INTRODUCTION

Blood is 55% blood plasma and about 45% different types of blood cells. Over 99% of the solid particles present in blood are cells that are called red blood cells (erythrocytes) due to their red colour. The rest are pale or colourless white blood cells (leukocytes) and platelets (thrombocytes). Red blood cells look like discs with indentations on top and on the bottom. (1) They can bend easily to “squeeze through” narrow blood vessels. Red blood cells have no nucleus, in contrast to many other cells. Each red blood cell contains haemoglobin, which can transport oxygen. In tiny blood vessels in the lung the red blood cells pick up oxygen from inhaled air and carry it through the bloodstream to all parts of the body. When they reach their goal, they release it again (2). The cells need oxygen for metabolism, which also creates carbon dioxide as a waste product. The red blood cells then take up the carbon dioxide and transport it back to the lung. Then carbon dioxide is exhaled it while breathing out. Red blood cells can also take up or release hydrogen and nitrogen. When taking up or releasing hydrogen they help to keep the pH level of the blood steady; by releasing nitrogen the blood vessels expand, and blood pressure falls. Red blood cells have a life cycle of about 120 days (3). When they are too old or damaged they are broken down in the bone marrow, spleen or liver. The hormone erythropoietin, which is produced in the kidneys, promotes the production of red blood cells. The haematological test used for determining the size of red blood cells is Mean Corpuscular Volume (MCV) (4). It was first introduced by Wintrobe in 1929 and is expressed as femtolitres (10−15 litres) (μm3). The normal values for MCV are between 80-99 fl. The femtoliter is the metric unit of volume equal to 10−15 litres. One femtolitre is the same as one cubic micrometre (μm)3. MCV in fl = Volume of Packed Red Blood Cells/1000 ml of blood / Red Blood Cell count in millions/ml (4).

Packed cell volume (PCV) is the volume occupied by the red cells when a sample of anticoagulated blood is centrifuged. It indicates relative proportion of red cells to plasma. PCV is also called as haematocrit or erythrocyte volume fraction. It is expressed either as a percentage of original volume of blood or as a decimal fraction. Most clinical laboratories now use automated machines to perform haematology tests, including MCV (5,6). Newer machines, capable of calculating RDW or red cell morphology index, mean platelet volume, absolute lymphocyte count, and differential white cell count are now being used in many red cell morphology index, mean platelet volume, absolute lymphocyte count, and differential white cell count are now being used in many clinical laboratories. These instruments are also capable of producing histograms (6,7).

Vitamin B12 is distinctive among all vitamins due to its large size, complexity, and that it contains the metal ion cobalt. It is necessary for appropriate nervous system function and for the metabolism of carbohydrate, protein, and fat. Deficiencies in B12 can lead to inefficient erythropoiesis and megaloblastic anaemia. Furthermore, neurological disorders such as neuropathy, myelopathy, memory impairment, dementia, depression, and brain atrophy may occur in those with low B12 status.

MATERIALS & METHODS:

The study inhabitants consisted of 250 teenager aged 08-16 years leaving to schools in the rustic zone of the region. Those with olden times of hemolytic illness were barred in the study. Of all 250 subject matter were in use up for data analysis after excluding 5 cases with very high serum B12 values. Designed proforma encompass of required demographic silhouette and detail history was filled-up. Blood sample were collected under all aseptic conditions and sent to laboratory for analysis of complete hematogram, serum iron, and vitamin B12 levels. Inclusive hematogram was analyzed in automated analyzer. Serum B12 was measured in Electrochemiluminescence method in Cobas e-500 immunoassay autoanalyzer from Roche Diagnostics and serum Iron was measured by Iron Ferrozine method in Biosystem B 400 fully automated clinical autoanalyzer from Biosystem reagent and instruments. The cut off value for serum B12 was 200 pg/ml, accordingly, the study population was categorized as B12 deficient (B <200 pg/ml) and B12 non-deficient groups (B ≥ 200 pg/ml) In order to evaluate the accuracy of MCV as a screening parameter, a value of MCV>100 fl was considered as macrocytic. SPSS 17 software was used for statistical analysis. Categorical data were compared using Chi-square analysis and binary-logistic regression analysis. Independent’s test was used for comparison of patients’ laboratory data of the groups. Statistical significance was accepted at p<0.05

OBSERVATION & RESULTS

In the age group of 21-30, 8 subjects having normal MCV do not have normal B12 levels, instead the B12 levels were found low. In the age group of 31-40, 16 out of 19 subjects had normal MCV and low B12 levels. And in the age group of 41-50, 12 out of 13 subjects showed normal MCV and low B12 levels. Hence, no correlation is observed between normal MCV and normal serum vitamin B12 levels in majority of the cases. 71% males and 24% of the females from the age...
group 21-30, 39% males and 22% females of age group 31-40, and 56% males as well as 14% of the females from age group 41-50 did not show relative levels of MCV and serum vitamin B12.

