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Research Article on Fluid of Life: Blood and Disease Alterations

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Abstract: *Blood is a viscous fluid formed of cellular elements suspended in plasma. The cellular element composed of red blood cell, white blood cell and platelets. Plasma is a viscous and translucent Yellow fluid composition of water proteins inorganic Salts and organic compounds such as amino acids liquids and vitamins. Bleeding disorders are divided into two broad categories that is inherited and acquired. In contrast to inherited hemorrhagic diseases generally a single hemostatic abnormality is found multiple hemostatic defects are commonly present in acquired hemorrhagic diseases. Blood disorders in lupus include anemia and platelet disorders and white blood cell disorders and clotting disorders. The most common types of anemia are anemia of chronic disease and iron deficiency anemia and hemolytic anemia. Commonly encountered platelet disorders include antiphospholipid syndrome. These disorders are important to be aware of because they are commonly and counted in patients they may even be presenting features of the diseases. Genetic blood disorders are a group of disorders that are passed down from parents to their children.* [1,2,3,4,5]

Keywords*: Introduction, blood and its components,total blood count white blood cell count, red blood cell count, count ranges ,erythrocytes, leukocytes, platelets, functions , bone marrow , haemopoiesis, hematopoietic cells,blood disorders, alterations in blood count in smoking patients, conclusion.*

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I. Introduction:

blood is a collection of cells that have been specialized to perform a set of tasks within an organism. Blood is a tissue and consists of Plasma and cells. Blood is a connective tissue that consists of cell suspended in liquid Matrix . Blood count changes according to the lifestyle of a patient and increases and decreases among the various disorders. Increased blood count cause hyperplasia and decreased blood count cause anemic conditions. There are about 1 billion red blood cells in 2-3 drops of blood and for every 600 red blood cells there are about 40 platelets and onee white cell. Monitoring blood count decrease fat all conditions.[1,2,21,22]

Blood: blood is a viscous fluid formed of cellular elements suspended in plasma. The cellular element composed of erythrocytes (red blood cells) leukocytes (white blood cells) and platelets. Plasma is a viscous transmission fluid composed of water of 90% proteins of 7% organic salts of 1% an organic compound 2% such as amino acids, lipids and vitamins. The total body volume in human is about 5 years depending upon the body size. Outside the blood vessels blood undergoes a complex reaction called coagulation or clot formation which plays an important role in repairing damaged blood vessels and preventing blood loss.[4,5]

Blood components :

- Plasma
- Cellular elements

Composition of Plasma :

- Water constitutes of 90% of Plasma volume
- Solutes consists of 10% of Plasma and include plasma proteins and other organic compounds as well as inorganic salts.

1. Plasma proteins - plasma contains a rich variety of soluble proteins 7% by volume.

Albumin, globulin and blood coagulation proteins.

2. Organic compounds - they include nutrients such as amino acids and glucose vitamins and variety regulatory peptides steroid hormones and lipids.

3. Inorganic salts - the constituent 0.9% of Plasma volume in blood electrolyte such as Sodium Potassium and Calcium salts.[1,2,3,4,5]

4. **Erythrocytes Or red blood cells: red** blood cells are structurally and functionally specialized to transport oxygen from the lungs to the other tissues their cytoplasm contains the oxygen binding protein hemoglobin and mature red blood cells lack nuclei and cytoplasmic organelles which they lose during differentiation make sure erythrocytes therefore have a limited lifespan of 120 degrees in the circulation before they are removed by macrophages in the spleen and bone marrow.

5. Serum- portion of Plasma that separate from coagulum after clotting.[5,6,7]

Red blood cells are enucleated corpuscles that is nucleated in embryonic and fetal mammals and in other vertebrates. They are biconcave disc about 7 micrometer in diameter and to micrometer thick and its Rim and less than 1 micrometer at its center. The content hemoglobin which fills almost entire cytoplasm and erythrocytes are elastic and can withstand deformation. The number is about 4.5 to 5 million /mm^3. The lifespan of an erythrocyte in the bloodstream is 100 to 120 days which is abort 5 $x10^{11}$ erythrocytes are formed or destroyed each day. Electron is whole mass of red blood cells and their precursors in bone marrow.

Plasmalemma and stroma: the stroma is composed of proteins such as spectrum that are associated with the inner surface of the plasmalemma and it maintains the biconcave shape of the red blood cell and the external surface of the plasmalemma is covered by a carbohydrate rich glycocalyx which contains genetically determined antigens that a low blood types like A, B ,O, AB groups to the distinguished.[1,2,3]

