

REVIEW ARTICLE

Effect of Nicotine on Haematological Parameters in Healthy Population: A Review Literature

¹Sumedha Rabra, ²Meenakshi Verma

ABSTRACT

Tobacco smoking is one of the causes of the incidence and mortality of cancer in the world. The prevalence of tobacco consumption is a hallmark menace of today's era. Lot of countries are planning to curb such menace but uncertainly, the consumption is still at par. The usage of tobacco not only harm the individual but it also effects the society. Irrespective of any morbidity the tobacco consumption is causing deleterious effects on healthy population. The counter effects of this consumption on hematological variables are significantly high. The attempt has been made to portray the baneful impact of tobacco among healthy population on the basis of Hematological parameters like white blood cells, red blood cells, platelets, concentration of Hemoglobin, Hematocrit, mean corpuscular volume, packed cell volume, mean corpuscular hemoglobin concentration.

KEY MESSAGES: Nicotine is a highly addictive and hazardous substance. The deleterious effects of nicotine are not only harnessing the individual but society too. Hence, this review culminates the effect of nicotine on important hematological variables among healthy individuals.

KEYWORDS | smoking, tobacco, Complete blood count

Author's Credentials:

^{1,2}Assistant Professor, Department of Physiotherapy, Sharda University, Greater Noida, Uttar Pradesh 244001, India.

Corresponding Author:

Rabra Sumedha, Assistant Professor, Department of Physiotherapy, Sharda University, Greater Noida, Uttar Pradesh 244001, India.

Email:

sRabra339@gmail.com



How to cite this article

Sumedha Rabra. Effect of Nicotine on Haematological Parameters in Healthy Population: A Review Literature. Indian J Forensic Med Pathol. 2021;14(3 Special):691-693.

INTRODUCTION

SMOKING IS A MAJOR HEALTH RISK THAT IS associated with a number of co-morbidities. Tobacco smoke contains more than 4,000 distinctive poisonous and cancer-causing synthetics. These synthetic compounds, like nicotine, tar, carbon monoxide, and others, have various adverse consequences on the body's different functionalities. It is particularly related to the pathogenesis of aspiratory and cardiovascular diseases.¹

Smoking is the most common way of consuming different techniques like cigarette, stogie, Biri, and hookah pipe. It gives the smoker a feeling of joy and satisfaction. It is a perplexing outer and inner improvement with visual, material, mechanical (mouth development), gustatory, olfactory, and bothering parts. Tobacco use is one of the main reasons for death among ladies. Various examinations have been

directed all around the world to explore the danger factors for cigarette smoking. Hereditary and segment factors, accepted practices, peer impacts, and parental mentalities and conduct are only a couple of models.²

Impact of Smoking on White Blood Cells

Smokers are more likely to develop coronary artery disease (CAD), atherosclerosis, severe myocardial localized necrosis, hypertension (HTN), thickening problems, aggravation, respiratory illnesses, cancers, and other diseases. Smokers have a 20-25 percent greater complete white cell count in their peripheral blood than non-smokers. Smoking is undoubtedly responsible for the increase in white cell count as shown in Table-1. Smoking causes increased blood leukocytes, neutrophils, lymphocytes, and monocytes. The goal of this study was to see if the concentration of nicotine in plasma

HAEMATOLOGICAL PARAMETER	SMOKERS	NON-SMOKERS
Blood Leukocytes	++++	Normal
Neutrophils	+++	Normal
Lymphocytes	++	Normal
Monocytes	+++	Normal

Table 1: Impact of smoking on White Blood cell

HAEMATOLOGICAL PARAMETER	SMOKERS	NON-SMOKERS
Mean Corpuscular Volume	++++	Normal
Mean Corpuscular Haemoglobin*	+++	Normal

Table 3: Impact of Smoking on Mean Corpuscular Volume and Mean Corpuscular Haemoglobin

or carbon monoxide in end-terminated air correlates with the number of white blood cells in smokers.³

