



## NUMERICAL ALTERATIONS OF DIFFERENT WHITE BLOOD CELLS IN CHRONIC TOBACCO SMOKERS

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### ABSTRACT

In India smoking is a common habit in both rural and urban areas. According to national sample survey 35% of men and 12% of women in India use tobacco in some form or other and it causes various effects on body including blood. Evidence is that accumulating haemostatic factors have a pathogenic role in ischemic heart diseases and stroke, smoking habit is known to affect several haemostatic heart diseases.

In this study 100 healthy male subjects, 50 chronic smokers and 50 non smokers were assessed for differential white blood cell count. There was decreased neutrophil and basophil count while lymphocyte count was significantly increased to about 30% in smokers from about 24% in non smokers, while there was no significant changes in other white blood cells.

Objectives- 1.To study the effect of tobacco smoking on different white blood cell count.  
2.To establish a correlation between chronic tobacco smoking and its effects on parameters which were studied.  
3.To create awareness in tobacco smokers about the effect of tobacco on their health.

**KEY WORDS:** Tobacco, Smoking, differential leucocytes count.

### INTRODUCTION

The World health organization reported that tobacco smoking killed 100 million people worldwide in the 20<sup>th</sup> century and warned that it could kill one billion people around the world in the 21<sup>st</sup> century also(1).

Smoking is a well recognized risk factor for the development of coronary heart diseases, angina pectoris and sudden cardiac death(2)  
Besides the direct consequences of smoking on smokers passive smoking by non-smokers who are exposed to tobacco smoke also has shown an increased risk of respiratory and cardiovascular problems in children (3).

There is approximately a 50 % increase in the smoking rates in the low-income countries (4).  
In India, smoking is a common habit in both the urban and rural areas in the form of cigarettes, beedies, pipes, cigar, hookah, etc (5).

Smoking has been repeatedly shown to increase mortality. One of three deaths of middle aged males is caused by diseases associated with smoking. According to national sample survey 35% of men & 12% of women in India use tobacco in some form or other and it causes various effects on body including blood. Evidence is that accumulating haemostatic factors have a pathogenic role in ischemic heart diseases and

stroke, smoking habit is known to affect several haemostatic heart diseases (6).

There are so many reports that smoking produces rise in total leucocyte count but its effect on differential leucocyte count is still controversial.

Subramanian N observed lymphocytosis in chronic smokers while Grimm et al reported that there is decrease in eosinophil count after cigarette smoking(7,8,9,10).

Some workers found that there is no changes in DLC after smoking. According to Joel Schwartz and Scott effect of cigarette smoking on differential cell count is not uniform and is primarily influenced by current smoking behaviour, although long lasting effect of past smoking are also evident (11)

In view of this present study was undertaken to find out effect of cigarette smoking on differential white blood cell count.

Actually the several constituents of cigarette promotes increase in leucocyte count. The major one is nicotine. Role of nicotine is to stimulate hormone secretion that leads to raise total leucocyte count (9).

According to Kishloam and papajolin due to presence of nicotine in blood stimulate adrenal gland to secrete corticosteroid which increase corticosteroid level in the blood which is responsible for changes in blood smear like neutrophilia, lymphopenia, and eosinophilia. Scheer attributed that nicotine release catecholamine's and also affect secretion of epinephrine by sympathetic ganglion stimulation as well as by direct action on adrenal medulla which leads to increase total leucocyte count..

Recently it is also shown that irritant effect of smoke on respiratory tree which leads to inflammation and synthesise cytokines which either directly or in conjunction with one another can influence various leucocyte count (12).

It is proved that incidence of coronary diseases and bronchitis is increased due to smoking indirectly due to increased leucocyte count.

But effect of cigarette smoking on differential count is still controversial i.e. immediate neutrophilia with relative lymphopenia and later a lymphocytosis with relative neutropenia. This is the reason that many workers are working on smoking , leucocyte count and differential count. so this study was undertaken with the aim to find out the exact effect of smoking on differential WBC count.

Our main aim of this study is to create awareness in tobacco smokers about the effect of tobacco smoke on their health and to give suggestions to smokers to stop smoking.

### MATERIALS AND METHODS

The present study was carried out at Rural Medical College Loni, from may 2005 to April 2008. Study population includes 100 healthy male subjects belonging to age group 30-60 years divided into experimental group and control group (50 each). Experimental group were chronic tobacco smokers with history of tobacco smoking more than one year and still smokers with no history of any major illness at present and in the past. Number of cigarette smoked by each subject is calculated approximately and expressed in "pack years".

1 pack year = 1 pack of 10 cigarette per day for one year.

Smokers less than one year duration, quitters and ex-smokers were excluded from study. The control group was healthy non-smoker male of 30-60 years without history of any Major illness in the past. Subjects of study groups were informed

about the study and written consent was taken from them. After obtaining detailed history and written consent blood samples were collected in the morning between 10 am to 12<sup>o</sup>clock after abstinence from smoking for about 2 hrs.