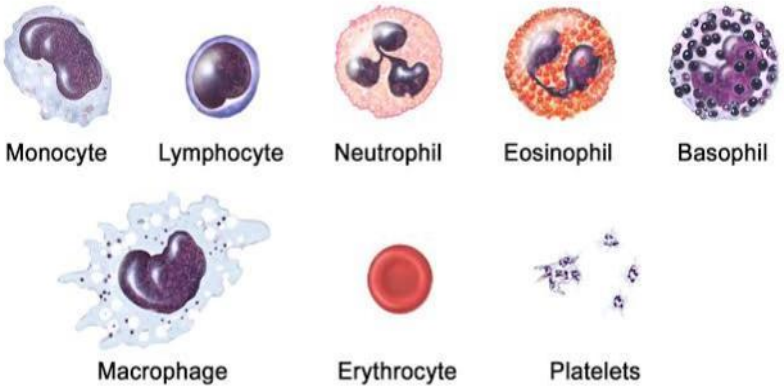
Hemoglobin: if hemoglobin molecule consists of polypeptide subunits each includes an iron containing him group hemoglobin exist in a different form distinguishable on the basis of the Amino acid sequence of their subunits in humans only three forms are considered normal and postnatal life.HbA1 constitutes 97% HbA2 constitutes 2% HbF constitutes one percent of the hemoglobin of healthy adults and HBF makes up around 80% of the hemoglobin of newborns however this proportion gradually decreases and normal adult levels are reached at about 8 months of age.[5]

White blood cells or leukocytes

- Leukocytes can be subdivided into granular leukocytes and non granular leukocytes
- Granular leukocytes are neutrophils basophils and eosinophils and non granular leukocytes and monocytes and lymphocytes.
- In healthy individuals the total number of circulating local site is about 4000 to 10000/mm^3
- The decrease the count below the lower range is called leukopenia which occurs in excessive exposure to x-ray and after prolonged treatment with steroids.

Differential cell count : blood is also studied by spreading a drop on a flight to produce a single layer of cells the cell sustain it differentiated by type and counter to reveal disease related changes in their relative numbers less me a sari usually stained with a mixture containing kerosene and methylene blue blood cells and their components exhibit four major staining properties that a lot of the cell types to be distinguished :

- Basophilia is affinity for methylene blue basophilic structures stain purple to black
- Azurophiliais affinity for the oxidation productions of methylene blue called as azures.
- Eosinophilia stain pink to orange
- Neutrophilia is affinity for a complex of dyes in mixture and neutrophilic structures stain pink.



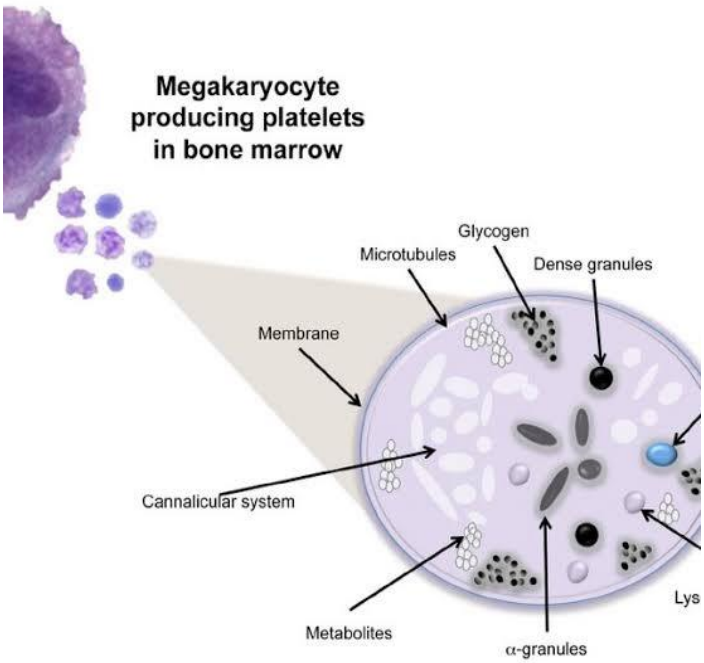
60% neutrophi4% eosinophils (0% to 5%) ,0.5 to 1% Basophils (0% 2.%)
5% monocytes (1% to 9%)
40% lymphocytes (20% to 40%).[3,4,5]

Functions of white blood cells :

- Neutrophils play a central role in inflammatory process
- Major basic protein which can function as a Cytoxan involved in the response of the body against parasitic infections.
- Heparin and histamine are vasoactive substances and Ireland the blood vessels and make wasn't walls more permeable and prevent blood coagulation.
- Monocytes also give rise to mononuclear phagocyte system which include his two sides and multinucleated Giant cells hepatic macrophages cells microglia of central nervous system and macrophages of skin antigen presenting cells of lymphoid organs and osteoclast of bones.
- B Lymphocytes responsible for humoral immune response and produce antibodies
- T lymphocyte responsible for cell mediated immune response.[3,4,5]

Blood platelets (thrombocytes) :

- Blood platelets or thrombocytes are the smallest formed elements in the blood they are cytoplasmic fragments of very large strombus right that are found in the bone marrow.
- Their number is 150000 to 400000/$mm^{3.}$
- Bare round or oval and biconvex disc 1.5 to 3.5 micrometer in diameter.
- The cytoplasm is divided into two zones and Outer hyalomin and inner granuloma which contains a few mitochondria glycogen granules and a variety of purple granules.
- Different types of vesicles contain either serotonin or compounds important for blood coagulation they also contain platelet derived growth factor which may play a role in the repair of damaged tissue.
- Platelets have an important physical role plugging owns and they contribute to the cascade of molecular interactions among the various clotting factors is dissolved in plasma.



