A COMPARARTIVE STUDY OF CHANGES IN LEUCOCYTE COUNTS IN CHRONIC CIGRETTE AND BIDI SMOKERS

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Abstract

30 cigarette smokers, 30 bidi smokers, and 30 non-smokers (ascontrols) had been examined for total leucocyte count (TLC), differential leucocyte count (DLC), and absolute eosinophils count(AEC). With the use of a hemocytometer equipped with a Neubaeur's counting chamber, the total leucocyte count (TLC) was examined, and it was observed to be significantly greater in smokers than in nonsmokers (P<0.001).

As compared to non-smokers, DLC showed higher eosinophil percentage and AEC, in both group of smokers, and difference is higher statistically significant (P<0.001).

Keywords: Smoking**,** Total Leucocyte count (TLC), Differential leucocyte count (DLC),Absolute eosinophil count (AEC), cigarette smokers, bidi smokers

Introduction

According to multiple prospective studies, the total white blood cell count (TLC) is a reliable predictor of death from cancer, coronary heart disease, and other causes(1).Smoking cigarettes,

both actively and passively, there are raised TLC, lymphocytes, and granulocytes counts in chronic smokers(2). Numerous researchers have thoroughly investigated how smoking affects the pulmonary and cardiovascular systems in addition to other systems of the body. With regard to the types of tobacco used and the amount of tobacco used, cigarettes and bidis differ in a few ways (3). Although bidi smoking is quite prevalent in India, specially among those from lower socioeconomic backgrounds, very little research has been done on the effects of bidi smoking on the body's many systems, notably the cardiovascular system and hematopoietic parameters.

The aim of this study was to investigate the effects of cigarette and bidi smoking on these counts and to determine the impact of long-term smoking on total leucocyte count, differential leucocyte countas well as absolute eosinophil count.

Material and Methods

A large number of male subjects between ages of 25 to 40 years were thoroughly screened for the present study. Subjects having any disease of lungs such as bronchitis, bronchial asthma, tuberculosis etc. and cardiopulmonary disease were excluded. Out of above screened subjects a total of 90 subjects belonging to almost same socio-economic status were finally selected for the study and categorized in the following three groups:

a) 30 nonsmokers (as control group)
b) 30 cigarette smokers and
c) 30 bidi smokers

The participants provided information of their age, smoking history, and amount of tobacco consumed. The number of cigarettes and bidis smoked daily as well as the years of smoking were taken into account when calculating the duration and amount of smoking. 10 cigarettes or 10 bidis smoked daily for a year were regarded to have consumed one pack for the purposes of the study, as the pack year concept used by Nancy &Rai(4). As a result, the time period and amount of smoking were measured in pack years. Participants were taken for the study who smoked cigarettes or bidis for a period of time ranging from 5 to 10 pack years. In barefooted posture, the patients' height was measured in cm, and a standard weighing machine was used to determine their weight in kilogram. Before the commencement of the testing, smokers were requested to abstain from smoking for two hours. To minimize the impact of twilight fluctuation, all tests were carried out in the morning before meals. The individuals' total leucocyte count was done using a hemocytometer that included a Neubaeur's counting chamber and a WBC pipette.

The blood in the WBC pipette was diluted with Turk's fluid. Under a low power microscope, the count was performed from Neubaeur's counting chamber. Leishman's stain was used to stain the blood film for the differential leucocyte count. Different types of leucocytes were counted under a high power microscope, and the proportion of each type of leucocyte was computed. Total leucocyte count and eosinophil percentage were used to compute the absolute eosinophil count.

Results

Obtained results and their statistical interpretations are shown in table 1&2 and Graph 1-3.

Table 1 indicates no significant difference in the three subject groups in terms of their age, height, or weight. In comparison to cigarette smokers, bidi users smoked somewhat more tobacco overall and for a slightly longer period of time (pack years).

Table 2 indicates that cigarette and bidi smokers had higher total leucocyte counts than non-smokers, and that the difference is very significant ($P<0.001$). Cigarette smokers had shown the rise a little more than bidi smokers, but statistically, it is not significant.

In both smoking groups compared to nonsmokers, the differential leucocyte count reveals a relative increase in neutrophils and eosinophils with a modest decrease in lymphocytes and monocytes. The percentage of eosinophils has increased in both smoking groups as compared to non-smokers ($p<0.001$). Comparatively, cigarette smokers have a somewhat higher rise in eosinophil percentage than do bidi smokers, although the difference is statistically insignificant.

Additionally, it was discovered that both smoking groups had higher absolute eosinophil counts than non-smokers, and this difference was very significant ($p<0.001$). Comparatively, cigarette smokers showed more increase than bidi smokers, but statistically, the difference was not significant.

Discussion

The current study's findings showed a distinct correlation between smoking cigarettes and bidis and the leucocyte count. Both smoking groups have higher total leucocyte counts than non-smokers, and the difference is very significant ($p<0.001$). The findings of the present study are alike with those of Venuxem et al. (1984) (5), Howell et al. (1970) (6), Corre et al. (1971) (7), etc., however none of these studies examined the effects of bidi smoking on leucocyte count. Comparatively, the rise is greater among cigarette smokers than among bidi smokers, although the difference was not determined to be statistically significant. Smokers had increased lymphocyte counts and decreased neutrophil counts as compared to non-smokers Corre et al.

