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Variation of Haematological Parameters in Alcoholics

P.L.Rajagopal[1*], K.R.Sreejith[1], K.Premaletha[1], S.Aneeshia[2]

1.Department of Pharmacognosy and Phytochemistry, Academy of Pharmaceutical Sciences, Pariyaram Medical College, Kannur, Kerala.

2.Department of Medical Laboratory Technology, Academy of Paramedical Sciences, Pariyaram Medical College, Kannur, Kerala.

ABSTRACT

The aim of the study was to assess the haematological parameters in alcoholics. Hematological parameters like platelet count and white blood cell count were analysed in chronic alcoholics by manual, automation and by means of peripheral smear examination. The result revealed that there was a significant reduction in both the parameters in alcoholics.

Keywords: Alcoholics, Platelet, White blood cell

*Corresponding Author Email: just4rajagopal@gmail.com

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INTRODUCTION

People who abuse alcohol are at risk for numerous alcohol related medical complications, including those affecting the blood, that is, the blood plasma and marrow where the blood cells are produced[1]. Alcohol's adverse effects on the blood building or hematopoietic system are both direct and indirect. The direct consequences of excessive alcohol consumption include toxic effects on bone marrow, the blood precursors, and the mature red cells (RBCs), white blood cells (WBCs) and platelets. Alcohol's indirect effects include nutritional deficiencies that impair the production and function of various blood cells.[2]

Alcoholism is chronic, progressive behavioral disorder characterized by a strong urge to consume ethanol and an inability to limit the amount of drinking despite adverse consequences, including social or occupational impairment and deterioration of physical health. Alcoholism, also known as alcohol use disorder is a broad term for any drinking of alcohol that results in problems.[3] It was previously divided in to two types: Alcohol abuse and Alcohol dependence.[4,5] In a medical context, alcoholism is said to exist when two or more of the following conditions is present a person drinks large amounts over a long time period, has difficulty cutting down, acquiring and drinking alcohol takes up a great deal of time, alcohol is strongly desired, usage result in not fulfilling responsibilities, usage result in social problems, and health problems, result in risky situations, withdrawal occurs when stopping, and alcohol tolerance has occurred with use. Risky situations include drinking and driving or having unsafe sex among others.[5] Alcohol use can affect all parts of the body but particularly affects the brain, heart, liver, pancreas, and immune system. This can result in mental illness, Wernicke-Korsakoff syndrome, an irregular heart beat , liver failure, and increase in the risk of cancer among other diseases.[6,7] Drinking during pregnancy can cause damage to the baby resulting in fetal alcohol spectrum disorders.[8] Generally women are more sensitive to alcohol's harmful physical and mental effects than men.[9]

Platelets

Platelets are one of the three cellular elements of the blood, whose function is to stop bleeding. Platelets have no nucleus. They are fragments of cytoplasm, which are derived from the megakaryocytes of bone marrow, and the circulation. Thus un activated platelets are biconvex discoid structure shape like a lens 2-3 micro meter diameter platelets are found only in mammals. On a stained blood smear, platelets appear as dark purple spots, about 20% diameter of red blood cells. The smear is used to examine platelets for size, shape, qualitative number and clumbing.[10,11] Low platelet concentration is thrombocytopenia and is due to either decreased production or

increased destruction elevated platelet concentration is thrombocytosis and is either congenital, reactive (to cytokines) on due to unregulated production. A normal human platelet count 150,000-450,000plateles/micro liter of blood. When a break in a blood vessels occurs substances are exposed that normally are not in direct contact with the blood flow. This substances allow the platelet to adhere to the broken surface. Once a platelet adhere to the surface, it releases chemicals that attract additional platelet to the damaged area, referred to as platelet aggregation. This two process are the first response to stop bleeding. The protein based system serve to stabilize the clot that has formed and further seal up the wound.[12]

White blood cells

White blood cells (WBCs), also called leukocytes or leucocytes, are the cells of the immune system that are involved in protecting the body against both infectious disease and foreign invaders. All white blood cells are produced and derived from a multipotent cell in the bone marrow known as a hematopoietic stem cell. Leukocytes are found throughout the body, including the blood and lymphatic system.[13] Alcohol consumption also interferes with the neutrophils' ability to reach the site of an infection or inflammation. When traveling to such a site, the neutrophils adhere to the walls of the blood vessels into before migrating out of the blood vessels into the affected tissue. In tissue culture experiments using nylon fibers to mimic this adherence, neutrophils could not adhere to the fibers if the blood samples were incubated with alcohol. This effect was more pronounced the higher the alcohol doses were. Neutrophils obtained from intoxicated volunteers had same defect. The degree and duration of this adherence defect correlated with the inhibition of neutrophil delivery observed in the body.[14]The function of neutrophils, including their adhesion ability, is regulated by hormone like substances called leukotrienes. Thus, the impaired neutrophil functioning observed after alcohol treatment could be attributed to reduced leucotriences. Some research results indicate that alcohol can interfere with leucotriene production.[14,15,16] In the present study an attempt has been made to assess the variation of platelet and WBC count in alcoholics.