High MCV levels are mainly found in cases of macrocytic anaemias caused due to folate or vitamin B12 deficiencies. Some liver diseases can also cause MCV to rise. Macrocytic anaemia describes an anemic state characterized by the presence of abnormally large RBCs in the peripheral blood. This abnormality is usually recognized by the automated blood cell counter and confirmed on review of the peripheral blood smear. The cause of macrocytic anaemia may be due to a variety of illnesses and demands further clinical and laboratory assessment. Macrocytic anaemia can usually be divided into two categories, megablastic and non-megablastic, based on the examination of the bone marrow. This categorization is important and frequently aids in determining the etiology of the anemia. Additionally, a careful review of the peripheral blood smear noting the morphology of the RBCs, as well as the other cellular elements and features on the smear, can provide important clues as to the etiology of the anemia. The erythroblasts become large, oval shaped and contain a characteristic immature, lacy nucleus. These bone marrow features are called “megablastic” and are highly suspicious of a vitamin B12 or folate deficiency-induced macrocytosis. (Florence Aslinia et al., 2006) Common pathologic causes for macrocytosis includes – drugs, alcohol, reticuloctyosis, non-alcoholic and alcoholic liver disease, hypothyroidism, vitamin B12 deficiency, folate deficiency, multiple myeloma, myelodysplastic syndromes, aplastic anaemia, acute leukaemia, etc. Drugs that may induce macrocytosis: chemotherapeutic drugs are 5-Fluoracil, Azathioprine, Hydroxyurea, etc., diuretics is Triamterene. Antiretrovirals are Zidovudine, Stavudine. Anti-inflammatory is Azathioprine, Hydroxyurea, etc., diuretics is Triamterene.

Low MCV levels were found in 21 females and 4 male subjects. Low levels of MCV are caused due to acute blood loss, haemolytic anaemia, such as autoimmune haemolytic anaemia, hereditary spherocytosis of non-spherocytic congenital haemolytic anaemia.

DISCUSSION
This means that if MCV is normal, it is not necessary that B12 levels might also be normal (Rohit Jain et al., 2012) (2). In cases of nitrous oxide induced B12 deficiency, such type of results are observed (Rusher and Pawlak, 2013). A high MCV can be used to make the diagnosis of B12 deficiency more probable, while a normal or low MCV can be used to make the diagnosis of B12 deficiency less probable (Oosterhuis WP et al., 2016)(4).

Mean Corpuscular Volume (MCV) has been proposed as the most sensitive haematological indicator of vitamin B12 deficiencies (as B12 is required and is mandatory for erythropoiesis) and it tends to increase in the subjects even before haemoglobin levels decrease significantly (Rajalakshmi Birur Rajashekar et al., 2017)(8) but from derived results it can be said that MCV levels should not be considered as a parameter for determination of vitamin B12 sufficiency.

71% males and 24% of the females from the age group 21-30, 39% males and 22% females of age group 31-40, and 56% males as well as 14% of the females from age group 41-50 did not show relative levels of MCV and serum vitamin B12 (9).

B12 deficiency was found in 45 patients of the total 114 patients. This makes 39.4% of the total patients. About 50% of these patients are males. Vitamin B12 deficiency can affect the body in a negative way. The most common disease caused as a result of B12 deficiency is pernicious anaemia. Pernicious anaemia is a type of anaemia with the term “anaemia” that usually refers to a condition in which the blood has a lower than normal number of red blood cells. In pernicious anaemia, the body has no ability to make enough healthy red blood cells because it does not have enough vitamin B12. The deficiency of vitamin B12 and iron has been described in patients with Chronic Atrophic Gastritis (CAG), as a result of an altered absorption. Therefore there is an onset of enter a microcytic or macrocytic anaemia (A. Noto et al., 2018) m (11). H. pyloroinfections can also cause atrophic gastritis in subjects with H. pyloroinfections and hence leading to vitamin B12 deficiency. Variations in the phenotype and genotype of the infecting H. pylori strain can play a role in the severity of the disease. However individuals infected with more virulent strains of H. pylorigenotypenever develop a severe disease. Host genotypes plays a significant role in H. pylorinofections. The tendency of an individual to respond to an infection with specific immune mechanisms can dramatically affect the severity of the disease and possibly put an individual at an increased risk of progressing to disorders such as atrophic gastritis. In patients suffering from atrophic gastritis, the stomach cells are no longer able to produce and secrete an important protein called intrinsic factor (IF). IF is absolutely essential for the absorption of vitamin B12. Another effect of gastritis is decreased hydrochloric acid production. This makes it harder for your body to break down food to get at the all-important B12 molecules. Lower levels of hydrochloric acid will actually encourage the growth of certain bacteria in the intestines, some of which use vitamin B12 for themselves. The vitamin B12 and the probability of recovery from major depression are positively related. (JukkaHintikka et. al. 2003) (10, 11) . Individuals with vitamin B12 deficiency from any cause should receive cyanocobalamin intramuscularly or subcutaneously 1000 µg/week for 1 month and monthly, thereafter. This time-honored method remains an acceptable form of treatment for all causes of vitamin B12 deficiency, particularly when cognitive impairment or neurologic disease is present.

CONCLUSION
From this study, it is concluded that normal Mean Corpuscular Volume (MCV) of an individual does not interpret that the serum B12 levels are also normal or high because in age group 21-30, 100% subjects, in age group 31-40, 84% subjects and in age group 41-50, 92% of the subjects did not have correlation between MCV and B12 levels. Hence, only MCV should not be used as a marker for determining B12 deficiency.
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