Changes in the Hematological parameters of cigarette smokers and non-smokers in Eagle Island, Mgbodanya Obio/Akpor, Rivers State, Nigeria.

Original Research Article

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ABSTRACT

The effects of Cigarette smoking on human health was carried out using a total of 80 subjects sample among whom are 40 smokers and 40 non-smokers. Full Blood Count (FBC), Platelet count and Erythrocyte Sedimentation Rate (ESR) tests were carried out in the laboratory. The subjects were consuming a total of 11-15 cigarettes daily for at least 5-8 days.

The result revealed that smokers had a high level of white blood cell count of 5.63 ± 1.27g/l and non-smokers had count of 4.97 ± 0.59. The red blood cell count of smokers were 4.92±037/l and non-smokers 4.32±0.37. The Heamoglobin concentration of smokers were 15.43±144g/dl and 14.08±1.11g/dl for non-smokers. For packed cell volume the smokers had a level of 4.72±3.81% and non-smokers 36.90±3.73. The Platelet count for smokers were 242.33 ± 59g/l and 175.33 ± 34.47 for non-smokers. The Lymphocyte count for smokers and non-smokers were 51.33±89% and 31.45±7.62 respectively. Means cell volume for smokers and non-smokers were 92.64±3.44 and 90±3.41, respectively. The ESR level for smokers were 16.51±3.96 and 8±2.90 for non-smokers. The means cell heamoglobin concentration level of smokers were 32.37±1.66 and 30.97±1.08 for non-smokers. Smokers level of MCH was 29.65±1.78 and 29.46±1.60 for non-smokers. Monocyte level for smokers was 9.92±1.77 and 2.59±1.33 for non-smokers. Basophil level for smokers was 0.21±0.41 and 0.36±0.46 for non-smokers. Eosinophil for smokers was 2.64 ± 1.23 and 0.90 ± 0.91 for non-smokers. Neutrophil level for smokers were 39.82±7.63 and 47.18±6.81 for non-smokers. The result showed that cigarette smoking had a significant effect on hematological parameters and this might be associated with a greater risk of developing atherosclerosis, polycythaemia vera, chronic obstruction, pulmonary disease, Cardiovascular diseases and as such should be discouraged.

Key words: Cardiovascular, Pulmonary, Polycythaemia, Cigarette concentration.

I. INTRODUCTION

Tobacco is the dried and processed leaf of the plant Nicotine tobacumlinn that is widely cultivated in America and some West African countries.

Tobacco Cigarette smoking is one of the major leading causes of death and essential public health challenge in the world (Kume et al., 2009). Tobacco smoking is one of the most potent and prevalent additive, influencing behavior of human beings for over four (4) centuries. Smoking is now increasing rapidly throughout the developing world and is one of the biggest threats to current and future health (Edward, 2004). Tobacco continues to be the second major cause of death in the world. By 2030, if the current trend continues, smoking will kill over 9 million people annually World Health Organization (WHO, 2002). Smoking has both acute and chronic effects on hematological parameters. There are over 4000 chemicals found in Cigarettes smoke (Green and Rodman, 1996). Cigarette smokers are exposed to a number of harmful substances including nicotine, free radicals, carbon monoxide and other gracious products (Gitte, 2011).

It is known that smokers have higher risk for cardiovascular disease, hypertension, inflammation, stroke clothing disorder and respiratory disease (Abel *et al.*, 2005).

Cigarette smoking accelerates pathogenesis in different type of cancers such as lung, pancreas breast, liver and kidney (Islam *et al*., 2007), (Yarnel *et al.*, 1991).

Similarly smoking enhances PH in the stomach that result in peptic ulcers and gastric diseases (Kume et al., 2009 and Torres et al.,2009) Yarnell *et al.*, (1991) and Wannamethee *et al*., (2005) found that smokers have higher white blood cells counts than non-smokers. It has been demonstrated that many of the chemical agents that enter the body through Cigarette.

Smoking have cytotoxic effects on Blood parameters (Mrunal *et al*., 2012). According to Milman and Pederson (2009), Packed cell volume (PCV), White blood cell (WBC) Platelet (PLT), Erythrocyte sedimentation rate (ESR), Differential leukocyte count and Hemoglobin concentration in smokers was higher than in non-cigarette smokers. They also observed that the PCV, WBC, HB, ESR and Lymphocyte count increase progressively with the number of cigarettes consumed per day. The increased level of these parameters may be attributing to the increase level of carbon monoxide, carboxy haemoglobin. Cigarette smoking has been found to be a major source of carbon monoxide. Some scientist suggested than increase in haemoglobin level in blood of smokers could be a compensatory mechanism. Cigarette smoking provides a ready source of carboxy heamoglobin. Non –smokers have measurable levels of carboxy heamoglobin from endogenous product and environmental exposure carboxy heamoglobin is a product of chemical combination between carbon monoxide and heamoglobin Polycythemia may be a manifestation of carbon monoxide intoxication in heavy smokers. A condition where quantity of oxygen is transported to the tissue to decrease erythropoin secretion.

This study is aimed at assessing the extent of adverse effects of Cigarette smoking on heamatological parameters of healthy adult male smokers and non smokers.

II. MATERIALS AND METHODS

Study Area : The study was carried out at Eagle Island, Mgbodanya Obio/Akpor Local Government Area of Rivers State, Nigeria. The test was also carried in Braithwaite Memorial Hospital laboratory.

