Article

Total Count of White Blood Cells in Adult Male Smokers

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The present study was carried out to observe the changes in total count in WBC in cigarette smokers. The study population consisted of 105 adult male smokers and non-smokers, aged 20~40 years, from different socio-economic classes. Among them, 30 apparently healthy non-smokers were taken as control . 75 apparently healthy smokers, who had the history of smoking of one or more cigarette per day, regularly for at least last one year, were taken as the study group. Smokers were again subdivided into three categories according to the number of cigarettes they consumed per day. For statistical analysis unpaired "t" test was used for comparison. Mean ± SD of Total count of WBC in non smokers and smokers were 7501.66 ± 929.4 /mm^3 and 9171.3 ± 1037.7/mm^3 respectively. Smokers had significantly (P <0.001) higher WBC counts than non-smokers. In addition, WBC count was found increased with intensity of smoking. The smokers who were smoking e" 20 cigarettes per day had the higher total WBC count than those who were smoking lesser.

The findings of the present study suggest that cigarette smoking may cause increased the total count of WBC, which may predict high risk for some fatal diseases.

Key words: Cigarette Smoking; White Blood Cell; Adult Male

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Introduction

Tobacco is the second major cause of death in the world. It is currently responsible for the death of one in ten adults' worldwide (about 5 million deaths each year). If current smoking patterns continue, it will cause some 10 million deaths each year by 2020. Half the people that smoke today – that is about 650 million people – will eventually be killed by tobacco.[1] The Expert Committee observed that tobacco related diseases are rising in developing countries.[2]

In 2003, the smoking prevalence in Bangladesh, among adults was 54.8% in males and 16.6% in females. The prevalence of smoking in age group 18-29 years, 30-39 years, 40-49 years are 36.3%, 64.2%, and 70.8% respectively.[3]

Infection and inflammation may contribute to vascular injury and atherogenesis. Inflammation may also promote atherosclerotic plaque rupture and thrombosis. Leucocytes, or white blood cells, may serve as an important biomarker for these disease processes.[4]

Inflammation is currently considered to play a central role in carcinogenesis, a hypothesis that has been addressed by assessing white blood cell count as a predictor of risk for cancer.[5] Chronic inflammation has been hypothesized to play a role in the pathogenesis of several cancers.[6]

The WBC count can be used to predict mortality from all causes and from ASCVD (atherosclerotic cardiovascular diseases),[5] myocardial infarction,[7] ischemic heart disaease.[8] Elevated WBC count is associated with increased

risk of Cerebrovascular Disease,[4] cancer mortality,[6] and an independent risk factor for carotid atherosclerosis.[9]

In this study, we hypothesized that cigarette smoking can alter the total count of WBC and level of increased WBC count may be associated with severity of smoking.

Methods

This cross sectional study, was carried out in the department of Physiology of the Dhaka Medical College from July 2005 to June 2006. Total 105 apparently healthy subjects age ranged from 20~40 years were selected, of whom 30 were non smokers (control – Group A) and 75 were smokers (experimental – Group B) who smoked for at least last one year. The smokers were again sub-grouped into 3 categories accordingly to the number of cigarette smoked per day (Group B_1 : Consisted of 25 smokers consuming 1~9 cigarettes / day; Group B_2 : Consisted of 25 smokers consuming 10~19 cigarettes/day; Group B_3 : Consisted of 25 smokers consuming e" 20 cigarettes / day). They were selected from different areas of Dhaka city and different socio-economic classes.

Subjects suffering from any acute or chronic respiratory illness, hypertension, diabetes mellitus, angina, endocrine, hepatic, allergic disorders, any infectious or debilitating illness etc. and subjects with history of recent hospitalization and surgery were excluded. Persons taking the drugs such as antibiotic, steroids, thiazide diuretics, aspirin etc. or taking radiotherapy and subjects who drink alcohol were also excluded. Passive smokers were not included for control group.