Platelet Structure

Clotting factors - clotting involves a cascade of molecular interactions among several plasma proteins and ions the cascade can be initiated by two converging Pathways each of which results in the conversion of fibrinogen into fibrin by the enzyme thrombin.

Role of platelets :

- Primary aggregation ,secondary aggregation.
- Blood coagulation
- Clot retraction
- Clot removal.[8,9]

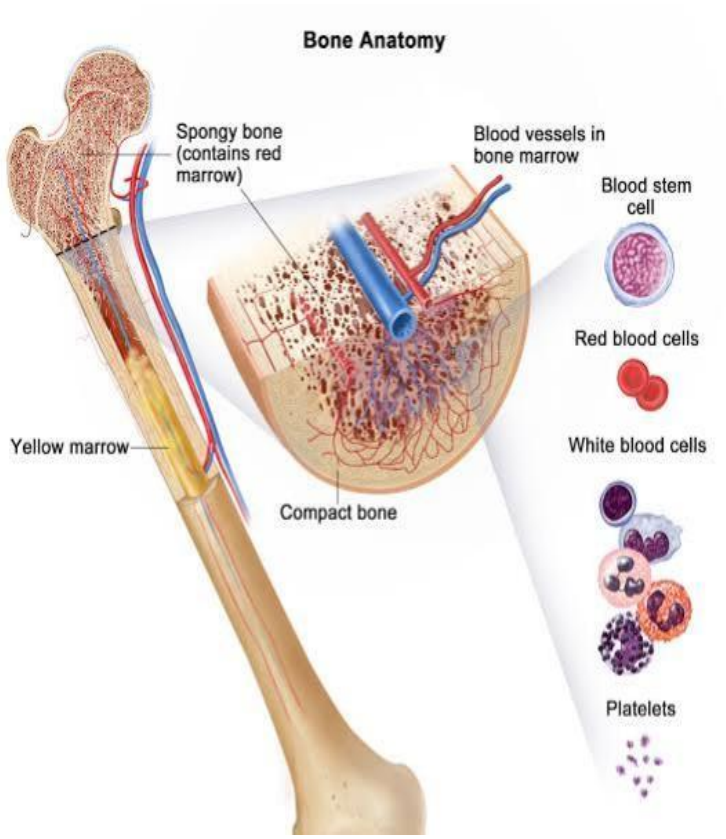
Cell type	Main products	Main functions
Erythrocyte	Hemoglobin	Carbon dioxide and oxygen transport.
Leukocytes		
Neutrophils	Specific granules and modified lysosomes	Phagocytosis of bacteria
Eosinophils	Specific granules and pharmacologically active substances	Defence against parasitic helminths and modulation of inflammatory processes
Basophil	Specific granules containing histamine and heparin	Release of histamine and other inflammation mediators
Monocyte	Granules with lysosomal enzymes	Generation of mononuclear phagocyte system cells and tissues phagocytosis and digestion of Protozoa and virus and sensient cells
B lymphocyte	Immunoglobulins	Generation of antibody producing terminal cells
T lymphocyte	Substances that kill cells and substances that control the activity of other leukocytes	Killing of virus infected cells
Natural killer cells	Attacks virus-infected cells and cancer cells without previous stimulation	Killing of some tumor and Virus infected cells
Platelets	Blood clotting factors	Clotting of blood

Haemopoiesis :[18,19]

During fetal development the formation of blood cells is called as haemopoiesis commences in wall of the Yolk sac after the second month of the fetal development the liver and the spleen become the dominant sides of haemopoiesis from the 6th month and dominating from the 7th month onwards the formation of the blood cells occurs in bone marrow which is the major site of formation blood cells in normal adult men.

Hematopoietic cells : the basis of haemopoiesis is a small population of self replicating stem cells which ultimately can generate all types of blood cells and their progeny may develop into lymphocytic system or plural portent heamalstemcells.

Bone marrow : functionally and histological there are two types of bone marrow yellow and red bone marrow. Yellow bone marrow which harbours main the adipocytes dominates in the hollow of the diaphysis of adult long bones. Haemopoiesis occurs in red bone marrow which is typically found between the trabeculae of spongy bone in the epyphases of adult long bones. Hematopoietic cells Surround the vascular sinusoids under supported by reticular connective tissue and in addition to the endothelial cells of the sinusoids and the reticular size of the connective tissue macrophages are frequent in red bone marrow.



