EFFECT OF CIGARETTE SMOKING ON HAEMOGLOBIN AND RBC COUNT AND RDW (RED CELL DISTRIBUTION WIDTH)

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Abstracts: **Background & objectives**: Smoking has been found to harm nearly every bodily organ and organ system in the body and diminishes a person's overall health Smoking is one of the most preventable causes of death in our society. Smoking affect the blood characteristics as well that leads to death .Therefore, in the present study we intended to determine the effect of Cigarette smoking on Haemoglobin and RBC count and RDW. **Methods:** A cross-sectional study was conducted on 100 healthy male subjects age between 20 to 50 year, out of 50 were non-smoker and 50 were smokers. The subjects who suffered any diseases were excluded. HB concentration, RBC count and RDW were compared between two groups. **Results:** Study shows that Hb concentration, RBC count and RDW were insignificantly higher in smokers than non-smoker. **Conclusion:** Smoking affect the blood characteristics as well that leads to death. Our study showed that smoking had adverse effect on blood parameter and that is injurious to health.

Key Words: Hb, RBC count, RDW (Red cell distribution width), Smoking.

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Introduction:

Smoking in India has been known since at least 2000 BC when cannabis was smoked and is first mentioned in the *Atharvaveda*, which dates back a few hundred years BC. According to the World Health Organization (WHO), India is home to 12% of the world's smokers.[1] According to the study, "A Nationally Representative Case-Control Study of Smoking and Death in India", tobacco was responsible for 1 in 5 of all male deaths and 1 in 20 of all female deaths in the country by 2010. This means approximately 1 million Indians were died annually from smoking by 2010. [2]

Smoking has been found to harm nearly every bodily organ and organ system in the body and diminishes a person's overall health. Smoking is a major risk factor for heart attacks, strokes, chronic obstructive pulmonary disease (COPD), emphysema, and cancer (particularly lung cancer, cancers of the larynx and mouth, esophageal cancer and pancreatic cancer..In addition to cigarettes and cigars, other forms of tobacco include smokeless tobacco (also called chewing tobacco, snuff, and snus), pipes, hookahs (waterpipes), bidis, and kreteks.

Cigarettes, cigars, and other tobacco products vary widely in their content of nicotine, cancer-causing substances, and other toxicants. In a cigarette (which contains 0.49 to 0.89gram of tobacco), the nicotine content can vary between 13.79 and 22.68 milligrams per gram of dry tobacco.[3,4] Smoking affect the blood characteristics as well that leads to death. Some earlier studies relationship between smoking and red blood cell was found in smokers. [5] Some scientists suggested that increase in haemoglobin level in blood of smokers could be a compensatory mechanism. However, some were of view that smoking does not increase in haemoglobin level in all smokers and this relates to tolerance potential of individual to different kind of diseases. Moreover, episodic duration of smoking and age of individual might have changed the adverse effects of smoking on blood characteristics of human being.

Red blood cell distribution width (RDW) is a measurement of the variability in size of circulating erythrocytes.RDW is generally used for the differential diagnosis of anemia.[6] Higher RDW was found to be a strong and independent predictor of increased risk of mortality and adverse

cardiovascular outcomes The present study was carried out a comparative analysis of blood haematology parameter of male smokers and non-smokers..

Material and Methods:

After clearance from the institutional human ethics committee, 100 healthy male ages between 20 to 50 year with informed written consent were selected for study. Both smokers and controls (non-smokers) were hospital employees and people from surrounding areas of GMERS medical college, Gotri, Baroda. Male normotensives, non diabetic's smokers with frequency of 5 or more cigarette per day with more than 2 year duration of smoking will be selected for study. Method:. Five millilitres of venous blood was withdrawn with minimum stasis into a clean disposable syringe 5 ml. The blood samples were stored in EDTA bulb. Hb concentration, RBC count and RDW were done using CBC Automatic Analyzer in pathology laboratory

Statistical Analysis: Unpaired t' test of Microsoft excel 2007 was used to comparison of two groups. P value less than 0.05 was considered as significant.

