

**IMPACT OF NICOTINE ON HEMATOLOGICAL PARAMETERS AND ITS
COMPARATIVE STUDIES ON ACTIVE AND PASSIVE SMOKERS**Khan Uzma Aftab^{1*} and Maha Al Shammari²^{1,2}, Department of Clinical Laboratory Sciences, College of Applied Medical Sciences University of Ha'il. Ha'il, Kingdom of Saudi Arabia.***Correspondence for Author: Dr. Khan Uzma Aftab**

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ABSTRACT

The worldwide smoking is becoming alarming day to day with the fast intake of nicotine. This study aimed to assess and compare the impact of nicotine on the blood components on both smokers and non smokers. Data was obtained on 20 male members. Smoker (n=10) and non smokers (n=10) aged between 20 to 50 years. From the results it can be depicted that the 60% of the smokers have high concentration of WBC as compare to non smokers since WBC is the biomarker for endothelial damage and cardiovascular disease hence they are more prone to these damage and the associated problems. 80% of smokers have high value for RBC and hemoglobin and can be associated with a greater risk for developing atherosclerosis, in comparison to non smoker. Number of platelets was found higher by 50% among the smoker as compare to the non smoker. Increase concentration of nicotine is directly proportional to number of platelets, most likely causing thrombocytosis.

KEYWORDS: Cigarette smoking, hematological parameters, atherosclerosis, Nicotine thrombocytosis.**INTRODUCTION**

Tobacco cigarette smoking is one of the factor causing death and essential public health related challenge in world (Kume A, *et. al.*2009 & Islam MM *et.al.*, 2007). Smoking has both acute and chronic effect on hematological parameters. Cigarette smoker is exposed to a number of harmful chemicals and substances including nicotine, free radicals, carbon monoxide and other gaseous products (Gitte RN, 2011.) Nicotine is the addictive drug in tobacco smoke that makes the smokers addiction towards smoking. Nicotine is a potent parasympathomimetic alkaloid found in the nightshade family of plants (Solanaceae) and a stimulant drug.

It has been found that smoking elevate white blood cell (WBC) count resulting systemic inflammation (Yeung MC,1984 & Tell GS 1985) causing serious health events as myocardial infarction (Zalokar JB,1981,Lampe JW, 2001), and chronic obstructive pulmonary disease (Terashima T.1999) . Tobacco smoke promotes leukocyte transit from bone marrow to small pulmonary vessels and that the effect on alveolar walls favors the development of pulmonary emphysema (Adams DH, 1997) However, WBC count is also influenced by a range of acute and chronic infectious and inflammatory processes that are difficult to screen for in population studies (Arcavi L.2004, Casan P 2002).

Smoking decrease the anti oxidant level by increasing large number of free radicals. Large volumes of oxidants triggers the level of oxidative stress in smokers (Pryor WA 1993) which causes low-density lipoprotein (LDL) oxidation and atherosclerosis (Heinecke JW 1999, Ross R 1993).

Red blood cell (RBC) membrane lipids are rich in poly-unsaturated fatty acids; therefore, the oxidative effects of oxygen on RBC membranes are greater than on other tissues.

The invasion of the RBC membrane by peroxidants, which occurs with hemoglobinopathies, radioactive radiation, the consumption of oxidative drugs, increased levels of certain metals and the decreased function of antioxidant systems, can lead to RBC hemolysis (Fernandes A 1992).

METHODOLOGY

In the present study we enrolled total of 20 male member aged between 20–50 yrs, working in Maternity hospital, Hail, Saudi Arabia. We divide them equally into two groups. One group subjected as smoker and 10 subjected as non smoker according to the information received. Written parental consent was obtained from all study participants, Prior to the start of study. After being informed in detail of the study purpose and procedures, all subjects answered a questionnaire about their medical

history, and detailed smoking habits (both active and passive).the enrolled subjects did not had any serious health problems, no history of drug usage.