Complete blood count in both males and females :

Blood cell types	**Men**	**Women**
Red blood cell	4.5 to 6.0Million/microlitre	**4.0 to 5.0 million per microlitre**
White blood cell	4.5 to 11000 per micro litre	4.52 11000 per microlitre
Platelet	150-250 Thousand per microlitre	150 - 450 1000 per microlitre
Hematocrit	42 % to 50%	36% to 45%
Hemoglobin	14 -17 grams per 1000 ml	12 - 15 G per 1000 ml

hemoglobin level chart

Male	
For age 12 to 18 years	13.0 to 16.0 mean 14.5
Age more than 18 years	13.6 to 17.7 mean 15.5
Females	
Age 12 to 18 years	12.0 to 16.0 mean 14.0
Age greater than 18 years	12.1 to 15.1 mean 14.0
Children	
Birth	13.5 220 4.0 mean 16.5
1 month	10.0 to 20.0 main 13.9
1 to 2 months	10.02 18.0 mean 11.2
2 to 6 months	9.5 to 14.0 mean 12.6
6 months to 2 years	10.5 to 13.5 main 12.0
2 to 6 years	11.5 to 13.5 main 12.5
6 to 12 years	11.5 to 15.5 main 13.5

White blood cell count

Parameter	Unit	Males	Females
Lymphocytes	$10^3/mm^3$	7.52+/-0.86a	6.27+/-0.40a
Neutrophils		1.85+/-0.15a	3.60+/-0.31b
Monocytes		0.95+/-0.01a	1.25+/-0.09b
Eosinophils		0.03+/-0.01a	0.03+/-0.00a
BAasophils	$10^3/mm^3$	0.03+/- 0.01a	0.03+/- 0.00a

Bleeding disorders : [5,6,7,8]

Variations in the number of red cells :

- **Physiological variations**

Increase in red blood cell :

Age
Sex
Higher altitude
Muscular exercise
Emotional conditions
Increase environmental temperature
After meals

Decrease in red blood cell :

- High barometric pressure
- After sleep
- Pregnancy

Pathological variation

- Polycythemia
- Anaemia.

Red blood cell disorders

- Erythrocytosis
- Polycythemia
- Anaemia
- Iron deficiency anaemia
- Anaemia to haemolysis
- Sickle Cell anaemia
- ErythroblastosisFetalis
- Thalassemia
- Pernicious anaemia
- Aplastic anaemia.

Erythrocytosis :

- Condition with an increase in circulating red blood cells. Two types relative and absolute.
- Relative polycythemia occur as a result of loss of fluid with haemo concentration of cells
- Seen in vomiting diarrhoea or loss of electrolytes with accompanying loss of water and increase in number of red blood cell is only relative to the total blood volume.
- Absolute polycythemia true idiopathic increase in the number of circulating red blood cell of the hemoglobin level and bone marrow with an inherited increased proliferative activity.
- Secondary apsolute polycythemia is increase in red blood cell mass result and to enhance stimulation of red blood cell production.

Polycythemia :

chronic stem cell disorders with an insidious onset characterized as a fan hyperplastic malignant and neoplastic marrow disorder. Absolute increase in the number of circulating red blood cell and in the total blood volume because of uncontrolled red blood cell production and accompanied by increase in WBC and platelet production.

Laboratory findings:

RBC - normochromic normocytic - greater than 10000.000 cubic mm
Hemoglobin greater than 20 gram per DL
Platelets 4 lakh to 8 lakh /dl
Bone marrowhypercellular megakaryocytes are present.

Anaemia :

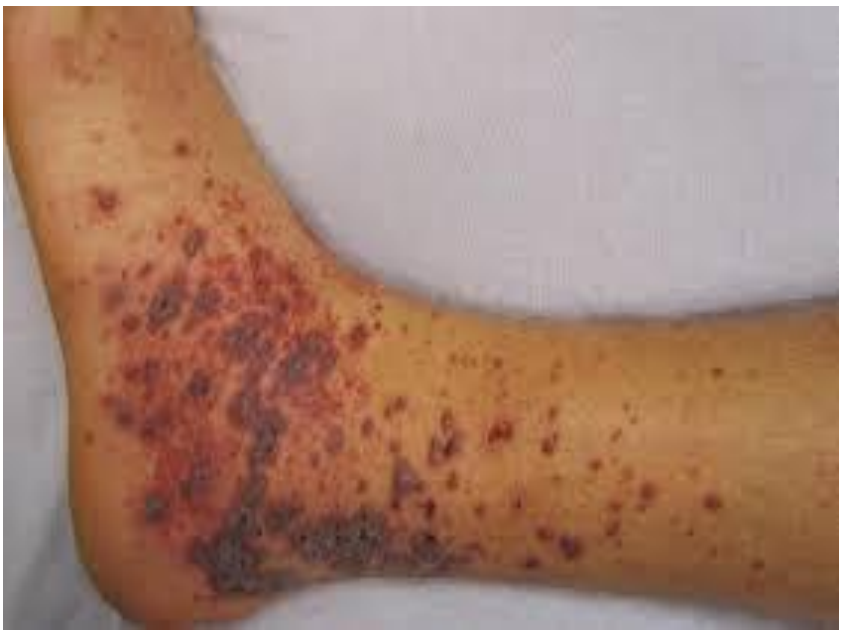
Anaemia refers to reduction in red blood cell count and hemoglobin count and packed cell volume count it can also be defined as a lowered ability of the blood to carry oxygen.

