EXPLORING THE INFLUENCE OF TOBACCO USE ON COMPREHENSIVE BLOOD COUNT PROFILES AMONG STUDENTS AT IQRA NATIONAL UNIVERSITY

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ABSTRACT

Background: The use of tobacco in any form by human being has proved to be a health hazard and its harmful effects on human health cannot be ignored. Tobacco uses have the adverse effect on CBC parameters. Tobacco smoke contains more than 4000 detectable substances, such as poly-cyclic aromatic hydrocarbons, nicotine, carbon monoxideand heavy metals, which are considered powerful enzymatic inducers.

Objective: The major aim of this study is to determine the association between tobacco use and CBC parameters among the students of Iqra National University Peshawar and the frequency between cigarette, E-cigarette and snuff use on CBC parameters. The ultimate goal of this study is to provide a better understanding of the impact oftobacco use on the human body and to encourage smoking cessation for overall healthbenefits.

Methods: It was a descriptive cross-sectional study consisting of 130 samples of tobacco user from the students of Iqra national university Peshawar. It was approved by ethical review committee of institute. Closed ended questionnaire was used to collect data. The blood was collected in EDTA tubes using from the students and analyze by hematology analyzer in the laboratory at Iqra national university Peshawar. Then the data was analyzed by SPSS 22 and MS EXCEL.

Result: A total of 130 samples were collected from the students. In which 14 samples using cigarettes showed low WBC count, 36 samples using cigarette 5 samples using E- cigarette and 3 samples using snuff showed high RBC count, 38 samples usingcigarettes showed high HGB count, 6 samples using cigarettes show high HCT count, 5 samples using cigarettes showed high MCV count and 5 samples using cigarettes showed low MCV count 16 samples using cigarettes, 2 samples using E-cigarettes and 1 sample using snuff showed low MCH count, 21 samples using cigarettes, 4 samples using E-cigarettes and 1 sample using snuff showed low MCHC count, 31 samples using cigarettes showed low PLT count.

Conclusion: Red blood cells, haemoglobin, heamatocrit and Mean Corpuscular Volume increased, while Mean Corpuscular Haemoglobin, Mean Corpuscular Haemoglobin Concentration and platelets count decreased in cigarette smokers. Although the use of E-cigarette and snuff have no significant effect on CBC parameters except Red blood cells.

Introduction:

Tobacco smoke contains more than 4000 detectable substances, such as polycyclic aromatic hydrocarbons, nicotine, carbon monoxide and heavy metals, which are considered powerful enzymatic inducers that have notable influence on the efficacy and tolerability of many medications through complex pharmacokinetic and pharmacodynamic interactions (1). Nicotiana tabacum is basically native of America but it is now commercially cultivated throughout the world (2).

Cigarette smoking contributes to the development or progression of numerous chronicand age-related disease processes. One major risk factor for morbidity and mortality among smokers is cardiovascular disease and lung cancer. Hematological abnormalities have been associated with coronary heart disease and other oxidative damage at the tissue levels increasing in age is significantly associated with higher hemoglobin concentrations (3).

Tobacco cigarette smoking is one of the major leading causes of death and essential public health challenge in world over. There are more than 4000 chemicals found in cigarette smoke, and the smoker is exposed to a number ofharmful substances including nicotine, free radicals, carbon monoxide and other gaseous substance (4).

Complete blood count (CBC) is a cheap and easily available laboratory test. One of the measures included in a CBC is mean platelet volume (MPV) and measurements obtained from aCBC can be used to calculate the neutrophil-lymphocyte ratio (NLR) and the platelet- lymphocyte ratio (PLR). NLR is accepted as a systemic inflammatory marker and apart from being used for the diagnosis and determination of severity for manydisease processes (cardiovascular disease, pulmonary, infections, endocrinologicaldisorders and some cancers), its correlation with prognosis, morbidity and mortality has also been reported (5).

Hematology analyzers (HA) or automated blood cell counters are analytically and technically highly complex automated analyzers (6). These instruments performed measurements using either the light scattered and absorbed by blood cells, or changes in the electrical current induced by blood cells flowing through a small, electrically charged opening (7).

