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A REVIEW OF ALCOHOL AND SMOKE'S IMPACT ON HAEMATOLOGICAL PARAMETERS

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ABSTRACT

Alcohol and tobacco consumption are significant social and economic health issues, causing liver, kidney, blood cancer, central nervous system, and hematopoietic system issues. Anaemia is a common condition among smokers and regular drinkers, as alcohol and tobacco consumption cause early red blood cell destruction, increasing the risk of anaemia. This study measures total red blood cell count, haemoglobin, total white blood cell count, mean corpuscular haemoglobin (MCH), MCH concentration (MCHC), erythrocyte sedimentation rate (ESR), and platelets in moderate-smoking individuals. Results show that smokers and alcoholics have haematological parameter disorders. Assessing low haemoglobin levels in smokers and alcoholics will contribute to raising awareness of haematological parameter disorders.

Keywords: Alcohol, tobacco, cancer, haemoglobin, smokers, alcoholics

INTRODUCTION

Smoking and drinking are major killers in the United States, with alcohol being the leading cause of death for 2 million people annually. Young people aged 15–29 are particularly affected, and alcohol consumption negatively impacts various organs, including the hepatobiliary, cardiovascular, central nervous, and hematopoietic systems. Alcohol can affect the haematological system in both direct and indirect ways, with anaemia being a key indicator of persistent alcoholism. The bone marrow is also affected, with red, white, and platelet cells being affected. Smoking also impacts various hematopoietic factors, making it a significant contributor to the global disease burden[1].

Smokers are exposed to numerous dangerous compounds and gaseous pollutants, including over 4000 compounds found in cigarette smoke. Smoking often contributes to cancer pathogenesis and changes our pH levels. Doctors play a crucial role in advising and educating patients about the dangers of smoking. Smokers have higher white blood cell counts than non-smokers, and simple tests like haematological counts can provide information about potential complications. This study aims to evaluate and analyse blood parameters in India, as there is limited research on comparing haematological tests between alcoholics and non-alcoholics. The study aims to compare the haematological results of alcoholics and non-alcoholics based on alcohol consumption.

SMOKING

Smoking significantly impacts CBC parameters, including haemoglobin, hematocrit, white blood cell count, red blood cell count, MVC, and MCH. Male smokers have significantly higher RBC values than female smokers. Hematocrit levels were similar in both groups, but smokers had significantly higher haemoglobin values. Smokers' Hb levels and erythrocyte counts increased significantly as their smoking intensity increased. Research by Whitehead found that smokers who smoke more than 8 to 10 cigarettes a day have significantly higher levels of hematocrit and haemoglobin concentration.

The rise in haemoglobin levels in smokers' blood is thought to be a compensatory mechanism, as exposure to carbon monoxide is thought to be the mediator. Carbon monoxide forms carboxyhemoglobin, an

inactive form of haemoglobin that cannot carry oxygen and decreases its ability to transport oxygen to tissue[2].

RED BLOOD CELLS

RBCs transport oxygen and carbon dioxide from the lungs to other body parts. Low platelet counts indicate anaemia, while polycythemia, a disorder with an abnormally high red blood cell count, can clog blood vessels and hinder RBCs' ability to transport oxygen, leukocytes, or white blood cells[3].

WHITE BLOOD CELLS

WBCs, or white blood cells, are crucial for protecting the body from infections and eliminating bacterial or viral organisms. RBCs are larger and more numerous than WBCs. WBC counts are used to detect infections and monitor cancer therapy responses. Excessive drinking has been linked to the growth of ailments since the 1920s, suggesting that alcohol reduces WBC production and function. Alcohol's effects on leukocytes, lymphocytes, macrophages, and monocytes, which defend against bacterial invasion, have gained attention due to the frequent acquisition of bacterial infections by alcoholics[1].

NEUTROPHILS

Leukocytosis occurs when the body produces more white blood cells, primarily neutrophils, in response to a severe bacterial infection. However, drinkers with bacterial diseases often experience decreased neutrophil counts, as shown in a study where five out of ten alcoholics with severe infections had neutropenia at hospital admission, while the other five acquired it within 24 to 48 hours[4].

MONOCYTES AND MACROPHAGES

The monocyte-macrophage system is a crucial defence against infections, functioning similarly to neutrophils. It eliminates foreign proteins and invasive microbes in the blood. Alcohol affects the monocyte-macrophage system's functionality, making alcoholics less resistant to infections caused by germs like tuberculosis and pneumonia. Inebriated laboratory animals have shown that the system is less successful at eliminating infections. This results in the removal of albumin, a protein typically found in alcoholics' bodies, using their monocytes[5,6].

ALCOHOL'S EFFECTS ON THE RBC AND BONE MARROW PRODUCTION

Alcohol, a frequently abused substance, has a detrimental effect on hematopoiesis, the formation of blood cells. Severe alcoholism leads to nutritional deficiencies in folic acid and vitamins needed for blood cell synthesis, resulting in reduced hematopoiesis. This is due to the dose dependence of alcohol's effects. Long-term alcohol abuse decreases the bone marrow's blood cell precursors, causing structural flaws and preventing the development of functionally mature blood cells[7].

ALCOHOL'S EFFECTS ON THE BLOOD-CLOTTING SYSTEM

Coagulation is a crucial physiological process that causes blood to clot, maintaining the vascular system's health. It involves dissolved proteins and platelets, which form a temporary stopper at blood vessel injuries. Blood cells produce clotting factors and amino acids, which are either already present in the blood or produced by surrounding tissues. This process is essential for maintaining the vascular system's health[8].

Fibrin forms in injured vessels to capture blood cells and close wounds, and fibrin-based clots can be eliminated[7].

DISCUSSION

The study found that individuals who regularly consume alcohol and cigarettes have altered their haematological indicators, with moderate to frequent smokers and drinkers being more likely to experience anaemia and thrombocytopenia. Moderate to frequent smokers and drinkers had low haemoglobin, MCH, and MCHC, which were abnormal in non-drinkers and non-smokers but increased in moderately and seriously alcoholics and smokers. All individuals had average white blood cell counts, but the number of red blood cells was reduced in drinkers or smokers. PLT values were lower in smokers and drinkers. Alcohol and other drug abuse, especially among men, is on the rise in India, and young adults are now facing serious problems.

The patient's socioeconomic status, as well as factors like inadequate nutrition or cirrhosis caused by alcohol and smoking, significantly impact the clinical manifestation of these diseases. The majority of these modifications result in anaemia, and in severe liver disease cases, patients may also have coagulation abnormalities, such as improperly functioning fibrinogen, which can lead to bleeding onset or worsening. Anaemia can start to appear even before symptoms appear.

CONCLUSION

Severe drinkers and smokers have higher anaemia rates compared to moderate drinkers and non-smokers. Early detection of anaemia in smokers and drinkers can reduce

mortality and prevent long-term effects. This study aims to spread knowledge on anaemia diagnostics by examining reduced haemoglobin levels in smokers and drinkers. Identifying haematological alterations in chronic drinkers and smokers and providing psychiatric counselling can improve future complications like liver, cardiac, and kidney failure.

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