Normocytic anaemia - occurs when the overall hemoglobin levels are decreased but the red blood cell size remains normal causes include acute blood loss anaemia of chronic disease.

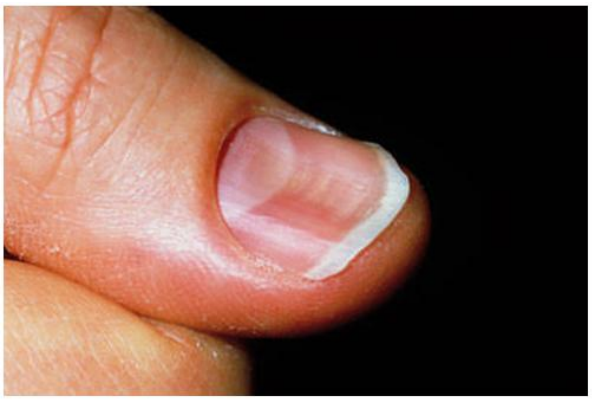
Microcytic anaemia - result of hemoglobin synthesis failure or insufficiency and iron deficiency anaemia thalassemia

Microcytic anaemia - megaloblasticanaemia the most common cause of microcytic anaemia is due to A deficiency of vitamin B12 Folic acid and both also seen in Hypothyroidism and alcoholism.

Hypochromic microcytic anaemia - iron deficiency anaemia :



Iron deficiency anaemia is defined as a reduction in total body iron to an extent that iron stores are fully exhausted and some degree of tissue iron deficiency is present. Females are mostly affected



Laboratory findings : Microcytic hypochromic anaemia due to inadequate supply of iron for normal hemoglobin synthesis
Low hemoglobin (RBC 3 million to 4 million cubic mm)
Plummer vinson syndrome - rare syndrome and in middle aged white women

- Iron deficiency and malnutrition causes this disease
- Iron supplementation is treatment.

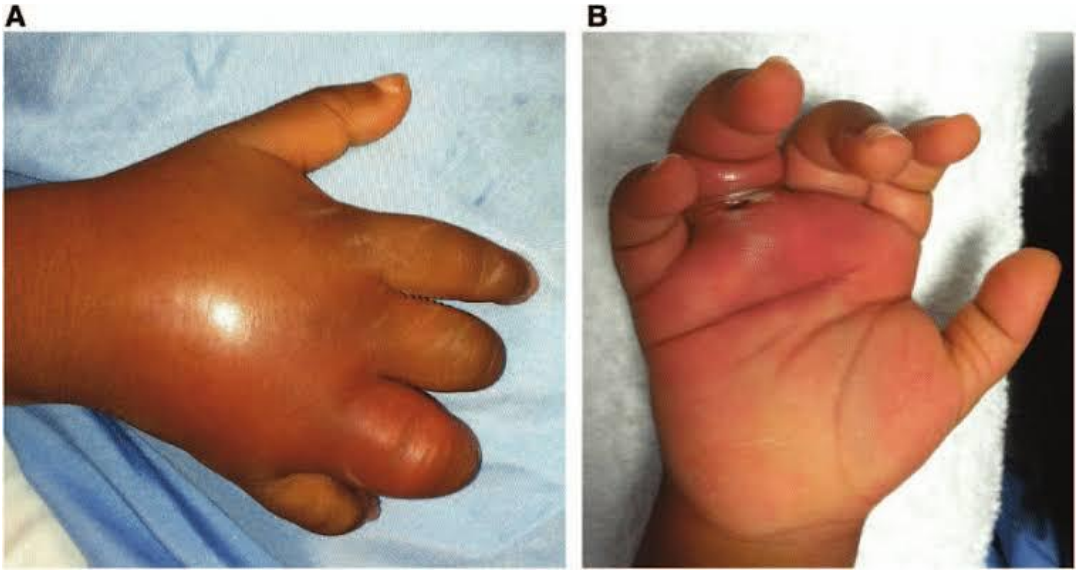
Anaemia to haemolysis

- Normal RBC lifespan is 90 to 120 days
- Himalaya take disease result in any Miya if the bone marrow is not able to replenish adequately the premature early destroyed red blood cells are inherited or acquired.
- Free mechanism for accelerated destruction of red blood cells are molecular defect inside the red blood cell and abnormality in membrane structure and function and environmental factor and mechanical trauma.

Laboratory findings - an elevated reticulocyte count is the most useful indicator of humour lysis in reflecting erythroid hyperplasia of the bone marrow.
Sickle Cell anaemia–Hereditary type of chronic hemolytic anaemia transmitted as a mendelian dominant and non gender linked characteristic

- Exclusively in black and invites of Mediterranean region
- Hemoglobin is genetically altered to produce hemoglobin as which results in substitution of a line for glutamine at the sixth position of the beta globin chain.
- Erythrocytes have their normal by concave discoid shape distorted generally presenting in Sickle Cell shape
- Reduces both their plasticity and lifetime from the normal 120 days average down to 14 days
- This results in underlying anaemia and hypertrophic bone marrow
- In heterozygote 40% of haemoglobin is hbs
- Deoxygenation of the himmati of hbs results in hydrophobic interactions between adjacent hbs molecule with aggregate into larger polymer and distorting of RBC into classical shape and observe microcirculation which results in hypoxia and promotes sickling.