Result: 50healthy male non smokers and 50 male smokers were participated in this study, Hb concentration, RBC count and RDW were compared in both group. There were insignificant different in age, height and weight in smokers and non-smokers (Table-1). We observed insignificantly high Hb concentration, RBC count and RDW in smokers (13.85 ±1.39, 4.99 ±0.7615.79 ±4.27) , compared to non-smokers(13.35 ±1.2, 4.73 ±0.79 and 15.3 ±1.58).

Table1: Mean and SD values for age, height, weight in smokers and non-smokers

	Smokers	Non - smokers	P-value
Age	39.26±11.61	36.66±12.56	p value >0.05
Height	166.5±6.95	167.66±6.80	p value >0.05
Weight	57.29±6.70	59.82±9.43	p value >0.05

Table 2: Hb concentration, RBC count and RDW (Red cell distribution width) in Smokers and Non-smokers groups.

Parameter	Smokers	Non-Smokers	P-value
Hb concentration	13.85 ±1.39	13.35 ±1.2	p value >0.05
RBC count	4.99 ±0.76	4.73 ±0.79	p value >0.05
RDW	15.79 ±4.27	15.3 ±1.58	p value >0.05

(* Non sugnificant p value >0.05)

Discussion:

We observed insignificantly high Hb concentration, RBC count and RDW in smokers compared to non-smokers. Rashmi Gitte[7] observed that in smoker's haemoglobin concentration and RBC count increasing significantly. Increase in haemoglobin concentration of smokers supported by the findings of Tirlapur VG et al.[8] They evaluated 230 healthy subjects and compared them with 66 light smokers and 50 heavy smokers. They divided subjects into three groups: group1 (20-39 years), group2 (40-59 years) & group3 (60-75 years). The mean haemoglobin concentration for non-smokers is 13.80 g/dl and for light and heavy smokers is 14.60 g/dl for group. Tarzi IS et al[9] evaluated the effect of cigarette smoking on diagnostic reliability of HbA2. A total of 2,867 (654 smokers and 2,213 non-smokers) male subjects were involved in study. The result showed a significant increase in RBC count and haemoglobin concentration in smokers.

According to Galea G and Davidson RJ[10] smoking is a cause of disease and death to present generation. They had undertaken study to establish the hematological changes associated with cigarette smoking in 20 heavy smokers. Highly significant difference was observed in haemoglobin concentration of smokers and non-smokers. The

mean haemoglobin concentration for non-smokers was 13.9 g/dl and heavy smokers were 14.6 g/dl. Their study showed that cigarette smoking has several deleterious effects on properties of blood flow. Cigarette smoke contains carbon monoxide. The carbon monoxide forms COHb which interferes with oxygen transport and utilization. Chronic mild elevation of COHb is common cause of mild polycythaemia.[11]Cigarette smoke results in numerous pathologic effects including changes in the central and peripheral airways, capillaries and the immune system. Smoking reduces tissue oxygen delivery and stimulates erythropoiesis.[12]

Kurtoğlu E et al[13] observed that that the mean RDW values were higher in smokers than in non-smokers (13.9±1.2 vs.13.1±0.8, p<0.0001).Significant positive correlations between RDW and number of cigarettes smoked per day and between RDW and duration of smoking were identified (r=0.565 and r=0.305, respectively).Exposure to greater oxidative stress may be yet another potential contributing pathophysiologic mechanism linking higher RDW with smoking. A relationship between smoking and higher oxidative stress has been estab-lished.[14] It has been shown that oxidized RBCs lose their flexibility owing to a loss of lipid asymmetry and cytoskeleton rearrangement, causing them to be more rigid and thus develop anisocytosis.[15]Adrenergic activation caused by smoking may also affect bone mar-row response, thus resulting anisocytosis.[16]

Conclusion:

Our study shows that that Hb concentration, RBC count and RDW were insignificantly higher in smokers than non-smoker. Smoking has been found to harm nearly every bodily organ and organ system in the body and diminishes a person's overall health Smoking is one of the most preventable causes of death in our society.Smoking affects the blood characteristics as well that leads to death Early cessation of smoking is beneficial and prevents hazards of complication of smoking.

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