

**International Journal Of Medical Science And Clinical Inventions**

Volume 2 issue 08 2015 page no. 1255-1259 ISSN: 2348-991X

Available Online At: <http://valleyinternational.net/index.php/our-jou/ijmsci>

**Smoking Effects On Some Hematological Parameters In Human**

*Bulkasim M. Abdulnabi*

Faculty of Science, Zoology department, Omar Al-Mukhtar University, Al-Beida-Libya.

Email: [abdul20502000@yahoo.com](mailto:abdul20502000@yahoo.com)

**Abstract:** *This study was made to investigate cigarette smoking impact on serum hematological parameters. Levels of red blood cells, hemoglobin, hematocrit and white blood cells levels were significantly increased, while platelets were significantly decreased by the toxicity cigarette smoking.*

**Key words:** smoking, hematological parameters, human.

**Introduction:**

Tobacco cigarette smoking is one of the major leading causes of death and essential public health challenge in world over<sup>1,2</sup>. Addiction to tobacco products has become common in most societies. The addictive nature of tobacco is mainly due to the presence of nicotine (a major tobacco alkaloid) in it<sup>3</sup>. Tobacco smoke produced by cigarette contains harmful and carcinogenic substances e.g. carbon monoxide, nicotine, free radicals and others<sup>4,5</sup>. Smoking has negative impact on health, which includes cardiovascular complications, respiratory diseases and cancer<sup>6,7</sup>. The harmful substances present in the tobacco smoke may lead to oxidative damage to lungs especially by causing accumulation of neutrophil in the lungs<sup>8</sup>. Smoking is responsible for every six cases of death<sup>9</sup>. The effects of smoking on various metabolic and biological processes, hormone secretion, and hematopoietic system have been demonstrated. In many studies, among acute effects of smoking on hematological system,

increases in WBC, eosinophil, and platelet (PLT) counts have been shown<sup>10</sup>.

**Materials and methods**

Thirty male smokers were used in this study; they smoked at least 10 cigarettes per day for at least 10 years. Data were collected in El-beida city during period (January, 2014 to June, 2014). The present study was conducted between two groups i.e. smokers and non-smokers. All were apparently healthy male subjects between the age group of 25-40 yrs. Total sample size was 60, out of which study group included smokers (n=30) and control group included non-smokers (n=30).

**Hematological parameters**

Venous blood was collected in the morning hours from each person to avoid the effect of diurnal variation on blood counts. 5 ml of blood were collected into a syringe with all aseptic precautions with and without EDTA (anticoagulant) and immediately automated counting was done using sismex auto-analyser.

All the haematological parameters were studied using Sysmex Autoanalyser, which works on the principle of Electrical Impedance.

**Statistical analysis**

Data were presented as the mean ± SE values. Quantitative data were analyzed, using one-way ANOVA, and the statistical comparisons among the groups were performed with Post Hoc and the least significant difference (LSD) tests using a statistical package program (SPSS version 14)<sup>11</sup>.

Avalue P < 0.05 was considered as statistically significant at 5% level respectively.

**Results**

Table (1) showed that levels of red blood cells, hemoglobin and hematocrit percentage were within the normal range in non smokers. RBCs count, Hb and hematocrit were significantly increased in smokers group (P<0.05) compared to control (non-smokers).

Table (1): The effect of cigarette smoking on some hematological parameters

Parameter	RBCs		Hb		Ht	
	Range	M ± SE	Range	M ± SE	Range	M ± SE
Non-smokers	4.1 – 4.8	4.6 ± 0.19 <sup>a</sup>	14 – 15	14.6 ± 0.17 <sup>a</sup>	38.4 – 40.5	39.3 ± 0.15 <sup>a</sup>
smokers	5.1 – 5.9	5.5 ± 0.16 <sup>b</sup>	15.8 - 16	16 ± 0.17 <sup>b</sup>	39.5 – 40.8	40.3 ± 0.18 <sup>b</sup>

Red blood cells (RBCs × 10<sup>6</sup>/μL), hemoglobin (Hb g/dL), hematocrit (%). Values are means ± SE (standard error). Different superscripts differ significantly (P<0.05), while similar superscripts differ insignificantly from the control. Number of observations in each mean = 5.

Table (2) showed that levels of white blood cells were significantly increased by cigarette smoking (P<0.05). Platelets levels were significantly decreased by cigarette smoking (P<0.05).