Impact of Smoking on Red Blood Cell

Cigarette smoking has adverse effects on red blood cells (RBC), several RBC-related parameters, and hemoglobin (Hb) in previous studies. It was found that RBC haemolysis in smokers was 20-25 % higher than in non-smokers. Cigarette smoke increases 2,2'-azo-bis-(2-amidino-propane) dihydrochloride-induced RBC haemolysis. Several studies have shown the fact that there is an increase in the percentage of macrocytic RBCs and a decrease in the red cell distribution width (RDW) in smokers compared with non-smokers as depicted in Table 2.³

Impact of Smoking on other Hematological Parameters

Lymphocytes have been found to have specific morphine receptors. Opioid receptors are thought to function in both an autocrine and paracrine manner. Although it has been proposed that morphine affects some immune cells indirectly, it can also directly affect the functions of macrophages and polymorphonuclear (PMN) leukocytes, as well as regulate the expression of some T-cells. Some researcher reported that the endogenous opioid peptides, including α -endorphin and the dynorphin peptides, and exogenous alkaloids such as morphine plays an important role in the lymphocytes and other immune cells function.^{4,5}

Constantly raised carboxyhemoglobin levels, like those found in cigarette smokers,

HAEMATOLOGICAL PARAMETER	SMOKERS	NON-SMOKERS
RBC Haemolysis	+++++	Normal
Haemoglobin	+++++	Normal
Macrocytic RBC	+++++	Normal
Red Cell Distribution Width*	-----	Normal

Table 2: Impact of smoking on Red Blood cell

invigorate erythropoietin creation. Smokers have higher hematocrits than non-smokers in examinations and different investigations propose that smokers have a more prominent expansion in hematocrit than non-smokers when presented to high elevation. The effect of adjusted aspiratory work in cigarette smokers comparable to HA transformation has not been tended to. Persistent hypoxemia from the low oxygen immersion of hemoglobin actuates polycythaemia⁹, an expanded mean corpuscular volume (MCV)¹⁰ and decrease in Mean Corpuscular Hemoglobin than normal levels in smokers as discussed in Table-3.

Nicotine makes a coagulation structure in the coronary supply routes, decreases vascular movement, and increments endothelial break. An increment in carboxy-hemoglobin levels might cause hypoxia, and it is additionally liable for sub-endothelia odema since it adjusts vascular penetrability and lipid gathering. Tobacco smoke unmistakably contains free extremists and peroxides. They are connected with physiological marvel like union of prostaglandins and thromboxane, and they are likewise engaged with the pathogenesis of different infections including atherosclerosis, carcinoma, and provocative processes.¹¹

CONCLUSION

The review concludes with an attempt of various contraindications which are reported among smokers and non-Smokers. Numerous Hematological parameters like Blood Leukocytes, Neutrophils, Lymphocytes and monocytes level shows significant increase in

