the role of WBC in immune responses.

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DECLARATION

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TABLE:

Table 1: Comparison of Total Leucocyte Count, Differential Leucocyte Count, and Platelet Count between
control and smoker group

Blood Cell	Group	Mean (n=120)	P-value
TLC	Control	6,612	$P < 0.0001^{***}$ S
	Smoker	8,895	1 < 0.0001 B
N	Control	59.8	$P < 0.0005^{**}S$
	Smoker	62.0	1 < 0.0005 5
Е	Control	4.2	$P < 0.0001^{***}S$
	Smoker	5.7	1 < 0.0001 B
В	Control	0.2	- 0 NS
	Smoker	0.1	
М	Control	4.9	P < 0.103 NS
	Smoker	4.6	
L	Control	30.9	P < 0.0655 NS
	Smoker	29.5	
Platelet	Control	2,69,276	P < 0.6218 NS
	Smoker	2,73,391	1 0.0210100

TLC: Total Leucocyte Count, N: Neutrophil, E: Eosinophil, B: Basophil, M:Monocyte, L:Lymphocyte, S: Significant, NS: Non-significant.