MATERIALS AND METHOD

The study was conducted for a period of 3 months in a tertiary care hospital in Kannur district of Kerala state .A total of 40 samples were evaluated, in which 30 from alcoholic individuals and 10 from non-alcoholics. People between 25-50 age groups were included. Females and individuals having serious diseases and disorders were excluded from the evaluation.

Platelet count

Total platelet count was determined by three methods like manual method, automated platelet count method and peripheral smear method. In manual method, the blood is diluted with diluting fluid to give a dilution of 1:200 and the cells are counted in the improved Neubauer counting chamber under high power objective. In automated method, the blood is well mixed and placed on a rack in the analyzer. Blood counting machines aspirate a very small amount of the specimen through narrow tubing followed by an aperture and a laser flow cell. Laser eye sensors count the number of cells passing through the aperture and identified them, this is flow cytometry. The two main sensors used are light detectors and electrical impedence. The instrument measures the type of blood cell by analyzing data about the size and aspects of light as they pass through the cells. Other instruments measure different characteristics of the cells to categorize them. However, certain abnormal cells in the blood may not be identified correctly, requiring manual review of the instrument's results and identification of any abnormal cells the instrument could not categorize. In peripheral smear method, Leishman stained thin smears were examined for platelet count under oil immersion objective.

White blood cells

Total WBC count was determined by manual method, automated method and by means of peripheral smear method. In manual method, whole blood is diluted 1:20 with diluting fluid, which haemolysis red cells leaving all the nucleated cells intact. The no. of white cells in a known volume and known dilution are counted using a counting chamber.

Result and Discussion

Table 1: Mean value of platelet and WBC count

Total platelet count		**Total WBC count**	
Patient (Alcoholics)	Control (Non alcoholics)	Patient (Alcoholics)	Control (Non alcoholics)
81466.66	215600	2890.70	8637

It is evident from the present study that there is a reduction in platelet as well as WBC counts in patients or alcoholic individuals. Heavy consumption of alcohol can cause generalized suppression of blood cell production and production of structurally abnormal blood cell precursors that cannot mature into functional cells. Alcohol adversely affects the platelets and other components of the blood-clotting system. Blood clotting or coagulation, an important physiological process that ensures the integrity of the vascular system involves the platelets, or thrombocytes as well as several proteins dissolved in plasma. Alcohol can interfere with these processes at several levels,

causing abnormally low platelet numbers in the blood (thrombocytopenia), impaired platelet function (thrombocytopathy) and diminished fibrinolysis.