Radiographic features - hair on end is perpendicular trabeculations radiating outward from the inner table. Outer table of bone marrow a absent and the dipole thickened and generalized osteoporosis and enlarged medullary cavity is within cortices
Laboratory findings - RBC maricha level of 100000 cells per cubic mm and increased hemoglobin level.
High rate Akele site account and increase marrowresponse and elevated lactic hydro Journeys and decrease levels of hepatoglobine which confirms haemolysis.



ErythroblastosisFetalis - congenital hemolytic anaemia due to RH incompatibility results from the destruction of fetal blood brought about by a reaction between maternal and fetal blood factors.
If both parents are homozygously positive in hand infant will be RH positive and no maternal immunization.

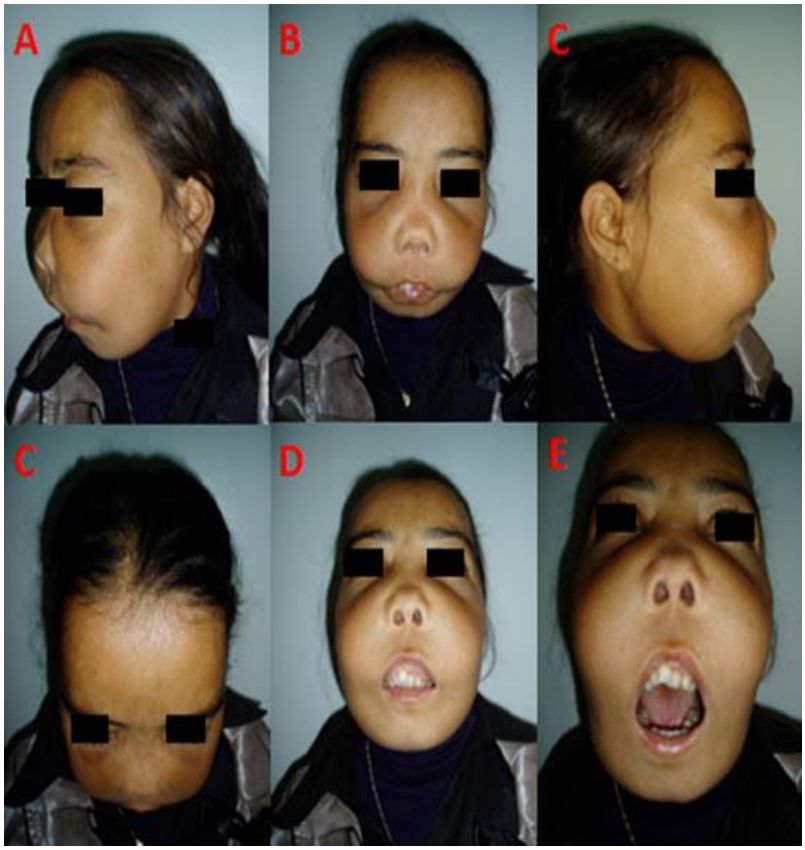
Laboratory findings :

RBC count decreased in large number of normal blood for nucleated red blood cells.

Thalassemia - Thalassemia is a group of genetic disorders of hemoglobin synthesis characterized by a disturbance of either Alpha or beta hemoglobin Sen production. An estimated 900000 births are expected to occur in next 20 years.

Laboratory findings

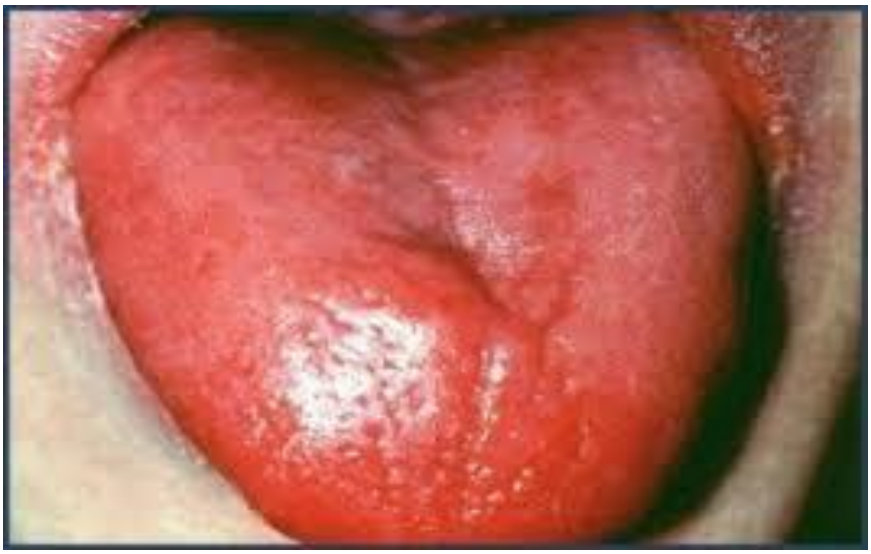
- Hypochromic microcytic
- RBC exhibiting poikilocytosis and ansiocytosis
- Safety pin cells and nucleated RBC in the circulating RBC is also a characteristic feature
- WBC frequently elevated
- Bone marrow cellular hyperplasia with larger number of immature primitive and stamp from of RBCs
- Supra vital staining methylene blue demonstrate inclusion bodies.
- Radiographic findings results in veterinary and hair on end and salt and pepper effect which is called as Peculiar trabecular pattern of maxilla and mandible Apparent cause meaning of some traffic and the blurring and disappearance of others.