All the subjects were explained about the aims and objectives of the study and the test procedures were briefed and written consent was taken before performing the test. A detailed history of smoking habit and health of each subject was obtained by using a pre-tested questioner and clinical examination sheet. Clinical examination of these subjects were done on the first day of the visit. The subjects were advised to fast overnight and not to engage in physical exercise and smoking before reporting on the next morning.

On the reporting day, the blood samples were collected at the morning between 8.00 to 9.00 am. with all aseptic (70% alcohol) precaution. 2 ml venous blood was drawn and it was mixed with the anticoagulant- EDTA. WBC count were done within 5 hours of sample collection.

With the collected samples total count of WBC was done by Manual method (Visual haemocytometer method) for each study subjects in the laboratory of Physiology of Dhaka Medical College and Hospital, Dhaka.

After the collection data were checked, verified, edited for consistency to reduce error. All the results of laboratory investigations were loaded in computerized SPSS 12.0 programmer and statistical significance were analyzed by unpaired student's "t" test.

Results

Results were expressed as mean ± SD (Standard Deviation).

The results are shown in Table-I .

The means (±SD) of total count of WBC were 7502 ± 929 and 9171 ± 1038 per mm^3 of blood in group A and group B respectively. Again the means (±SD) total count of WBC were 8928 ± 1084, 9038 ± 960 /mm^3, 9548 ± 998 per mm^3 of blood in B_1, B_2 and B_3 groups respectively.

The difference of means (±SD) of total count of WBC were significant ($p < 0.001$) between group A and B.

The results were also significant between group A and smoker's group B_1 ($p < 0.001$), B_2 ($p < 0.001$), B_3 ($p < 0.001$).

Again the differences of means (±SD) of total count of WBC among the smokers groups B_1 vs. B_2 ($p > 0.05$), B_2 vs. B_3 ($p > 0.05$) were not statistically significant. But the difference between B_1 vs. B_3 ($p < 0.05$) was statistically significant.

Table – I : Mean ±SD of total count of WBC in different groups. (n =105)

Groups	N	Mean thousands /mm^3	Standard Deviation
A	30	7501.66 (5650-9950)	± 929.44
B	75	9171.33 (6600-12000)	± 1037.7
B1	25	8928.00 (6600-11650)	± 1084.36
B2	25	9038.0000 (7250-10800)	± 959.84
B3	25	9548.0000 (8300-12000)	± 997.54

Statistical analysis

Groups	P values
A vs. B	0.001*
A vs. B_1	0.0001***
A vs. B_2	0.0001***
A vs. B_3	0.0001***
B_2 vs. B_3	0.072^{ns}
B-$_1$ vs. B_3	0.041^{ns}
B_1 vs. B_2	0.71^{ns}

, ***=p<0.001 * = p<0.05 ns= nonsignificant.

Discussion

The mean total count of WBC in the present study was significantly ($p < 0.001$) higher in smokers than non-smokers. This finding is consistent with several other investigators.[6,9,10-16,28]

Smith[14] et al. observed that men and women, those who were current cigarette smokers had mean total WBC counts about 20-25% higher than non smokers.[30]

In this study it was also seen that WBC count increases with intensity of smoking. The smokers who were smoking ≥ 20 cigarettes had the higher total WBC count compared to those smoked lesser number cigarettes.

Howell,[13] reported that the mean leukocyte count was more than 1,000/ cu mm greater in male cigarette smokers, aged 40 to 54, than in non-smokers. Corre[29] et al. confirmed Howell's finding. The result of present study had greater similarity with the finding of Friedman[30] They suggested, smoking induced increased leukocyte count might be due to nicotine-induced release of catecholamines, which could raise the leukocyte count. He also stated that the irritant effect of cigarette smoke on respiratory tree with resultant inflammation might be a contributory factor for higher WBC count which may also be the cause of higher WBC count in our study.

Smokers do have increase leukocyte count which might forecast the possible high risk for developing fatal such as, cancer, cardiovascular, cerebrovascular, respiratory diseases in these group of population.

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