

The Relationship between the Cigarette Smoking Intensity and Hematological Parameters among University Students

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Abstract

Objective: According to World Health Organization (WHO) nearly 5 million people worldwide died every year due to diseases caused by cigarette smoking. If the trends continue, there will be 8 million deaths in 2030. Around 80% of the world's 1.1 billion smokers live in low- and middle-income countries. To find solutions on this critical situation along with the raising people awareness about the dangerous of cigarette smoking, the damages related to smoking (i.e., hematological parameters) need to be assessed more to obtain better knowledge, treatment, and better health policy on smoking related problems. Cigarette smoking based on previous studies has acute and chronic effects on various hematological parameters with some inconsistent results. Many studies show cigarette smoking increases blood leucocyte levels but its effect on other hematological parameters is largely unexplored and inconsistent.

This study aims to determine the relationships between the degrees of smoking and some hematological parameters.

Method: This study was a cross-sectional design study on 51 healthy male students of Liaquat University of Medical Health Sciences, aged 18 – 24 years old.

Result: The subjects are active smokers of at least 2 cigarettes daily in duration of minimally 2 years. Blood samples were obtained from the subjects and measured for various hematology parameters.

Conclusion: There is a strong significant association between the intensity of cigarette smoking with total leucocyte levels ($p < 0.000$), neutrophil, basophil, and lymphocyte count ($p < 0.05$).

Keywords: Cigarette smoking, hematological parameters.

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INTRODUCTION

Tobacco cigarette contains about 7000 chemical compounds and 250 of them are very dangerous to the smokers and to non-smokers (passive smokers). There are 69 from 250 chemical contents in Cigarettes are carcinogenic. ⁽¹⁻²⁾ several studies show some evidence that smoking tobacco cigarettes is responsible in alteration of the lipid profile and some hematological parameters and moreover smoking causes diseases in every organ of the body such as coronary heart disease, chronic obstructive pulmonary disease, rheumatoid arthritis, and cancer. ⁽³⁻⁴⁾ According to World Health Organization (WHO) nearly 5 million people worldwide died every year due to diseases caused by cigarette smoking. If the trends continue, there will be 8 million deaths in 2030. Around 80% of the world's 1.1 billion smokers live in low- and middle-income countries. ⁽⁵⁻⁷⁾ WHO (2013) classified smokers into three categories which are light smokers ⁽¹⁻¹⁰⁾ cigarettes daily, moderate smokers ⁽¹¹⁻¹⁹⁾ cigarettes daily and heavy smokers (20 or more cigarettes daily). Data from Basic Health Research shows nearly one third of people aged ≥ 10 years old are active smokers with average 10 cigarettes of daily smoking. ⁽⁸⁾ In order to find solutions on this critical situation along with the raising people awareness about the dangerous of cigarette smoking, the damages related to smoking (i.e., hematological parameters) need to be assessed more to obtain better knowledge, treatment and better health policy on

smoking related problems. ⁽⁹⁻¹²⁾ Cigarette smoking based on previous studies has acute and chronic effects on various hematological parameters with some inconsistent results. Many studies show cigarette Smoking increases blood leucocyte levels but its effect on other hematological parameters is largely unexplored and inconsistent. ⁽¹³⁻¹⁶⁾ the objective of this study is to determine the relationships between the degrees of smoking and some hematological parameters.

MATERIALS AND METHODS

The study was conducted for 10 months, from February to December 2021. The research ⁴⁶⁴³ locations were in Liaquat University of Medical and Health Sciences, Jamshoro. The target population of this study was late teenagers aged 18 - 24 years old. The subjects were affordable populations that met the inclusion criteria as follows: university students aged between 18 -24 years old smoke at least 2 cigarettes per day for a minimum 2 years of smoking.

After taking ethical approval from review committee, the procedure of questionnaire was explained to all participants, and willing students were asked to enroll in interviews after giving informed consent. Physical examination was also performed including body weight, height, blood pressure etc. The blood samples were analyzed by standard clinical laboratory standard operation procedures using manuals. Hematological parameters were measured including total leucocyte count, differential leucocyte count containing all white blood cells, hemoglobin, platelet count, and hematocrit and erythrocyte sedimentation rate. The data was analyzed using SPSS version 24.0.