Smokers had higher levels of hematocrit and Hb, and their RBC count increased significantly as their smoking rate increased. Comparison of non-smokers and smokers' patients Hb, RBC and Pcv are more than non-smokers to smokers' patients is statistically significant (8).

The hematocrit and Hb level were significantly higher in smokers and among the smokers the RBC count was significantly increased as the intensity of smokingincreases (9).

The tobacco cigarette smokers had significantly higher hemoglobin, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration, total white blood cell count, mixed cells, Erythrocyte sedimentation rate, relative plasma viscosity, mean platelet volume and platelet distribution width and significantly lowerneutrophil count as compared to controls (10).

Study revealed a significant increase in total WBC counts in smokers. Lymphocytes count, were insignificantly decreased in smokers than that of non-smokers whileNeutrophils count and mixed white blood cells were insignificantly increasing in smokers than non-smokers (11).

The ultimate goal of this study was to provide a better understanding of theimpact of tobacco use on the human body and to encourage smoking cessation foroverall health benefits therefore our objective of the study is to determine the association between tobacco use and CBC parameters amongthe students of Iqra National University Peshawar.

Material and Method:

In the process of collecting 130 samples from students at Iqra National University in Peshawar, Pakistan, great care was taken to ensure precision and reliability in conducting the Complete Blood Count (CBC) test.

To begin, students were informed of the procedure, and their consent was secured. Ensuring their comfort was a priority, including providing proper seating. A tourniquet was expertly tied around the

upper arm to improve vein visibility, and a suitable vein was thoughtfully chosen for blood collection. Wearing gloves, the selected site underwent thorough cleaning with an alcohol swab, allowing it to dry completely. With skillful precision, a needle was inserted into the chosen vein, and the required blood amount was collected into an EDTA collection tube. Gentle inversion of the tubes facilitated proper mixing with the anticoagulant. Each tube was meticulously labeled with the patient's identification details and systematically organized in a rack for safe transport to the laboratory. In the laboratory, the blood samples underwent processing through a hematology analyzer, ensuring a precise and efficient analysis.

Following the analysis, the results were interpreted, and the acquired data underwent further analyzed using SPSS 22 and MS EXCEL software. The CBC test, applied to all collected samples, emerged as a crucial blood test, providing in-depth insights into various blood components.

This test utilized an automated hematology analyzer, ensuring accurate and efficient measurement of diverse parameters. The CBC test results were methodically compared to establish reference ranges to identify any deviations or abnormalities from the normal range, thereby offering crucial information about the overall health and functioning of the blood.

Results:

A total of 130 samples were collected from the students. All the samples were analyzed by hematology analyzer. In 80 samples the CBC parameters were affected by tobacco use. In which 14 samples using cigarettes showed low WBC count and the rest were normal,