Laboratory test

Collection of Blood sample

Venous blood samples were drawn in K3 EDTA (15%) Becton Dickinson Vacuum tubes and mixed gently.

Complete Blood Count (CBC) was measured within 1-2 hours of blood sampling by using Nihon Codon fully automatic Hematological analyzer (Nihon Kohden, Japan). CBC count (WBC, RBC, Hb, PLT,) were measured in this study.

RESULTS AND DISCUSSION

Table 1. General characteristic of smokers and non smokers.

S. No	Frequency of smoking (per day)		Period of smoking (years)		Medical history for any disease		Smoking member in the family	
	Smokers	Non smokers	Smokers	Non smokers	Smokers	Non smokers	Smokers	Non smokers
1	30	0	11	0	NO	NO	YES	NO
2	3	0	7	0	NO	NO	YES	NO
3	20-30	0	16	0	NO	NO	YES	NO
4	20	0	1	0	NO	NO	NO	NO
5	4	0	3	0	NO	NO	NO	NO
6	6	0	4	0	NO	NO	NO	NO
7	10	0	5	0	NO	NO	NO	NO
8	20	0	6	0	NO	NO	YES	YES
9	15	0	1.25	0	NO	NO	NO	NO
10	5	0	5	0	NO	NO	NO	NO

Table 1. shows the general information collected based on the questionnaire about smoker and non smoker, whether they are active or passive smoker ,the frequency of active smoker, smoking per day and the Number of years they have been smoking and their medical history. Data in the table shows that 40% of the smokers have already existing smoking members in their families and they started smoking more than a decade, it is well known fact that children get influenced by what see at home When kids and teens see adults, especially their parents or other family members, smoke, they will be more likely to smoke because they will perceive smoking as normal behavior and something that is grown-up and mature,10% of smokers are active as well as passive smoker.

Comparative hematological parameters of smokers and Non smokers.

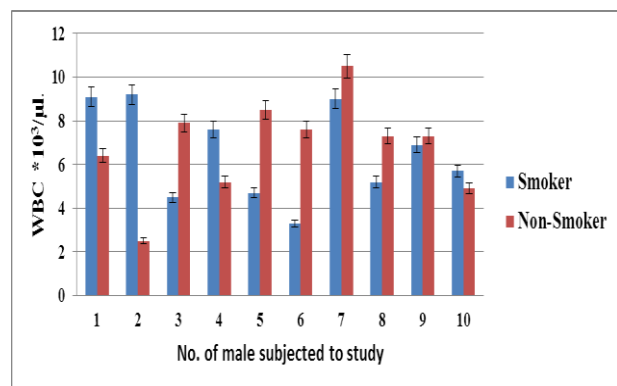


Fig 1: white blood cell count for smokers versus non-smokers.

Nicotine concentration is significantly related to WBC count, it can seen in fig 1 that the 60% of the smokers have high concentration of WBC as compare to Non smokers. This has been reported in other research findings also,(Freedman DS 1996 , Calapai G 2009).It is assumed that Nicotine increase the WBC level . Rise in WBC is the biomarker for the endothelial damage which

is used as the important step in diagnosing endothelial damage and cardiovascular disease. Rise in WBC causes another common disease that is bronchitis, it results in inflammation in the lungs and air passages, as a the inflammation in lungs and airway increase, body start producing more white blood cells to fight it off. If smoking is quit there is fall in WBC level than the normal range in about six to ten weeks. (Abel GA 2005).

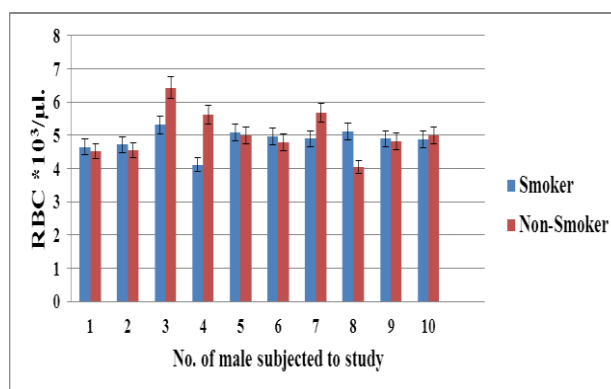


Fig 2: Red blood corpuscles count for smokers versus non-smokers.