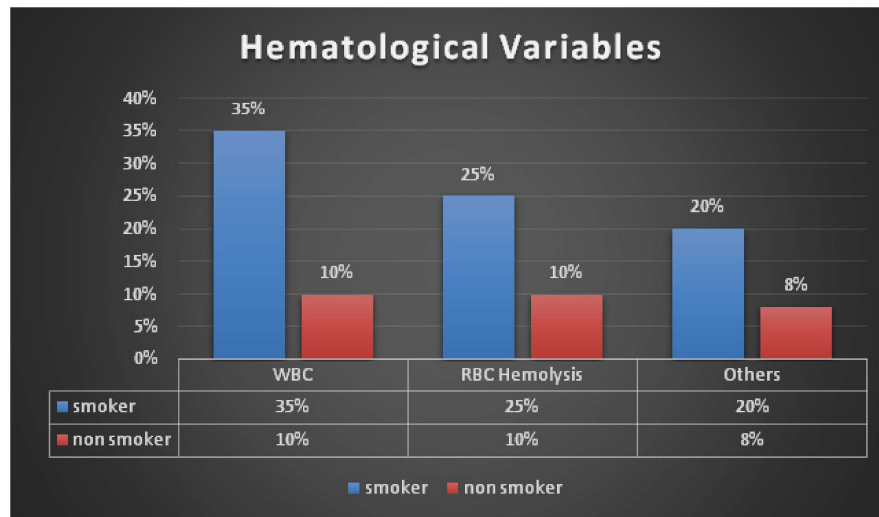


Figure 1:
A Comprehensive Description
of Hematological
Variables among Smoker
and Non-Smoker Population

smokers. Whereas, Red cell distribution width and Mean Corpuscular Hemoglobin levels were found to be extremely lower than normal values in smokers than non-smokers. Furthermore, the levels of Hemoglobin depict the remarkable increase in smokers as compared with non-smokers. Therefore, it is concluded that smoking not only affect the hematological variables but also the overall health of the individual. **IJFMP**

Acknowledgment:

This review was supported partially by Sharda University. We thank our colleagues from School of Allied Health Science who provided insight and expertise that greatly assisted us in the research. We would like to show our gratitude to Dr. Sally Lukose (Dean, School of Allied Health Science, Sharda University) for sharing her insight during the course of this research.

Conflict of Interest: The authors declare that there is no financial interest. links that could be construed as conflict of interests.

REFERENCES

- Jain Antra, Agrawal Vandana.** Evaluation of Impact of Cigarette Smoking on Platelet Parameters and Coagulation Profile in Young Healthy Male Subjects. *National Journal of Integrated Research in Medicine* 2019;10(5):53-57.
- Khan Ibrahim Muhammad.** Effect of smoking on Red Blood Cells Count, Haemoglobin Concentration and Red Cell indices in Pakistan. *Journal of Medical and Health Sciences.* 2014;8(2):361-364.
- Malenicae Maja, Prnjavorac Besim.** Effect of Cigarette Smoking on Haematological Parameters in Healthy Population. *Archives of Medical Research* 2017;71(2):132-136.
- Honnamurthy Boman, Shivashankara Ayyer Ram.** Biochemical and Haematological Profile in Patients with Alcohol Dependence Syndrome (ADS) Comorbid with Nicotine Dependence Syndrome. *International Journal of Biochemistry Research & Review.* 2016;13(4):1-10.
- Ouidad Atoussi, Sara Chetehouna, Islam Boulaare.** Analysis of Blood Pressure, Lipid Profile and Hematological Biomarkers in men Addicted to Tobacco Chewing. *Research Journal of Pharmacology and Pharmacodynamics* 2021;13(1):1-4.
- Shahabinejad Gholam abbas, Sabet Majid Sirati.** Effects of Opium Addiction and Cigarette Smoking on Haematological Parameters. *Addiction and Health* 2016;8(3): 179-185.
- Sultana Safia, Afsar Nabila, Jawad Mohammad.** Effects of cigarette smoking on erythrocyte sedimentation rate, platelet count, total and differential leucocyte counts in adult male smokers. *Annals of Medical Physiology* 2019;3(1):14-18.
- Taylor George Richard, Gross Evelyn.** Smoking, allergy, and the differential white blood cell count. *Thorax Medical Journal* 1985;40(1):17-22.
- Swaminathan Anandhalakshmi, Kalaivani Amitkumar.** Evaluation of the impact of cigarette smoking on platelet parameters. *National Journal of Physiology, Pharmacy and Pharmacology* 2015;5(5):426-430.
- StokkeKevine, Rootwelt Krystie.** Changes in plasma and red cell volumes during exposure to high altitude. *Clin Lab Invest* 1986; 184:113-117.
- Arguelles Ruiz, Medal Sanchez.** Red cell indices in normal adults residing at altitude from sea level to 2670 meters. *American Journal of Hematology* 1980;8(3):265-271.