Megaloblasticanaemia and Vitamin B12 deficiency anaemia

- It is adult form of anaemia that is associated with gastric atrophy and a loss of intrinsic factor production gastric secretion and rare congenital autosomal recessive form.

Autoimmune disease resulting from auto antibodies directed against intrinsic factor and gastric parietal cells.



Laboratory findings

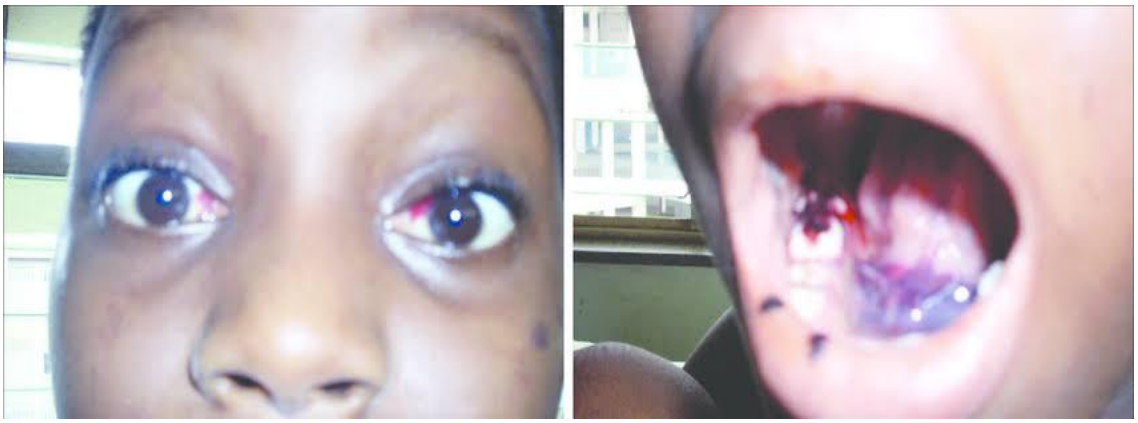
RBC count is seriously decrease of an 21 lakh aur less per cubic mm

Microcytosis is one of the chief characteristic feature of all the variation in shape of cells present

Indirect by Ruben may be elevated and serum lactic dehydrogenase is markedly increased which results in decrease of serum potassium cholesterol and Alkaline phosphatase.

Bone marrow hypercellular and show trillineage differentiation.

Aplastic anaemia : aplastic anaemia is a rare blood disease in which peripheral blood pancytopenia results from reduced or absent blood cell production in the bone marrow and normal heamopoeitic tissue in the bone marrow has been replaced by fatty marrow.
Primary plastic anaemia also called as Frank Turner syndrome which is congenital sometimes familial aplastic anaemia is associated with other congenital defects including born abnormalities and micro Shefali and generalized Olive brown pigmentation of the skin.
Secondary aplastic anaemia known etiology exposure of the patient various drugs or chemical substances or to Radiant energy in the form of X rays radium or radioactive isotopes.



Laboratory findings - RBC diminished as low as 100000 cells per cubic mm and decrease in haemoglobin level.[5,6,7,8]

White blood cells disorders

- **Physiological variations**

Age
Sex
Diurnal variations
Exercise
Emotional condition
Sleep
Pregnancy

- **Pathological variations**

Leukopenia
Leukocytosis
Neutrophilia
Basophilia
Monocytosis
Lymphocytosis
Leukaemia.

- **Disorders**

Leukocytosis
Leukopenia
Agranulocytosis
Acute leukaemia
Neutropenia
Chronic leukaemia.

Leukocytosis : defined as abnormal increase in the number of circulating WBC and considered to be a manifestation of the reaction of the body to a pathologic situation. It may also occur after exercise conversion such as epilepsy emotional stress pregnancy anaesthesia and epinephrine administration.

Main types are –neutrophilia
Eosinophilia
Basophilia
Lymphocytosis
Monocytosis.