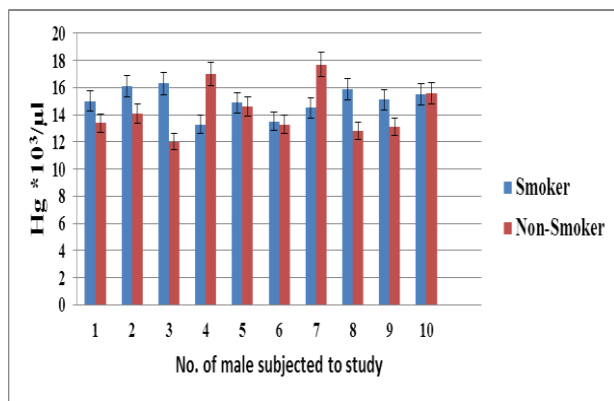


Fig 3: hemoglobin count for smokers versus non-smokers

Increase level of hemoglobin is directly proportional to RBC, it can be seen from the results (fig 2&3) 80% of smokers have high value for RBC and haemoglobin (Levenson AC 1987, Ho CH 2004), elevated level of RBC causes polycythemia high concentration of RBC, which makes the blood thick and hence slows the blood viscosity, giving rise to various other heart related diseases (Ravala M,2010).it is well documented that smokers are more prone to cardiac diseases as compare to Non smokers due to presence of higher level of fibrogen in smoker. (Wannamethee SG.,2005,Hunter KA,2001, Danesh J,2000). Carbon monoxide has great affinity for haemoglobin as compare to oxygen, therefore carbon mono oxide has tendency to replace oxygen and form carboxyl hemoglobin, hence releasing of oxygen to the tissues get reduced (Roethig HJ 2010). this can be one of the reasons responsible for higher conc. of RBC in smokers.

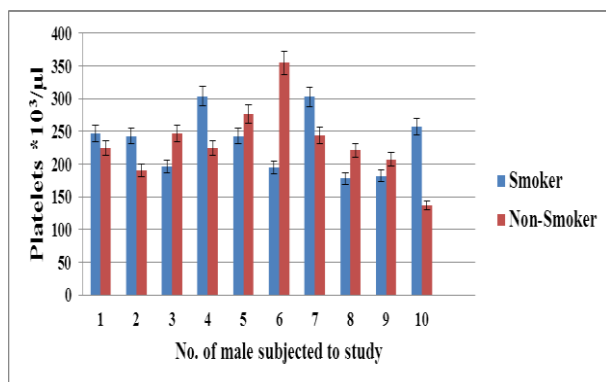


Fig 4: Platelets count for smokers versus non-smokers

Platelets has the tendency to adhere itself to the foreign particle surface (friedman GD. 1974), (Schwartz J 1974), releasing nucleotide in response, this loss of nucleotide causes the structural changes in the platelets. It can be seen in fig:4 that 50% of the smoker have higher value of platelets as compare to the non smoker. Smoker no 4 has the highest value for platelets. Resulting highest value for the nicotine since Nicotine is a foreign particle hence there is close direct relation between platelets and nicotine increase concentration of nicotine more no. of

platelets.platelets not only release nucleotide but other content also. (Malech HL.1987, Weiss SJ 1989).

CONCLUSION

Our results conclude that continuous cigarette smoking and its frequency has adverse effect on health, this may put the health at great risk, even in young age, the same threats are for passive smokers. Reduction in smoking may be a stepping stone toward quitting, and can save lives of many people who are directly or indirectly living in this environment.

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