Table no 1: Effect of Tobacco use on WBC

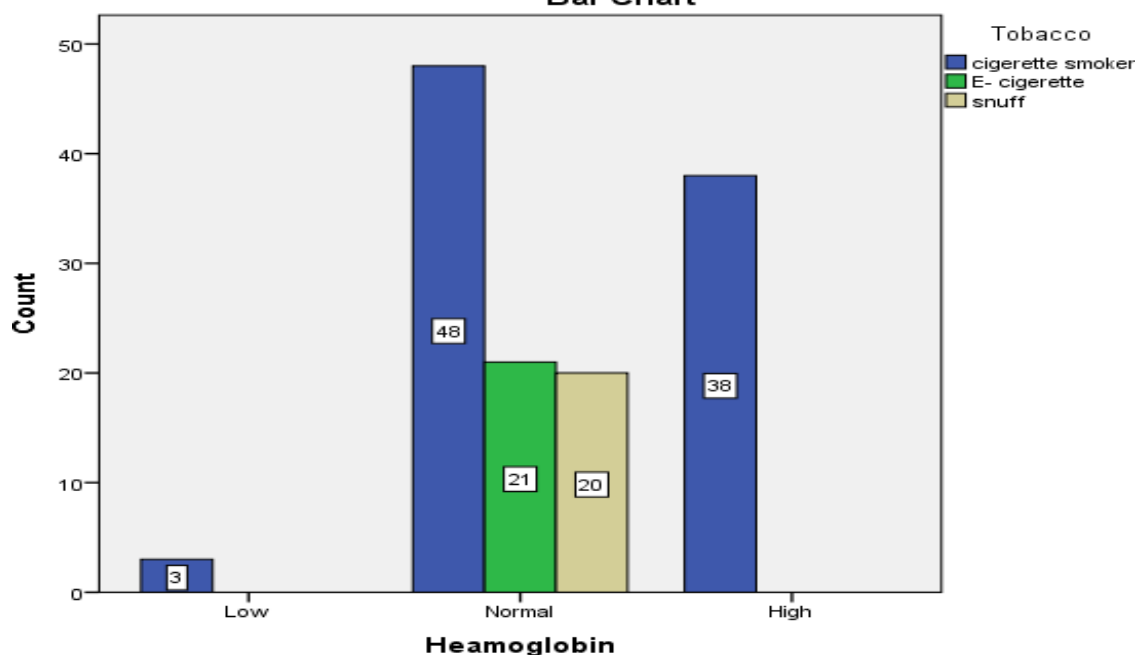|		Tobacco			
		cigarette smoker	E- cigarette	snuff	Total
White Blood Cells	Low	14	0	0	14
	Normal	75	21	20	116
Total		89	21	20	130

36 samples using cigarette, 5 samples using E-cigarette and 3 samples using snuff showed high RBC count.

Table No 2: Effect of Tobacco use on RBC

		Tobacco			
		cigarette smoker	E- cigarette	snuff	Total
Red Blood Cells	Low	3	0	0	3
	Normal	50	16	17	83
	High	36	5	3	44
Total		89	21	20	130

38 samples using cigarettes showed high HGB count and the rest were normal,

Fig no 1: effect of tobacco uses on HGB

6 samples using cigarettes show high HCT count and the rest were normal,

Table no 3: effect of tobacco uses on HCT

| | | Tobacco | | | |
		cigarette smoker	E- cigarette	snuff	Total
hematocrit	Low	3	0	0	3
	Normal	80	21	20	121
	High	6	0	0	6
Total		89	21	20	130

5 samples using cigarettes showed high MCV count and 5 samples using cigarettesshowed low MCV count and the rest were normal.

Table no 4: effect of tobacco uses on MCV

| | | Tobacco | | | |
		cigarette smoker	E- cigarette	snuff	Total
Mean Corpuscular Volume	Low	5	0	0	5
	Normal	79	21	20	120
	High	5	0	0	5
Total		89	21	20	130