(1971) in their study showed a clear relationship between the amount of smoke inhaled and increased in TLC. Venuxem et al. (1984) in their study showed that TLC in smokers was related to Carboxy-haemoglobin concentration of blood. Taylor et al (1986) worked on relationship of plasma nicotine concentration and TLC and showed in their study that TLC was 20-25% more in smokers than non-smokers. Also there is a close correlation between theconcentration of nicotine and end expired carbon monoxide.(8)Additionally, smoking led to a considerable rise in blood C-reactive protein levels while simultaneously lowering magnesium levels among smokers.(9)

TLC counts and AEC are elevated in smokers who are otherwise healthy, and these parameters fall quickly after quitting smoking which is biochemically confirmed, and that the decline is sustained, possibly indicating a reduction in an underlying state of tobacco-induced inflammation. The consequences of this link range from enhancing our comprehension of how smoking causes atherosclerosis to assisting in directing the medical work-up in a healthy smokers with leukocytosis. (10) In addition, the link between eosinophils, smoking, and lung function was investigated by Kauffmann et al. (in 1996). Only the prevalence of asthma and eczema was correlated with the absolute amount of eosinophils in childhood and present cigarette use. (11)

Conclusion

From the observations of the present study it can be concluded that there is significant increase in total leucocyte count, eosinophil percentage and absolute eosinophil count in both cigarette smokers and bidi smokers and the increase is more in cigarette smokers which can be due to about five times more quantity of tobacco in an Indian cigarette that an average Indian bidi. (Malik, et al in 1974) (3)

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TABLES & GRAPHS

Table 1: Showing characteristics of the subjects studied

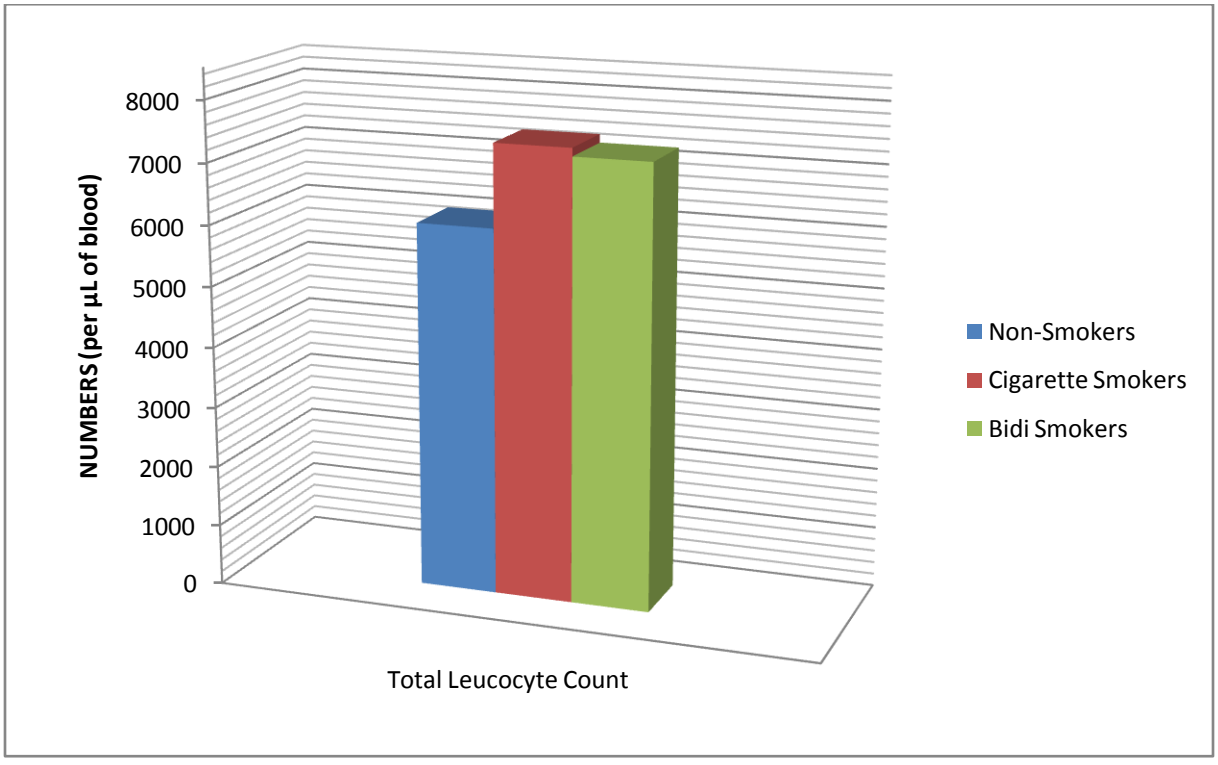
VARIABLES	**Non smokers (n=30) Mean ± SD (Range)**	**Cigarette smokers (n=30) Mean ± SD (Range)**	**Bidi smokers (n=30) Mean ± SD (Range)**
Age (yrs)	29.8 ± 5.02 (22-40)	30.8 ± 4.26 (25-40)	31.8 ± 5.54 (25-40)
Height (cm)	163.77 ± 4.51 (156-172)	162.89 ± 5.56 (155-180)	163.03 ± 4.60 (155-171)
Weight (kg)	58.85 ± 8.42 (52-70)	60.40 ± 2.07 (51-70)	59.66 ± 4.10 (50-67.5)
BMI ($kg/m^{2)}$	21.96 ± 3.21	22.81 ± 1.94	22.49 ± 2.0
Quantity of tobacco smoked (pack years)	Not applicable	7.7 3.11 (5-10)	8.46 ± 1.66 (5-10)