Selection of subjects.: A total of 80 subjects (40 male smokers and 40 non smokers who are healthy between the ages of 18-40 years were selected for the study. The subjects are people that smoke more than 8 sticks of Cigarette a day.

Sample collection: : The subjects under investigation made up of 40 smokers and 40 non-smokers (control) were bled by veni-puncture with 5ml Syringe/heedle. The blood was collected into EDTA container, mixed and labeled with patients name, age and sex and analyzed in the laboratory for heamatological parameters.

Sample Analysis: The samples were analyzed by using standard methods such as the use of microhaemoticrit for packed cell volume (PCO), Cyanmethaemoglobin method for heamoglobin (Hb), Turks solution for total white blood cell count (WBC), Westergreen method for Erythrocyte Sedimentation rate (ESR), Ammonium Oxalate method for platelet count, this blood film for differentia cell count. The results were recorded according to their units.

III. RESULT

The different Leucocyte count showed for lymphocytes, smokers had 51.33 ± 5.89, while non smokers had 31.45 ± 7.62, Monocyte count for smokers is a mean value of 2.92 ± 1.77 and non-smokers 2.59 ± 1.33, Busophil count for smokers is 0.21 ± 0.41 and 0.36 ± 0.46 for non-smokers mean Eosinophil count for smokers was 2.62 ± 1.23 while non smokers recorded 0.90 ± 0.91 and lastly the smokers had mean Neutrophil count of 39.82 ± 7.63 and 47.18 ± 6.81 for non smokers. All these are shown in table 1.

Table 1 : **Comparison of different leucocyte count between 40male smokers and 40 non-smokers** (mean ± SD)

Differential Count Parameters	Smokers (number = 40)	Non-smokers (number = 40)
Lymphocyte	51.33 ± 5.89	31.45 ± 7.62
Monocytes	2.92 ± 1.77	2.59 ± 1.33
Basophil	0.21 ± 0.41	0.36 ± 0.46
Eosinophil	2.64 ± 1.23	0.90 ± 0.91
Neutrophil	39.82 ± 7.63	47.18 ± 6.81

Table 2 shows the analysis of the various heamatological parameters, the total White blood cell count of smokers was 5.63 ± 1.27 as compared to non smokers that had 4.97 ± 0.59. The Red blood cell count for smokers was 4.92 ± 0.37 and that of non smokers is 4.32 ± 0.37. The packed cell volume of smokers was 47.72 ± 3.81 and 36.90 ± 3.73 for non smokers. The Hoemoglobin level for smokers was 15.43 ± 1.44 and 14.08 ± 1.72 for non smokers. The MCHC value for smokers was 32.37 ± 1.66 and 30.95 ± 1.08 for non smokers MCH value for smokers was 29.65 ± 1.78 and 29.46 ± 1.60 for non smokers. MCV levels for smokers was 92.64 ± 3.44 and 90 ± 3.41 for non smokers. ESR value for smokers was 16.51 ± 3.96 while non smokers had 8 ± 2.90. Finally platelet count for smokers was 242.33 ± 59.36 and 175.33 ± 34.47 for non smokers.

Table 2: Comparison of various heamatological parameters in 40 smokers and 40 non smokers (mean ± SD).

Parameters	Smokers (n=40)	Non-smokers (n=40)
TWBC Count	5.63 ± 1.27	4.97 ± 0.59
RHC Count	4.92 ± 0.37	4.32 ± 0.37
PCV Levels	47.72 ± 3.81	36.90 ± 3.73
Hb Concentration	15.43 ± 1.44	14.08 ± 1.12
MCHC	32.37 ± 1.66	30.95 ± 1.08
MCH	29.65 ± 1.78	29.46 ± 1.60
MCV	92.64 ± 3.44	90 ± 3.41
ESR Level	16.51 ± 3.96	8 ± 2.90
Platelet	242.33 ± 59.36	175.33 ± 34.47

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IV. DISCUSSION

From the study, there was significant increase in Lymphocytes of smokers, compared to non smokers and this may be due to residual chronic inflammation of the respiratory tract. The Consistent increase in Lymphocyte activity of smokers, are due to excessive intake of Cigarette smoke which increased the activity of the lungs thereby resulting in lymphocytosis. Previous studies on Cigarette has shown that lymphocytosis can reduce in smokers within few weeks of quitting smoking. This research had also shown that there was a significant decrease of neutrophils in smokers above the normal range, compared to that of non-smokers. Previous Study had shown that these may be associated with an increase of lymphocyte count.

The Study had also shown that smokers have increase monocyte and eosinophil counts compared to non smokers.

The Study also shows high level of HB and PCV in smokers as compared to non-smokers. The increase may be due to excessive intake of carbon monoxide which combines with haemoglobin to form carboxy haemoglobin that causes hypoxia which leads to increase in Erythropoietin secretion and increase Erythropoesis.

This study also showed that smokers have high levels of white blood cell count, red blood cell count and platelet count. This may be correlated to the presence of nicotine induced release of Catecholamine's steroid hormones and chronic inflammation of respiratory tract.

v. CONCLUSION

Conclusively, the research has shown that continuous cigarette smoking has severe adverse effects on haematological parameters eg. haemoglobin, haematocrit, WBC count, RBC count, MCH, MCHC, MCV, ESR Lymphocyte, Eosinophil, Basophil, Monocyte, Neutrophil and Platelet counts. These aberration might be associated with a greater risk for developing, atherosclerosis, polycythaemia vera, chronic obstructive pulmonary disease and cardiovascular disease.

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