

Research Article

The Relationship between Platelet Count and Haemoglobin Level

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Abstract: The relationship between platelet count and haemoglobin (Hb) level was carried out in Owerri metropolis among 100 volunteer with respect to differences between platelet count within Hb(g/dl) level within platelet counts. Blood samples were collected into EDTA anticoagulant bottles for both platelet count and haemoglobin estimation. Statistical analysis showed significant difference ($p < 0.05$) between Hb level that fell within platelet count $150-250 \times 10^9/L$ as (11.2 ± 1.57) and the Hb/g/dl level that fell within platelet count $251-400 \times 10^9/L$ as (9.9 ± 2.24) . Statistical analysis also show a significant difference ($p < 0.05$) between platelet counts that fell within the Hb level less than lib g/dl as (259.6 ± 77.4) and /platelet count that fell within lib level of 11-14 g/dl as (222.5 ± 43.9) . This implies that there is a relationship between low and high level of Hb on platelet count and low and high level of platelet count on haemoglobin level. Therefore, affirms that what affect the bone marrow would affect all the cells including the haemoglobin level and the platelets.

Keywords: Blood components, Platelet count, Haemoglobin level.

INTRODUCTION

According to medical dictionary, Blood is the familiar red fluid in the body that contains white and red blood cells, platelets, proteins and other elements [1].

In blood, the serum is the component that is neither a blood cell nor a clotting factor; it is the blood plasma with the fibrinogens removed. Serum includes all proteins not used in blood clotting id all the electrolytes, antibodies, antigens, hormones and any exogenous substances. Blood contains a non living fluid matrix (plasma) in which living cells is suspended. Blood contains 55% plasma and 45% formed elements. Plasma is over 90% water; it also contains electrolytes (salts), plasma protein, and substances transported by blood the three types of formed elements are erythrocytes (RBCS), leukocytes WBCS), and platelets.

Erythrocytes (RBCS)

They are the most numerous of blood cells, biconcave disk shape, Produced in the bone marrow. The life span is 100 - 120 days after which they fragment and are destroyed in the spleen mainly. It transports oxygen and carbon dioxide.

Leukocytes (WBCS)

They are formed in the bone marrow and made up of two major groups: Granulocytes which contain granules in their cytoplasm and lobed nuclei Neutrophils are phagocytes. Eosinophils attack parasitic worms, and lessen allergy attacks Basophils have a large U-or S- tamines and contain heparin. Agranulocytes contain no visible cytoplasmic granules. Their nuclei are spherical, oval, or kidney shaped. Lymphocytes act through antibodies or direct cell attack. Monocytes convert to macrophages once in tissues.

Platelets

They are formed in the bone marrow; thrombocytopenia is a disorder where there are not enough platelets in the blood. Thrombocytosis is a disorder where there are too may platelets 'circulating in the blood. Function of platelets is to help to stop bleeding latelets are the smallest of the three major types of cells, and only about 20% of the diameter of red blood cells, the most numerous cell of the blood. The normal platelet court is 150,000- 350,000 per microliter of blood, but since platelets are so small, they make up just a tiny fraction of the blood volume. The principal function of the platelets is to prevent bleeding [2].

Haemoglobin is a protein that is carried by red cells it picks up oxygen in the lungs and delivers it to the peripheral tissues to maintain the viability of cells. Haemoglobin is made from two similar proteins that stick together' both proteins must be present for the haemoglobin to pick up and release oxygen normally. Origin of Blood (Haemopoiesis). This is the formation of blood cellular components. All cellular blood components are derived from haematopoietic stem cells; in a healthy adult person approximately 10^{11} - 10^{12} .

New blood cells are produced daily in order to maintain steady state levels in the peripheral circulation.

Justification

All the blood components originate from the same bone marrow as seen in normal adult haemopoiesis, it is therefore assumed that what affects the bone marrow would affect all the cells including the haemoglobin level and the platelet. There is paucity of information on the relationship between low or high level of haemoglobin on platelet count

This work was therefore carried out to determine this relationship which will be of immense value to both physicians and scholars. Again most platelet disorders have been associated with Anaemia.

Aim and Objectives

To determine the relationship between the different levels of haemoglobin and platelet count of the same blood sample.

MATERIALS AND METHOD

Study Area

The research was carried out using the medical laboratory of Imo State University which is located in Owerri, the capital of Imo State in Nigeria.

Subject of Study:

A total number of 100 blood samples were collected from female students of Imo State University, test subjects were between 18-35years.

Ethical Clearance:

Introduction letter was obtained from my head of department medical laboratory science Imo State University with this letter approval was procured from all subjects before collection.

Sample Collection:

3 mls of blood was collected from each subject, from a prominent vein, using the standard venepuncture techniques. 3mls of each patient sample was dispensed into EDTA anticoagulant bottle for Haemoglobin estimation and platelet counts.

Haemoglobin Estimation

Method: Cyanmethaemoglobin [3].

Principle: When whole blood is diluted in drabskin's solution which contains potassium ferricyanide and potassium cyanide the red cell are hemolysed and the haemoglobin is oxidized the ferricyanide to methaemoglobin which is further converted to stable cyanmethaemoglobin the absorbance of the solution is then read in a spectrophotometer at wave length 540nm.