Table 2: Showing the haematological parameters of all subjects (n=90) and significance of differences

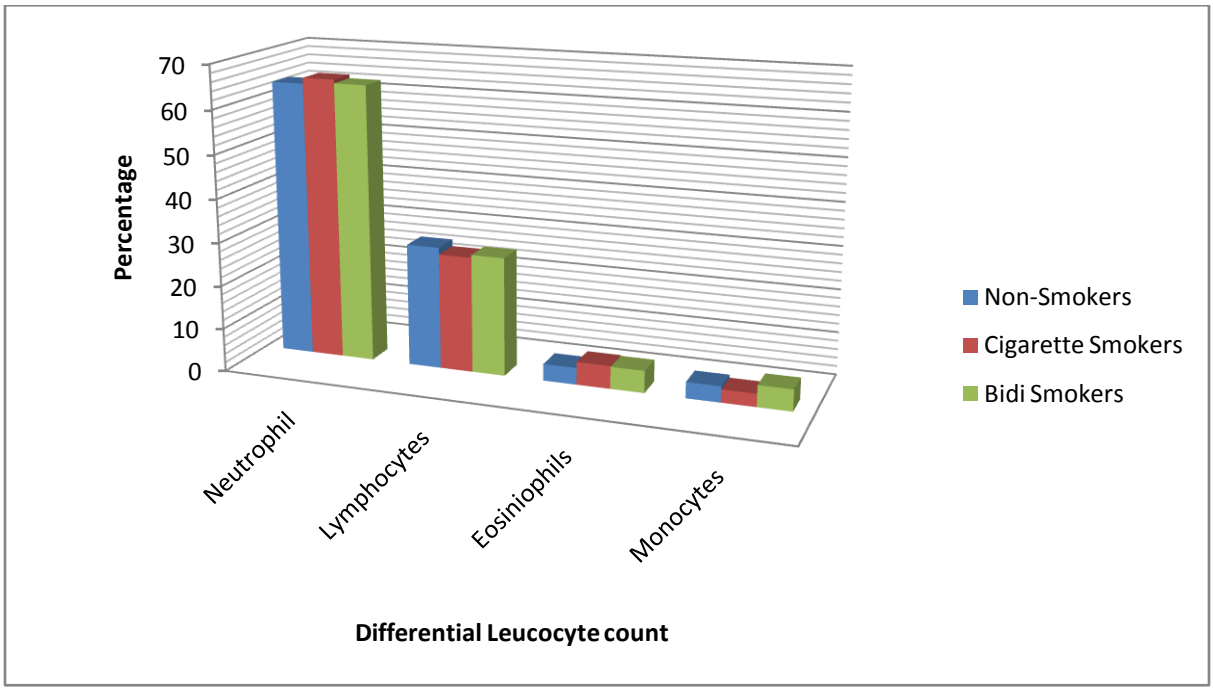
Haematological Parameters	Mean values ±S.D.			Significance of differences (t value)		
	Non-smokers (n=30)	Cigarette smokers (n=30)	Bidi smokers (n=30)	N.S. VS C.S.	N.S. VS C.S.	N.S. VS C.S.
TLC (per µL of blood)	6041.27 ±1032.37	7400.5 ±798.46	7265.1 ±1049.9	6.04*	4.55*	0.56
DLC (%)-						
Neutrophil	63.56 ±4.02	64.9 ±3.97	64.07 ±4.18	1.29	0.66	0.79
Lymphocyte	28.37 ±3.46	26.8 ±3.67	27.43 ±4.06	1.70	0.96	0.63
Eosinophil	3.9 ±1.18	5.3 ±1.18	5.13 ±1.55	4.59*	3.46*	0.48
Monocytes	3.73 ±1.78	3.03 ±1.18	3.33 ±1.40	1.64	0.97	0.80
Absolute Eosinophil Count (µL of blood)	233.4 ±75.06	394.27 ±99.45	378.93 ±133.63	7.07*	5.20	0.50

*Highly significant (p<0.001)

GRAPH 1. SHOWING TOTAL WBC IN SMOKERS AND NON SMOKERS



GRAPH 2 SHOWING DIFFERENTIAL LEUCOCYTE COUNT IN SMOKERS AND NON SMOKERS



GRAPH 3 SHOWING ABSOLUTE EOSINOPHIL COUNT IN SMOKERS AND NON SMOKERS