16 samples using cigarettes, 2 samples using E-cigarettes and 1 sample using snuff showed low MCH count.
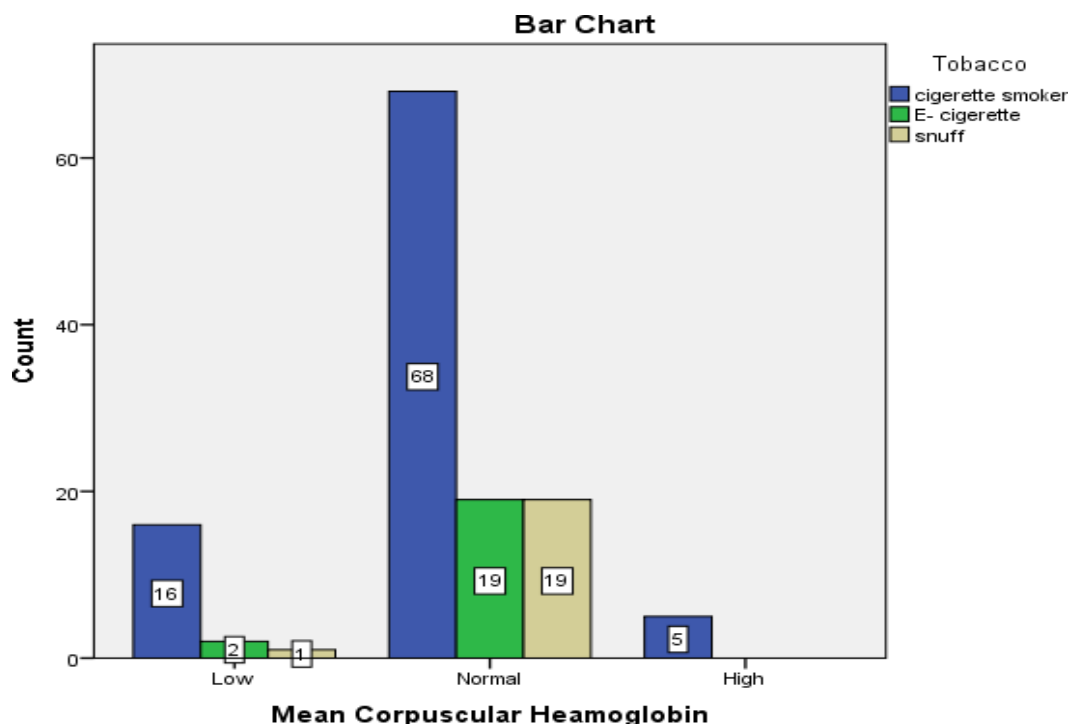
Fig no 2: effect of tobacco uses on MCH

21 samples using cigarettes, 4 samples using E-cigarettes and 1 sample using snuffshowed low MCHC count

Table no. 6: Effect of tobacco uses on MCHC

		Tobacco			
		cigarette smoker	E-cigarette	snuff	Total
Mean Corpuscular Hemoglobin Concentration	Low	21	4	1	26
	Normal	58	17	19	94
	High	10	0	0	10
Total		89	21	20	130

31 samples using cigarettes showed low platelets count while rest are normal

Table no 7: Effect of tobacco uses on PLT

		Tobacco			
		cigarette smoker	E- cigarette	snuff	Total
Platelets	Low	31	0	0	31
	Normal	58	21	20	99
Total		89	21	20	130

Discussion:

The use of tobacco in any form by human being has proved to be a health hazard and its harmful effects on human health cannot be ignored (3).

In the results of our study tobacco use have adverse effect on CBC such as increased in RBC count, HGB count, which is approximately similar with the results of the study conducted by bhadarge G in Vidharbha Region, India. Which also shows increase in RBC and HGB count (12).

In our results we found that due to the effect of tobacco use RBC count, HGB count and HCT count were significantly increased as compared to the results of the study conducted by Lakshmanan A in Tamilnadu, India which also shows increased in RBC, HGB and HCT counts (13).

In the current study our results show that due to effect of tobacco use there isincrease in RBC, HGB and HCT count. However, platelets count was significantly lower in cigarette smokers, which is similar to the results of the study conducted by MM Nadia in Sudan (14).

The results of our study show that the E-cigarettes and snuff use have no significant effect on CBC parameters except RBC and HGB count. while cigarette smoking shows significant effect on CBC parameters, which is approximately similar to the results of the study conducted by Andreas D. Flouris at Thessaly (15).

The results of our study show that due to tobacco use there is increase in RBC, HGB and HCT count. While MCHC and PLT count shows significant decrease. Another study conducted by M. Asif in turkey confirmed it (16, 17).

Our study shows that a large proportion of male students smoked cigarettes while we don't find female student who smoked because Cigarette use was negligible among females which is confirmed by the results of the study conducted in Pakistan by SI Gilani (2).

Conclusion:

Red blood cells, hemoglobin, hematocrit and Mean Corpuscular Volume increased, while Mean Corpuscular Hemoglobin, Mean Corpuscular Hemoglobin Concentration and platelets count decreased in cigarette smokers. Although the use of E-cigarette and snuff have no significant effect on CBC parameters except Red blood cells.

Conflict of interest:

There is no conflict of interest
There is no funding.

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