Procedure: 0.02ml of blood was measured carefully with a micropipette and dispensed into a test tube containing 4ml of Drabkin's fluid. This was mixed and left at room temperature for 5 minutes. The spectrophotometer was set at a wave length of 540nm. The absorbance of the cyan methaemoglobin standard was obtained and then the absorbance of the various sample were obtained in succession. The concentration of haemoglobin in the samples was obtained through the calculation below:

Concentration of Haemoglobin (g/dl)
= $\frac{\text{Absorbance of test} \times \text{Concentration of standard}}{\text{Absorbance of standard}}$

Platelet Count

Method: Neubauer ruled counting chamber

Principle: Blood is diluted in 20 in a filtered solution of ammonium oxalate reagent which lyses the red cells' platelets are counted microscopically using an improved neubauer ruled counting chamber and the number of platelets per liter of blood calculated.

Procedure: 0.38ml of filtered ammonium oxalate diluting fluid was measured and dispensed into a small tube, 20 μ l (0.2ml) of well mixed anticoagulated venous blood was added to it. The counting chamber was assembled and filed with the mixed sampled as described. The chamber was left for 20 minutes, undisturbed to prevent drying of the fluid, it was placed in a petridish on damp tissue and covered with a lid. The underside of the chamber was dried and placed on the microscope stage using 10x objective, the ruling of the grid was focused the central square of the chamber was brought into view 40x objective was used to focus the small platelets and will be seen as small bright fragment. Platelets in the small squares marked P were counted. Number of platelet was reported in 1 liter of blood. Number of platelet counted $\times 10^9$.

RESULT

From table 1 the mean and standard deviation of Hbg/dl level that falls within 150 - 250 $\times 10^9$ /L platelet count as (11.2+1.57) and Hbg/dl level that falls within 251 - 400 $\times 10^9$ /L platelet count as (9.9+2.24). Statistically, there is a significant difference ($p < 0.05$) between the Hbg/dl level that fell within 150-250

platelet count and Hbg/dl level that fell within 251-400x10⁹/L platelet count.

From table 2, the mean and SD of platelet count that fell within Hb g/dl level below 11g/dl

as(259.6+77.4) and platelet count that fell within Hb g/dl level of 11-14 g/dl as(222.5+43.9). It is shown that there is a significant increase (p<0.05) between platelet count fell below Hbg/dl level of 11andHblevel that fell within 11-14 g/dl.

Table 1: Mean and SD of Hbg/dl level that falls within platelet count of 150-250x10⁹/L: (n=67) and Hbg/dl level that fall within 251 - 400x10⁹/L platelet count(n=33).

Parameter	Platelet count between 150-250	Platelet count between 251-400	p. value
Hbg/dl	11.2±1.57	9.9±2.24	p>0.05

Table 2 : Mean and SD of Platelet count (x Count that fall within Hbg/dl level less than 11g/dl, (n=57) and platelet count (x10⁹/L) that fall within Hbg/dl level 11-14 g/dl, (n=43).

Parameter	Hbg/dl below 11	Hbg/dl between 11-14	p. value
Platelet count (x10 ⁹)	259.6±22.4	222.5±43.9	P<0.05

DISCUSSION

This study was conducted to establish the relationship between platelet count and haemoglobin level. Platelets are small, irregular shaped clear cell fragments which lacks nucleus containing DNA, they are derived from the fragmentation of precursor megakaryocytes [4]. They circulate in the blood of mammals and are involved in haemostasis leading to the formation of blood clot.

Haemoglobin is defined as an iron-containing oxygen transport metallo-protein in the red blood cell of all vertebrates. [5]. Bunn [6] also added that the production of haemoglobin continues in the Red cell throughout its early development from the proerythroblast to the reticulocyte in the bone marrow. The principal function of haemoglobin is to carry oxygen from the lungs to the tissues to burn nutrients to release energy and also to carry the resultant carbon-dioxide back to the lungs to be dispensed from the organism [7].

The result of this study shows that the mean Hbg/dl level that fall within platelet count of 150-250x10⁹/L is (11.2±1.51) and the mean Hbg/dl level that fall within platelet count of 251 -400 x 10⁹/L is (9.9±2.24). this shows that there is a significant difference (p<0.05) between the Hbg/dl level that falls within the platelet count of 150-250x10⁹/L and Hbg/dl level that falls within the 251-400x10⁹/L.

This work also show that platelet count that falls within Hbg/dl level below 11 (g/dl) has a mean of (259.6±77.4) and the platelet count that falls within H-14g-/dL Hb level has a mean of (222.5±43.9). This shows a significant increase (p<0.05) between the platelet count that falls within below 11g/dl level and 11-14g/dL Hb level.

From the result above, it is shown that when there is low platelet count (150-250x10⁹/L) there will be high haemoglobin level (11.2±1.57) and when platelet count is high (251-400x10⁹/L) haemoglobin level will be reduce haemoglobin level (9.9±2.24 g/dl).

Also, when there is low haemoglobin level, (below Hg/dL), there will be high platelet count (259.6±77.4) and high haemoglobin level (11-14g/dl), shows low platelet count (x10⁹/L) (222.5±4.9). The reason for the relationship between low and high platelet count on haemoglobin level and low and high haemoglobin level on platelet count, may be linked to the fact the blood components originates from the same bone marrow as seen in normal adult haematopoiesis. It is assumed that what affects the bone marrow would affect all the cells including the haemoglobin level and the platelet.

CONCLUSION

Since low platelet count shows increase haemoglobin level, high platelet count showed low haemoglobin level, low haemoglobin level shared high platelet count and high haemoglobin level showed low platelet count, it can be concluded that there is a significant relationship between low and high platelet count on haemoglobin level and low and high haemoglobin level on platelet count. The evaluated relationship will enable scholars for diagnosing purposes.

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