Parameter	WBCs (U/L)		Platelets (U/L)	
	Range	M ± SE	Range	M ± SE
Non-smokers	6.4 – 7.0	6.5 ± 0.16 <sup>a</sup>	270 - 283	278.6 ± 2.7 <sup>b</sup>
smokers	7.0 – 8.0	7.5 ± 0.19 <sup>b</sup>	244 - 255	248.6 ± 1.9

Table (2): The effect of cigarette smoking on leucocytes (WBCs) and platelets levels

Values are means ± SE (standard error). Different superscripts differ significantly (P<0.05), while similar superscripts differ insignificantly from the control. Number of observations in each mean = 5.

## Discussion

Smoking is known as a high risk factor for cardiovascular diseases, hypertension, inflammation, and respiratory diseases<sup>12,13,14,15</sup>. Besides, as shown in various studies, smoking accelerates cancer in various organs as lungs, pancreas, kidney, and liver<sup>16,17,18</sup>. This study was in agreement with the previous studies on the impact of smoking on hematological parameters, WBC, RBCs, Hb, and Hct levels were found to be markedly increased, while platelet counts were decreased. These changes have been associated with high risk of atherosclerosis, polycythemia, chronic obstructive pulmonary disease, and cardiovascular disease in smokers<sup>19</sup>. The mechanism of action of smoking on WBC is not clear yet. In smokers, lymphocytosis is thought to be mainly associated with an increase in T-cells<sup>20</sup>. Nicotine which is a component of cigarette smoke, stimulates catecholamine release, and induces increase in cortisol levels. Increases in peripheral blood WBC counts, and alterations in WBC function can be the result of direct damage stemming from alterations in epithelial, and endothelial surfaces and/or cytokine levels (especially IL-6) caused by components of cigarette smoke<sup>21</sup>. Kurtoğlu *et al.* detected that smoking significantly increased WBC, neutrophil, lymphocyte, monocyte, platelet counts, Hb, Hct, and RBC indexes in both genders<sup>22</sup>. Also some studies comparing smoker, and nonsmoker groups have demonstrated increases in Hb, Hct, RBC,

MCV, WBC, neutrophil, lymphocyte, eosinophil, and monocyte counts in both groups<sup>23,24,25</sup>. Zafar *et al.*<sup>26</sup> investigated the impact of smoking on RBC, WBC, and Hb, and indicated increases in WBC counts, and decreases in RBC, and WBC counts in smokers. Studies displayed important increments in WBC counts in line with pack-years of smoking. Even smoking 10 cigarettes a day led to important increase in WBC counts<sup>26</sup>. The harmful effects of smoking on hematological parameters improve with a little bit decrease in the daily number of cigarettes smoked. If chronic smokers quit smoking, then, as has been demonstrated in many studies, most of the parameters related to red, and white blood cells rapidly return to their normal values<sup>27</sup>. Our cases with a median age of 32, comprised most of our study population, who had been using tobacco products for 10 years. Some of our patients started to use cigarettes while they were just a small child, and continued to use them for 15 years. Educational level of smokers (high school) was significantly lower relative to non-smokers which reveals the importance of education. Awareness should be raised in the community about smoking, and its harmful effects. In conclusion, in this study, detrimental effects of smoking on hematological parameters have been demonstrated, and these harmful effects have been determined.

