

PATHOLOGICAL OUTCOME IN THE PATIENTS WITH DIFFERENT AILMENTS: A COMPREHENSIVE STUDY IN LAKHIMPUR DISTRICT, ASSAM

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ABSTRACT

Hemoglobin, total leukocyte count, differential leukocyte count, erythrocyte sedimentation rate, random blood sugar, creatinine and blood urea levels were measured in a total of 1123 participants attended at North Lakhimpur Civil hospital during the year 2013. The prevalence of anemia was observed in 45.33% (509/1123) cases. Among the study participants, 5.08% (57/1123) cases were typhoid widal test positive. The level of low monocyte count observed in all the typhoid positive cases. Beside this an increase level of ESR value, random blood sugar, creatinine and blood urea were examined in a considerable number of cases. Male tend to have higher erythrocyte sedimentation rate values than the females. Only a single *Plasmodium falciparum* positive case was detected among the study samples. The study concludes that hematological and biochemical estimation is probably useful in early detection of case infection.

Keywords: : blood urea, creatinine, differential leukocyte count, erythrocytic sedimentation rate, hemoglobin, random blood sugar level, total leukocyte count.

INTRODUCTION

Hematology is the study of blood diseases in human health. It includes problems with the red blood cells (RBC), white blood cells (WBC), platelets, blood vessels, bone marrow, lymph nodes, spleen, and the proteins involved in bleeding and clotting (hemostasis and thrombosis). Abnormalities in blood can affect our total health. Generally, blood disorders can influence any of the three main components of blood, RBCs, which carry oxygen to the body's tissues, WBCs, which fight infections and platelets, which help blood to clot. People may be affected by many different types of blood conditions. Common blood disorders include anemia, bleeding disorders such as hemophilia, blood clots, and blood cancers such as leukemia, lymphoma, and myeloma. It has been established that anemia is the most common blood disorders among the people of India. People with anemia have a low number of RBCs. Blood loss is the most common cause of anemia, especially in case of iron-deficiency anemia. Mild anemia often causes no symptoms however more severe anemia can cause fatigue, pale skin, and shortness of breath with exertion. As far as pathological study is concern, the abnormality in blood sugar, creatinine and urea level would also provide a significant consequence in medical sciences. The level of creatinine and urea is usually used as a marker for determining the severity of kidney failure [1-4]. It was established that the higher the blood levels of urea and creatinine, the less well the kidneys are working [1-4].

Several hematologic tests are routinely done when a patient came into the hospital for determine general level of health as well as the presence of pathologic conditions. These pathological studies could be a valuable tool for prognosis and primary diagnosis in some infectious diseases. Many previous studies mentioned that 'Lakhimpur' district in Assam, is a place where the peoples are vulnerable for different diseases [5-16]. Keeping in mind a study was carried out to determine the hematological abnormality and biochemical changes among the people of Lakhimpur district, Assam. The study will provide the role of hematological changes in early detection of different infections.

Materials and Methods

During the period of 2013, a study was carried out in Lakhimpur district of Assam. All patients attended in North Lakhimpur civil hospital to determine their general level of health were included for the study irrespective of age and sex. Whole blood examination includes hemoglobin (Hb) content, total leukocytes (TLC), leukocytes differential count (DLC), erythrocyte sedimentation rate (ESR) etc was done in all the cases. Beside this some other pathological tests like blood sugar level, creatinine and blood urea levels were also determined.

Hb Estimation

Hb estimation was done based on Sahli's method. In this technique, 0.1 Normal HCl was added up to the lowest mark of the tube and mixed it with 20 µl of blood sample. After formation of acid hematin (brown color complex), the mixture was diluted with distilled water drop by drop and compared with the comparator tube.

TLC

Total leukocyte count was done by hemocytometer. In this technique the blood specimen in diluted 1:20 in a WBC pipette with the diluting fluid and the cells are counted under low power of microscope by using counting chamber.