Collected samples then send for differential white blood cell count by using coulter counter machine which was available in pathology central processing lab. differential white blood cell count was done , data was collected and analysed by using various statistical methods.

### RESULTS

The physical parameters of smokers and non smokers are shown in table no-1. The age range of subject was 30-60 years with mean age of 48.25 years in smokers and in non smokers 49.20. There was no significant difference in the mean of other physical parameters like height, weight , body mass index and body surface area in the smokers and non smokers.

Table No -1 Physical characters of smokers and non smokers:

Variables	Smokers (Mean $\pm$ S.D.)*	NonSmokers (Mean $\pm$ 2 S.D.)*
Age(years)	48.25 $\pm$ 10.10	49.20 $\pm$ 10.20
Height(M)	1.67 $\pm$ 0.10	1.68 $\pm$ 0.11
Weight(Kg)	69.2 $\pm$ 8.4	67.4 $\pm$ 9.5
Body mass index(BMI)	23.50 $\pm$ 3.12	22.10 $\pm$ 3.10
Body surface area(m <sup>2</sup> )	1.73 $\pm$ 0.02	1.72 $\pm$ 0.10

\*S.D.-Standard Deviation.

Table no-2 gives values of DLC percentage in smokers and non smokers.

In our study we found that Neutrophil count decrease from about 61% in non smokers to about 57% in smokers.

Lymphocyte count increased from about 24% in non smokers to 30% in smokers , also there is significant changes in Basophil it significantly decreased in smokers than in non smokers

There are no significant changes in other leucocytes.

Table No-2 Comparison of differential white blood cell count in smokers and non-smokers.

Sr. no	DLC percentage	Smokers(n=50) (mean ± SD)	Non smokers(n=50) (mean ± SD)	P-value
1)	Neutrophil	57.11 ± 1.11	61.10 ± 5.80	P<0.05
2)	Lymphocyte	30.10 ± 3.75	24.20 ± 8.01	P<0.05
3)	Monocyte	2.10 ± 0.61	2.01 ± 1.01	NS
4)	Eosinophil	4.01 ± 0.61	4.41 ± 1.82	NS
5)	Basophil	0.10 ± 0.04	0.14 ± 0.05	P<0.05
	Quantity of cigarette per year.	09.10 ± 0.71		

n-Number.

NS-Non significant.

## DISCUSSION

There was no significant difference in the mean physical parameters like Age, height, weight, body mass index and body surface area on calculating the mean and the standard deviation in smokers and non smokers.

The differential leucocyte count were statistically analysed by finding out there averages, standard deviation and by applying 't' test to find out p value.

The p value <0.05 was taken as a statistically significant.

In our study we found that Neutrophil count decrease from about 61% in non smokers to about 57% in smokers.

Lymphocyte count increased from about 24% in non smokers to 30% in smokers, also there is significant changes in Basophil it significantly decreased in smokers than in non smokers.

There is no significant changes in other leucocytes and these observations was similar to the observation of Taylor and Gross E et al (13).

Stress factor like smoke may have significant role in elevating lymphocyte percentage as evidenced by the experiment of Venulet and Majcherrk, who studied the effect of chronic tobacco smoke exposure on the functional state of adrenal cortex, subcutaneous injection of

ACTH to female white mice exposed to tobacco smoke for about 10 days showed a slowing of lymphopenic reaction, with prolonged exposure lymphopenic reaction was absent and lymphocytosis appeared in most of mice. Friedman et al have shown that leucocytosis is a risk factor in coronary artery diseases(14).

In our study Basophil count is decreased while lymphocyte count increased it may be caused by the effect of toxic product on bone marrow and the formation of defence adaptive, allergic and immunological reactions of the body in condition of prolonged tobacco antigenemia(15).

Some workers found that there was immediate neutrophillia with relative lymphopenia and later lymphocytosis with relative neutropenia (7), as in table no 2 in our study there is lymphocytosis with relative neutropenia while difference in eosinophil and monocyte is not significant in DLC.

It is also observed that cigarette smoking is associated with decrease number of circulating natural killer cell thus this association is with increased number of circulating lymphocytes. The mechanism responsible for the non specific leucocytosis observed among smokers are obscure (16,10,17,18,19,20)

In our study it is also observed that neutrophil count is significantly decreased in smokers, these findings are correlated with the latter half of Von krenziger et al.

In our study also percentage of basophil is significantly changed, however it is reported an increased in percentage in smokers. the other workers showed immediate effect of smoking on blood basophil which was significantly decreased count. The decreased is most probably due to degranulation of these cells, Thus the cigarette smoking has significant effect on blood basophil.

Increased leucocyte count may directly reflect the greater sympathetic tone or may directly increased the peripheral vascular resistance by impeding circulation through small blood vessels (21).

It also raise the incidence of certain cancer and can hasten death attributed to cancer (22,23)

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