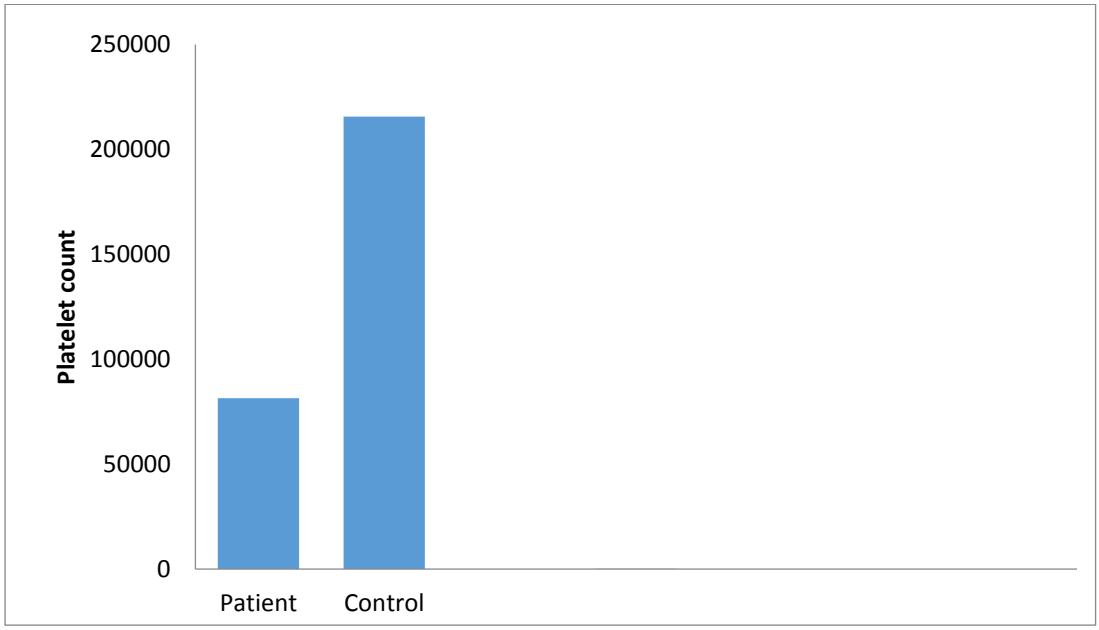

Figure 1: Mean value of platelet count

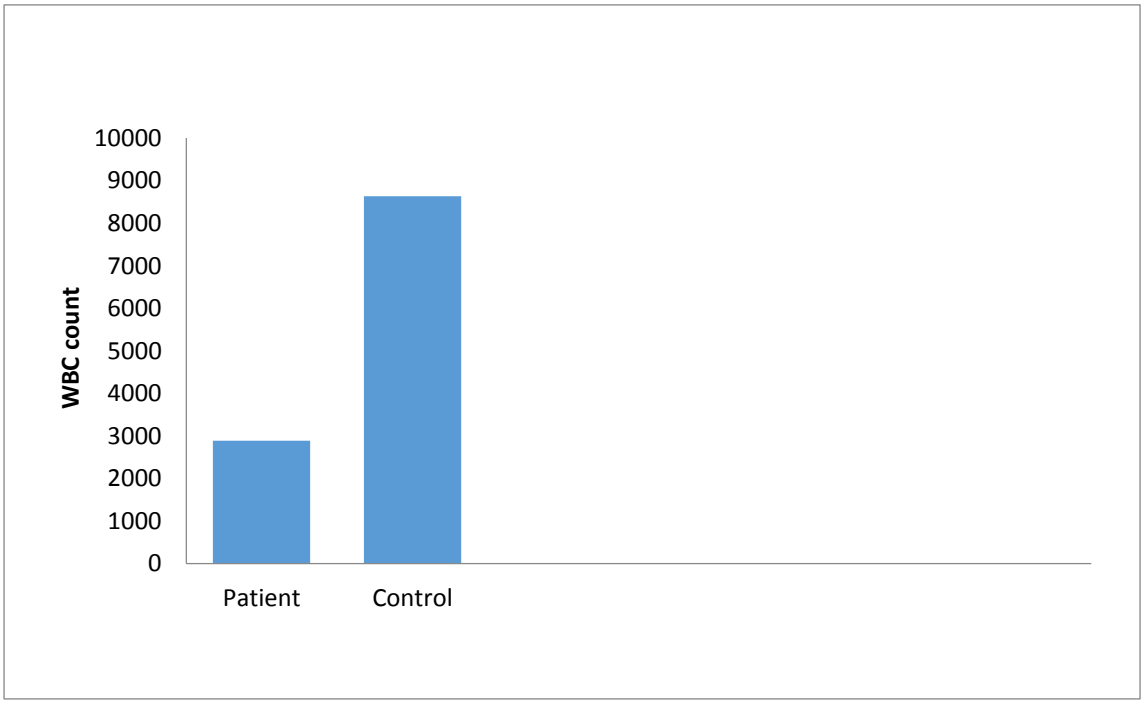

Figure 2: Mean value of WBC count

Alcohol interferes with the normal production and functions of WBC are which form the body's defense against microorganism and the other foreign substances. Because alcoholics commonly develop bacterial infections, much research has focused on alcohol's effects on neutrophils, the primary cell of defense against bacterial invasion.

Alcohol is the most commonly used drug whose consequences include the suppression of blood cell production, on hematopoiesis. The toxic effects are dose dependent, however significantly impaired hematopoiesis usually occurs only in people with severe alcoholism, who also may suffer from nutritional deficiencies of folic acid and other vitamins that play a role in blood cell precursors in bone marrow and causes characteristic structural abnormalities in these cells, resulting in fewer than normal or non-functional mature blood cells.

CONCLUSION

The present study was aimed to evaluate the variation of platelet and WBC count in alcoholics. Early recognition of these findings may help in reducing the complication and improving the treatment in alcoholics.

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