RESULTS

Table 1 show that the age of subjects ranges from 17-23 years old with the range of smoking duration of 2 to 8 years and the 6 – 16 cigarettes a day. As shown in table

2, the subjects are in the category of light smokers and moderate smokers, there are no heavy Smokers among them. Erythrocyte sedimentation rate -0,198 0,163 - 0,081 0,572

Table-1: General Characteristics (n=51)

Variable	Descriptive Analysis			
	n	Minimum	Maximum	Average
Age(year)	51	17	23	20.24
Duration of smoking (year)	51	2	8	4.65
Amount of cigarette daily	51	6	16	9.76

Table-2: Subject distribution based on smoker categories (WHO2013) (n=51)

Smoker type	n	%
Light smokers (1-10 cigarettes per day)	29	56.9
Moderate smokers (11-20 cigarettes per day)	22	43.1
Heavy smokers (>20cigarettes per day)Total	0	0
	51	100.0

Table 3: The correlation of smoking duration and daily number of cigarettes smoking with total leucocyte count, differential leucocyte count ,hemoglobin concentration, erythrocyte count, hematocrit, platelet count and erythrocytesedimentationrate (n=51)

Variable	Smoking duration		Number of cigarettes/days	
	Correlation coefficient (R)	ρ	Correlation coefficient (R)	ρ
Categories of smoking status (WHO2013)	0,119	0,406	0,875**	0,000
Hemoglobin(Hb)	0,148	0,300	0,158	0,269
Erythrocyte	0,168	0,239	0,105	0,462
Hematocrit (HCT)	0,144	0,313	0,118	0,410
Red blood Distribution Width(RDW)	0,039	0,785	-0,025	0,863
Leucocyte	0,078	0,588	0,793**	0,000
Eosinophil	0,105	0,463	-0,042	0,771
Neutrophil	-0,189	0,183	0,305*	0,029
Basophil	0,028	0,848	-0,290*	0,039
Lymphocyte	0,164	0,250	-0,286*	0,042
Monocyte	0,274	0,052	-0,170	0,232
Platelet	0,013	0,927	0,185	0,194
Erythrocytesedimentationrate	-0,198	0,163	-0,081	0,572

Discussion

This study (table 3) indicates there is a strong positive correlation between the number of cigarettes per day and total leucocyte count and neutrophil count. This means the increasing of daily number of cigarettes will increase leucocyte and neutrophil levels. The negative correlation between the daily number of cigarettes and basophil and lymphocyte counts means the more cigarettes smoked per day the lower the basophil and lymphocyte levels. This study did not find significant association between the intensity of smoking (number of cigarettes per day) and the other hematological parameters. The results of this study are consistent with other published studies in this case the positive correlation between smoking intensity and total leucocyte count.⁽¹⁷⁻²¹⁾ Total leucocyte count is perhaps the most simple, useful, and inexpensive biomarker to detect endothelial damage. The high count of leucocyte can promote cardiovascular diseases through multiple mechanisms that mediate inflammation, plug the microvasculature, induce hypercoagulability, and promote infarct expansion.^(4,22) The exact mechanism responsible for smoking association to elevated

leucocytes count is unclear. It is suggested that nicotine may produce smoking induced leukocytosis by circulating catecholamine, as an increase in certain endogenous hormones such as epinephrine and cortisol have been reported. Both hormones are known to increase total leucocytes count.⁽²³⁾ Another possible mechanism is an acute or chronic inflammatory response induced by particulates of cigarettes smoke.^(4, 22-23) The present study indicates the negative correlation between smoking intensity with basophils and lymphocytes. Previous studies reported inconsistent results on the relation of smoking and differential leucocyte count. Some studies reveal only the increase of neutrophils, some report only elevation in lymphocyte count while others indicate an elevation of the granulocytes count or several other combinations of differential leucocyte count.^(13-21, 24) A further study to clarify these inconsistent relationships may help to explain the underlying mechanism. Some substances released by leucocytes could be pathogenic in cardiovascular and pulmonary diseases and also cancer. A decrease in leucocyte count has been associated to decreasing risk of cardiovascular disease related deaths

while the increase of total leucocytes has been related to the increase in chronic cough and chronic bronchitis.⁽²³⁾ Therefore, in the present study increased total leucocytes among smokers might predict the possible risk of developing fatal diseases related to smoking.

CONCLUSION

There is a significant association between the intensity of cigarette smoking and total leucocyte levels (p<0.000), neutrophil, basophil, and lymphocytes count (p<0.05).

Conflict of interest: None.

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