DLC

Blood smear was prepared in clean dry microscopic glass slide and allowed for air dry. It was stained with Leishman staining solution. The dried stained slide was observed under oil immersion field and different leukocytes were counted with the help of a DLC counter

ESR

ESR {Erythrocyte (red cell) Sedimentation Rate (self explanatory)} is how fast the red cells stick to each other measured in seconds in a long tube filled with blood, standing vertically, to separate cells and liquids of patients blood. ESR is a test that indirectly measures how

much inflammation is in the body. Initially, one part of trisodium citrate is mixed with four parts of blood and with the help of an ESR pipette the solution was pipetted up to the 0 mark and allowed to stand in ESR stand till one hour. At the end of one hour the result were recorded.

Random blood sugar (RBS)/ Creatinine/Urea

Three test tubes were labelled as blank, standard and test.

- In blank tube RBS/Creatinine/Urea reagent was added based upon the test to be performed.
- Standard tube contains RBS/Creatinine/Urea reagent with standard
- In test tube RBS/Creatinine/Urea reagent with serum sample was added and allowed to incubate for 37°C. After incubation the optical density (OD) of standard and test was recorded against blank with the help of semi auto analyzer.

Diagnosis of malaria by rapid malaria test kit

All the study participants were subjected for detection of malaria parasite by using rapid malaria test kit as per the instruction provided in the kit manual (SD Bioline malaria Ag Pf/Pv test).

Diagnosis of typhoid by Widal test

Widal test is a serological test widely used to detect anti-S-typhi antibody in patient's blood. This test was done for all the blood samples.

Result and discussion

A total of 1123 (eleven hundred and twenty three) patients with different ailments were participated in our study. Among the study participants, 577 (five hundred and seventy seven) cases were male and the remaining 546 (five hundred and forty six) were belong to female sex (Table 1). Low hemoglobin concentrations were estimated in 45.33% (509/1123) cases. Beside this only 0.8% (9/1123) cases had shown higher level of hemoglobin concentration. Our result showed that, 33.28% (192/577) male and 58.06% (317/546) female participant had low hemoglobin concentration. Low hemoglobin concentrations primarily result from micronutrient (especially iron) deficiencies attributable to poor nutritional intake compounded by adverse socioeconomic conditions and food insecurity [17].

Generally, some people might also experience normal low hemoglobin concentrations as a natural way of life, simply depends on how their body works. Low counts in these cases shouldn't be alarming. Low hemoglobin level may occurs due to, anemia as a result of which RBCs being destroyed earlier than normal (hemolytic anemia). There are also certain other factors like, bleeding from digestive tract or bladder, heavy menstrual periods, chronic kidney disease, inability of bone marrow to produce new blood cells etc. This may be due to leukemia, other cancers, drug toxicity, radiation therapy, infection, or bone marrow disorders, poor nutrition, low level of iron, folate, vitamin B12, or vitamin B6 and other chronic illness, such as rheumatoid arthritis.

Table 1: Age group wise numbers of study participants

Age groups (in years)	Number of participants
1 to 10	82
11 to 20	147
21 to 30	270
31 to 40	209
41 to 50	174
above 50	241
Sex	
Male	577
Female	546
Total	1123

Except one case, the TLC count was found to be normal in all other study subjects. All the study samples were subjected to proceed for quantity estimation of DLC. Low monocyte count observed in 96.08% (1079/1123) patients. A monocyte is a type of WBC that is

produced by the bone marrow and helps to protect the body from foreign invaders, such as harmful bacteria and viruses. When there are a decreased number of monocytes (monocytopenia) in the blood, the body becomes more susceptible to illness. The observation of low monocyte count can occur for a variety of reasons, including physical illness, the use of certain medications, or vitamin deficiencies. Illnesses that affect the bone marrow, such as Human immunodeficiency virus (HIV), rheumatoid arthritis, or lupus, are among the most common causes for a low monocyte count.

