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Long term effects of smoking and alcohol consumption on hematological parameters of Indian men: A cross sectional study

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***Abstract*---** Current study was carried out to cross check the hematological parameters among smokers and alcoholic population from Panipat (Haryana). The hematological examination is playing very important role in assessment during the medical examinations. In the present study reveals that the hematological parameters much important to cross check these parameters in the both the population for public awareness. To make sure if there is any changes in the parameters and if any kind of enhancement in the parameters due to the over consumptions of alcohols and smokers. Material and Methods: The blood samples of the examined population was taken in the EDTA vials by following the standard procedures as mentioned in the guidelines. Total 120 samples have been taken from each group. Samples collected in the EDTA vials for the assessment. The study has been carried out on three different population, Smokers, Alcoholic & Smokers, Controls (Non-alcoholic and Non-Smokers). Results: The present study aims to evaluate the effects of alcohol and smoking on the hematological parameters of a population in the rural area of Panipat (Haryana). Participants with habit of consuming alcohol and smoke who are fulfilling inclusion and exclusion criteria will be considered for their hematological parameters. We observed slight increase in neutrophils and decrease in lymphocytes and PCV (Packed cell volume) among smokers when compared against controls, whereas monocytes, eosinophils, MCV (Mean corpuscular volume) and MCH (mean corpuscular hemoglobin) were found to be raised among those participants who consume both smoke and alcohol. Conclusion: We conclude that smoking alone can affect various haematological parameters but the combined effect of alcohol and smoke is more deleterious.

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***Keywords*---** smoking, alcohol, hematological parameters, level of significance.

Introduction

Tobacco and alcohol are two of the biggest threats to world health comes from its negative effects (1). Smoking had adverse effects on hematological parameters and also responsible for various pathological conditions and diseases including, chronic obstructive pulmonary disease, cancer, pancreatitis, gastro-intestinal disorders, periodontal disease, metabolic syndrome and autoimmune diseases. Risk of cardiovascular diseases is high in Cigarette smoker which include coronary artery disease, peripheral vascular disease, heart disease, atherosclerosis, myocardial infarction and stroke (2). Around 1.3 billion people smoke on regular bases and young people start to smoke every day between 8,200-9,900, therefore rapid addition to Tabaco (3). According to the data of the world health Organization (WHO), Smoking has both acute and habitual effect on haematological parameters, approximately 5 million people die globally each year from the diseases caused by smoking, it is expected that by 2015, that number would be 10 million. (2) Although this generalized reduction in blood cell numbers (i.e., pancytopenia) usually is not progressive or fatal and is reversible with abstinence, complex aberrations of hematopoiesis can develop over time that may cause death (4).

It has been signified the smoking effects hematopoietic system, various metabolic and biological activities and hormone secretion. Increase in hematological parameters as hemoglobin (Hb) concentration, red blood cell (RBC), neutrophil, eosinophil, monocyte, and platelet counts, are the acute effects of smoking, it is also ,mention in many studies (5). The cause of mediation of increase in hemoglobin is the exposure of carbon-monoxide by smoking. Carboxyhemoglobin is an inactive form of hemoglobin with no oxygen carrying capacity which is formed by binding of carbon-monoxide to Hb and reduced the ability to deliver oxygen to the tissues because of the shifting of Hb dissociation curve in the left side. smokers maintain a higher hemoglobin level to normalized the decreased oxygen carrying capacity (6).

Ischemic heart disease is commonly caused by heavy smoking and death within the age group of 30-40 years. High risk of occlusive vascular disease in chronic smoker is due to the change in hematological parameters (7). In USA the major health concern is smoking out of 10 health indicators (3). The aim of this study was to detect and treat haematological abnormalities in alcoholics and smokers early on, preventing complications and lowering mortality. Only a few studies have been done in India to compare the haematological manifestations of alcoholics and non-alcoholics, so this study was undertaken to assess and compare the blood parameters between these two groups, which would aid in preventing serious complications caused by alcoholics and smokers if detected earlier. The goal of the study was to evaluate the haematological manifestations of alcoholics, smokers and control.

Materials and Methods

Sample collection

Blood sample was collected by a clean venipuncture, 2 ml of blood was collected into a syringe with all aseptic precautions and immediately transferred to an EDTA (Ethylenediaminetetraacetic acid) vials.

Methods

This is a cross-sectional study, to investigate the effect of smoking and alcohol on hematological parameters. A total of 120 sample were collected in the study, 40 smokers, 40 smokers as well as alcoholic and 40 controls. The subjects were recruited from the rural area of Panipat, Haryana. With the help of questionnaire, the data of the subjects was filled and an informed consent was taken from each subject. The subjects underwent the following estimation: Hemoglobin, hematocrit, white blood cell, and platelet counts, mean erythrocyte, and platelet volumes were measured in Celltac Alpha MEK-6500K fully automatic hematological analyzer.

