

■ REVIEW ARTICLE

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

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## 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

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## INTRODUCTION

**S**MOKING IS A MAJOR HEALTH RISK THAT IS associated with a number of comorbidities. 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.<sup>1</sup>

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.<sup>2</sup>

### 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.<sup>3</sup>

### 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.<sup>3</sup>

### 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  $\alpha$ -endorphin and the dynorphin peptides, and exogenous alkaloids such as morphine plays an important role in the lymphocytes and other immune cells function.<sup>4,5</sup>

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

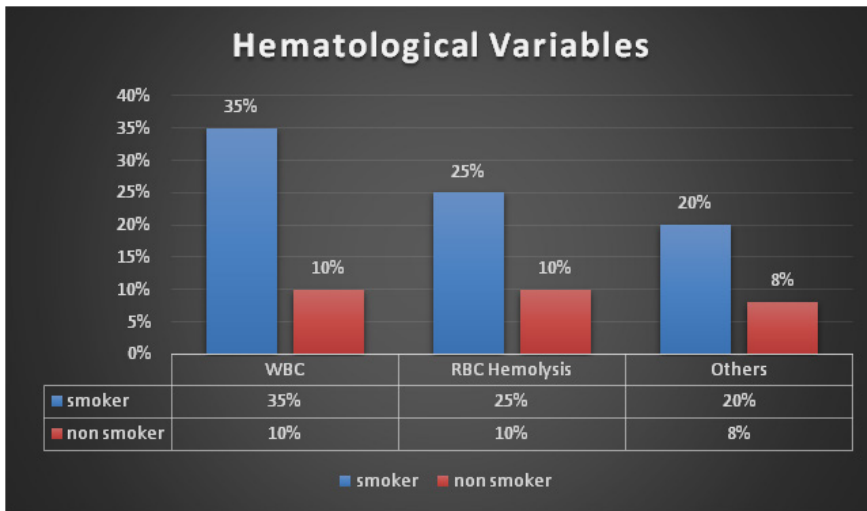
Table 2: Impact of smoking on Red Blood cell

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 polycythaemia<sup>9</sup>, an expanded mean corpuscular volume (MCV)<sup>10</sup> 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.<sup>11</sup>

### 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**

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