## References

1. Kume, A., Kume, T., Masuda, K., Shibuya, F., and Yamzaki, H. (2009). Dose-dependent effect of cigarette smoke on blood biomarkers in healthy volunteers: Observations from smoking and non-smoking. *Journal of Health Sciences*; 55(2):259-264.
2. Islam, M.M., Amin, M.R., Begum, S., Akther, D., and Rahman, A. (2007). Total count of white blood cells in adult male smokers. *J. Bangladesh Soc. Physiol.*; 2:49-53.
3. Ramamurthy, V., Raveendran, S., Thirumeni, S. and Krishnaveni, S. (2012). Biochemical changes of cigarette smokers and non-cigarette smokers, *IJALS*; 1:68-72.
4. Barland, C., Chamberlain, A., Higenbotlam, T., Shibley, M., and Rase, G. (1983). Carbon monoxide yield of cigarette and relation to cardio respiratory disease, *BMJ*, 287: 1583-6.
5. Church, D.F. and Pryos, W.A. The oxidative stress placed on the lung by cigarette smoke (1991). In: Crystal RG, West JB ed., *The lung: scientific foundation*, New York, Raven: 1975-9.
6. Sherman, C.B. (1991). Health effect of cigarette smoking, *Clin. Chest Med.*, 12, 643.
7. Diana, J.N. Tobacco smoking and nutrition (1993). *Ann. NY Acad. Sci.*, 686: 1-11.
8. Chow, C.K. (1993). Cigarette smoking and oxidative damage in the lungs. *Ann. NY Acad. Sci.*, 686: 289-98.
9. Kumar C. R. (2000). Basic pathology. Çevikbaş U. 6. Baskı, Elma Basım.
10. Öztuna, F. (2004). Sigaranın hücreyel etkileri. *Akkciğer Arşivi*; 2:111-6.
11. SAS (1986). *SAS User's Guide: Statistics*, version 5 edition, SAS inst., Inc., Cary, NC, USA.
12. de Heens, G.L., Kikkert, R., Aarden, L.A., van der Velden, U. and Loos, B.G. (2009). Effects of smoking on the ex vivo cytokine production in periodontitis. *J. Periodontal Res.* ;44:28-34.
13. Wannamethee, S.G., Lowe, G.D., Shaper, A.G., Rumley, A., Lennon, L., Whincup, P.H. (2005). Associations between cigarette smoking, pipe/cigar smoking, and smoking cessation, and haemostatic and inflammatory markers for cardiovascular disease. *Eur. Heart J.* 26: 1765-73
14. Freedman, D.S., Flanders, W.D., Barboriak, J.J., Malarcher, A.M. and Gates, L. (1996). Cigarette smoking and leukocyte subpopulations in men. *Ann. Epidemiol.* 6: 299-306.
15. Van Tiel, E., Peeters, P.H., Smit, H.A., Nagelkerke, N.J., Van Loon, A.J., and Grobbee, D.E. (2002). Quitting smoking may restore hematological characteristics

- within five years. *Ann. Epidemiol.* 12:378-88.
16. Yarnell, J.W., Baker, I.A., Sweetnam, P.M., Bainton, D, O'Brien, J.R. and Whitehead, P.J. (1991). Fibrinogen, viscosity, and white blood cell count are major risk factors for ischemic heart disease. Te Caerphilly and Speedwell collaborative heart disease studies. *Circulation*; 83:836-44.
17. Corre, F., Lellouch, J. and Schwartz, D. (1971). Smoking and leucocyte-counts. Results of an epidemiological survey. *Lancet*; 2:632-4.
18. Helman, N. and Rubenstein, L.S. (1975). The effects of age, sex, and smoking on erythrocytes and leukocytes. *Am J Clin Pathol*; 63:35-44.
19. Dodsworth, H., Dean, A. and Broom, G. (1981). Effects of smoking and the pill on the blood count. *Br. J. Haematol.* ;49: 484-8.
20. Silverman, N.A., Potvin, C., Alexander, J.C. and Chretien, P.B. (1975). In vitro lymphocyte reactivity and T-cell levels in chronic cigarette smokers. *Clin. Exp. Immunol.* ;22: 285-92.
21. Smith, M.R., Kinmonth, A.L., Luben, R.N., Bingham, S., Day, N.E. and Wareham, N.J., (2003). Smoking status and differential white cell count in men and women in the EPIC-Norfolk population. *Atherosclerosis*; 169:331-7.
22. Kurtuğlu, E. and Uğur, A. (2007). Sigara kullanımının kan sayımı parametreleri üzerine etkileri. XXXIII. Ulusal Hematoloji Kongresi özet kitabı, Ankara: 34.
23. Carel, R.S. and Eviatar, J. (1985). Factors affecting leukocyte count in healthy adults. *Prev. Med.* ;14: 607-19.
24. Islam, M.M. Amin, M.R., Begum, S., Akther, D. and Rahman, A. (2007). Total count of white blood cells in adult male smokers. *J. Bangladesh Soc. Physiol.* 2: 49-53.
25. Asif, M., Karim, S., Umar, Z., Malik, A, Ismail, T. and Chaudhary, A. (2013). Effect of cigarette smoking based on hematological parameters: comparison between male smokers and nonsmokers. *Turkish Journal of Biochemistry-Turk. J. Biochem.* ;38:75-80.
26. Zafar, I., Mohammad, K.N., Nisar, M., Rashida, M., Shumaila, B. (2003). Effect of cigarette smoking on erythrocytes, leukocytes and haemoglobin. *Journal of Medical Sciences*; 3: 245-50.
27. Bain, B.J., Rothwell, M., Feher, M.D., Robinson, R., Brown, J. and Sever, P.S. (1992). Acute changes in haematological parameters on cessation of smoking. *J.R.Soc. Med.* ;85: 80-2.