Statistical analysis

Data was collected and then entered into MS Excel and then analysed using the statistical software SPSS (SPSS Inc., Chicago USA Version 23). The Student t-test was used for parametric numerical data and ANOVA test was used for non-parametric categorical data.

Results

Statistically significant hematological parameters were compared in group 1 (i.e., between smokers and controls) and group 2 (i.e., between both smokers & alcoholics against controls) using mean, standard deviation (SD) and T-test. The data in table1 depicts that there is significant increase in neutrophils (71.6±9.40) and decrease in lymphocytes (23.82±8.87) and PCV (37.30±3.90) between the group 1 population.

Table 1

Hematological parameters	Smokers and alcoholics (Mean±SD)	Control group (Mean±SD)	p value
Hemoglobin (g/dL)	13.98±1.80	14.04±0.98	0.87
TLC (/cu.mm)	7735±2024.9	8690±4660.5	0.23
Neutrophils (%)	64.15±13.09	65.5±8.028	0.58
Lymphocytes (%)	29.42±11.52	29.57±6.61	0.94
Monocytes (%)	4.07±2.15	3.02±1.44	0.01*
Eosinophils (%)	2.35±0.86	1.9±0.74	0.01*
PCV (%)	40.04±5.39	40.67±3.69	0.53
MCV (fl)	94.05±9.83	87.17±4.11	<0.001*
MCH (Pg)	32.98±4.32	30.49±2.12	0.001*
MCHC (g/dL)	34.99±2.10	34.52±2.21	0.33
RBC (million/c.mm)	4.28±0.64	4.67±0.50	0.003*

Whereas, in group 2, value of monocytes (4.07±2.15), Eosinophils (2.35±0.86), MCV (94.05±9.83) and MCH (32.98±4.32) were seen elevated in participants who abuse both alcohol and smoke. In comparison with the control population, mean RBC count was significantly low in both group 1(4.1±0.560) and group 2 (4.28±0.64). Furthermore, hemoglobin, TLC, MCHC levels does not have any significant differences (p>0.05) in this study.

Table 2

Hematological parameters	Smokers (Mean±SD)	Control group (Mean± SD)	p value
Hemoglobin (g/dL)	13.1 ±1.41	14.04±0.98	0.06
TLC (/cu.mm)	7655 ±2723.4	8690±4660.5	0.22
Neutrophils (%)	71.6±9.40	65.5±8.028	0.002*
Lymphocytes (%)	23.82±8.87	29.57±6.61	0.001*
Monocytes (%)	2.5±1.43	3.02±1.44	0.09
Eosinophils (%)	2.05±0.72	1.9±0.74	0.37
PCV (%)	37.3±3.90	40.67±3.69	0.01*
MCV (fl)	91.7±11.03	87.17±4.11	0.06
MCH (Pg)	31.9±4.00	30.49±2.12	0.12
MCHC (g/dL)	34.8±1.95	34.52±2.21	0.53
RBC (million/c.mm)	4.1±0.56	4.67±0.50	<0.001*

Discussion

The results of this study show slight expansion in neutrophils and lessening in lymphocytes and PCV (Packed cell volume) among smokers when compared against non-smokers under the controlled parameters. The monocytes, eosinophils, MCV (Mean corpuscular volume) and MCH (mean corpuscular haemoglobin) shows rose among those members who do both smoke and drinking. Throughout the globe the trend of smoking is high, in spite of the fact that smoking is harmful for health. Study was done to compare the hematological parameters in different population. Age, gender, and lifestyle are demographic factors that affect Hematological parameters. Decreasing value of RBC, Hb, PCV and lymphocytes with aging is observed in men (8). However is another study on Canadians except MCHC, most RBC indices levels tended to increase with age in males (9).

The study done by Khan M. et.al (3)· found significant increase of MCH count among Hematology profile of smoker when compared to non-smoker. The similar finding was also observed by Malenica M et.al. (2) In a study by Pedersen KM et al (10) they showed increased leukocytes, neutrophils, lymphocytes, monocytes, PCV, Hb and RBC indices due to smoking. We observed that the MCV and MCH value (p<0.001) was significantly higher in group 2 (smokers and alcoholic) in present study. Iqbal Z et al (11), Hanumanthaiah RG et al. (12), Elanchezhian et al (13) and Thinnahanumaih M (14) study show significantly higher values in MCV (p<0.05) among alcoholics compared to non-alcoholics. Oduola T et al study

show that MCV is significantly higher in heavy drinker compared to moderate and occasional drinkers (15). In study by N. Patel et al (16), found significantly high level of MCV ($p< 0.05$) in moderate consuming alcohol patients.

Conclusion

Our study concluded that continuous smoking in any form i.e., bidi, cigarette or hookah and alcohol consumption have adverse effect on haematological parameters. Smoking alone can affect various haematological parameters but the combined effect of alcohol and smoke is more deleterious. Fall in levels of Packed Cell Volume (PCV), Lymphocyte count was highlighted in results of this study. Whereas in other cases increase in Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin (MCH) was evident. This study has been limited with low sample size and localized sample.

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