In our study, only 0.36% (4/1123) patients have shown low level of lymphocyte count. Almost all the patients had found normal count of basophil and neutrophil count. However, 29.12% (327/1123) patients had shown high eosinophil count. Increased eosinophil count (eosinophilia) may occur in many disease states, including but not limited to the following conditions: Allergies, dermatologic disorders, parasitic infections, bacterial infections, myeloproliferative disorders and other malignancies, collagen-vascular diseases, side effects of medications. Eosinophil-associated diseases occur in all epithelial organs, including the gastrointestinal tract, urinary tract, upper and lower respiratory tracts, the skin, and the heart. When the body wants to attack a substance, such as an allergy triggering food or airborne allergen, eosinophils respond by moving into the area and releasing a variety of toxins. However, when the body produces too many eosinophils, they can cause chronic inflammation resulting in tissue damage. Eosinophils disorders are diagnosed according to the location where the levels of eosinophils are elevated.

Increased ESR-values occurred in 19.24% (111/577) male cases and 15.93% (87/546) female participants. The level of ESR increases in many diseases because of the production of "sticky" substances in the blood. ESR is often higher than normal in people with an autoimmune disorder like, Lupus, Rheumatoid arthritis in adults or children. An increased ESR rate may be due to some other infections, including: body-wide (systemic) infection, bone infections, infection of the heart or heart valves, rheumatic fever, severe skin infections, such as erysipelas, tuberculosis etc.

An elevated level of RBS observed in 7.75% (87/1123) cases and is considered pre-diabetic patients while 5.25% (59/1123) cases were considered diabetes having very high level of blood glucose. Prediabetes means the amount of glucose, also called sugar, in the blood is higher than normal but not high enough to be called diabetes. Although our body uses glucose (a form of sugar) for energy but, too much glucose in blood can damage our body over time. If any patients have prediabetes, also called impaired fasting glucose (IFG) or impaired glucose tolerance (IGT), it is more likely to develop type 2 diabetes, heart disease, and stroke. Diabetes mellitus leads to persistently elevated blood sugar levels. Over time, high sugar levels damage the body and can lead to the multiple health problems associated with diabetes. Again in our study, low level of blood sugar (Hypoglycemia) was also observed in 5.08% (57/1123) patients. It should be discussed as without sufficient glucose, our body cannot achieve its normal functions. Mildly low blood sugar levels are somewhat common for people suffering with diabetes; however, severely low blood sugar levels can be life-threatening. They may lead to seizures and nervous system damage.

A significant increase level of blood creatinine was seen in 13.45% (151/1123) cases. Elevated creatinine level signifies impaired kidney function or kidney disease as it was known that the kidneys maintain the blood creatinine in a normal range. As the kidneys become impaired for any reason, the creatinine level in the blood will rise due to poor clearance of creatinine by the kidneys. Abnormally high levels of creatinine thus warn of possible malfunction or failure of the kidneys. A low blood level of urea was detected in 8.73% (98/1123) cases. On the other hand, 24.84% (279/1123) study participants with elevated level of urea ('uraemia') were observed in our study. Similar as creatinine, a high level of blood urea ('uraemia') indicates that the kidneys may not be working properly, or dehydrated (have low body water content). On the contrary low blood urea levels are rare which are believed to be associated with liver failure [18]. Among the study participants,

only one patient was found to be infected with *Plasmodium falciparum* malaria parasite. On the other hand, 5.08% (57/1123) cases had shown to be infected with typhoid of which 32 cases were male and the remaining 25 cases were female. Among the typhoid positive cases, 26.32% (15/57) had shown low level of hemoglobin concentration. On the other hand 14.04% (8/57) patients with high level of ESR and 24.56% (14/57) with high eosinophil counts were observed in our study. Low monocyte count was observed in all the typhoid positive patients. High level of RBS was found in 17.54% (10/57) cases, high creatinine level in 10.53% (6/57) and high urea level was observed in 33.33% (19/57) cases. In our study, no case of co-infection of malaria and typhoid was observed among the study subjects.

CONCLUSION

A large number of patients with low hemoglobin contents were observed in our study. This indicates that initially patients become anemic when suffering with any kind of infection. Low monocyte count is an important marker for typhoid positive patients. Hematological and biochemical tests are believed as imperative means for early detection of any kind of illness.

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