Leukopenia : leukopenia is a decrease in the number of white blood cells found in the blood which places individuals at increased risk of infection

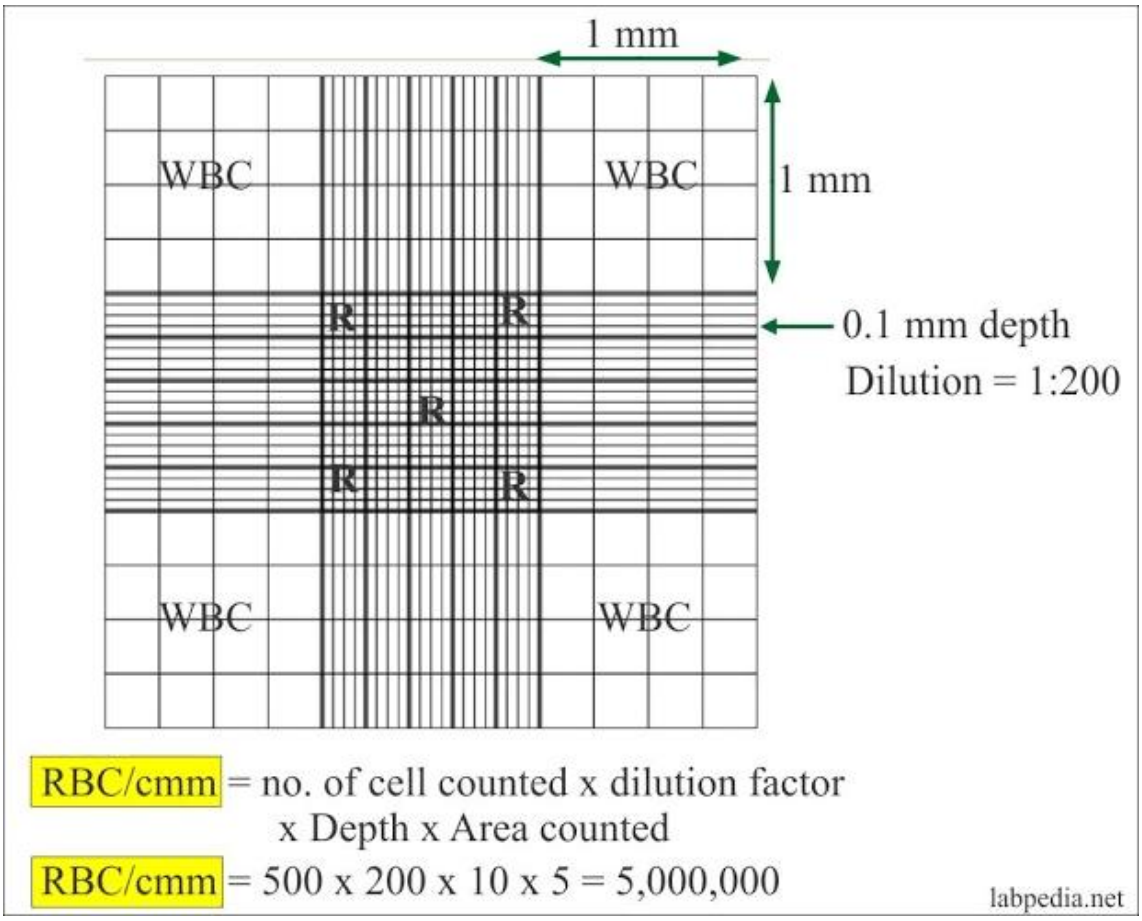
Agranulocytosis : serious disease involving the WBC and is characterized by decrease in the number of circulating granulocytes and the terms agranulocytosis and neutropenia are commonly used interchangeably for a reduced of quantity of leukocytes
Laboratory findings : WBC are often below 2,000 cells per cubic mm
Almost complete absence of granulocytes
RBC and platelet counts are normal.
Cyclic neutropenia : cyclic neutropenia is a rare hematologic disorder characterized by repetitive episodes of fever mouth ulcers and infections attribute it to recurrent severe neutropenia.
Radiographic features : mild to severe loss of superficial alveolar bone and pubertal Periondontitis.
Laboratory findings : patient exhibit a normal blood count which over a period of 4 to 5 days begins to show up precipitous decline in neutrophil count compensated by an increase in monocytes and lymphocytes.
Chediakhigashi syndrome : is a rare autosomal recessive immunodeficiency disorder characterized by abnormal intracellular protein transport.
Laboratory findings : exhibit giant abnormal granules in a peripheral circulating leukocytes and in the marrow precursors.
Granules represent abnormal lysosomes where resemblance to toxic granulation and Dol bodies.
Leukaemia: leukaemia is a disease characterized by the progressive overproduction of WBC which usually appear in the circulating blood in an immature form.
Laboratory findings :
Acute leukaemia - both bleeding and coagulation time are prolonged
Leukocyte count mein race up to 1 million cells per cubic mm.
Chronic leukaemia - anaemia and thrombocytopenia site area are common
WBC count over 5 million cells per cubic mm.
Platelets and its disorders :
Physiological variation

- Age
- Sex
- Higher altitude
- After meals

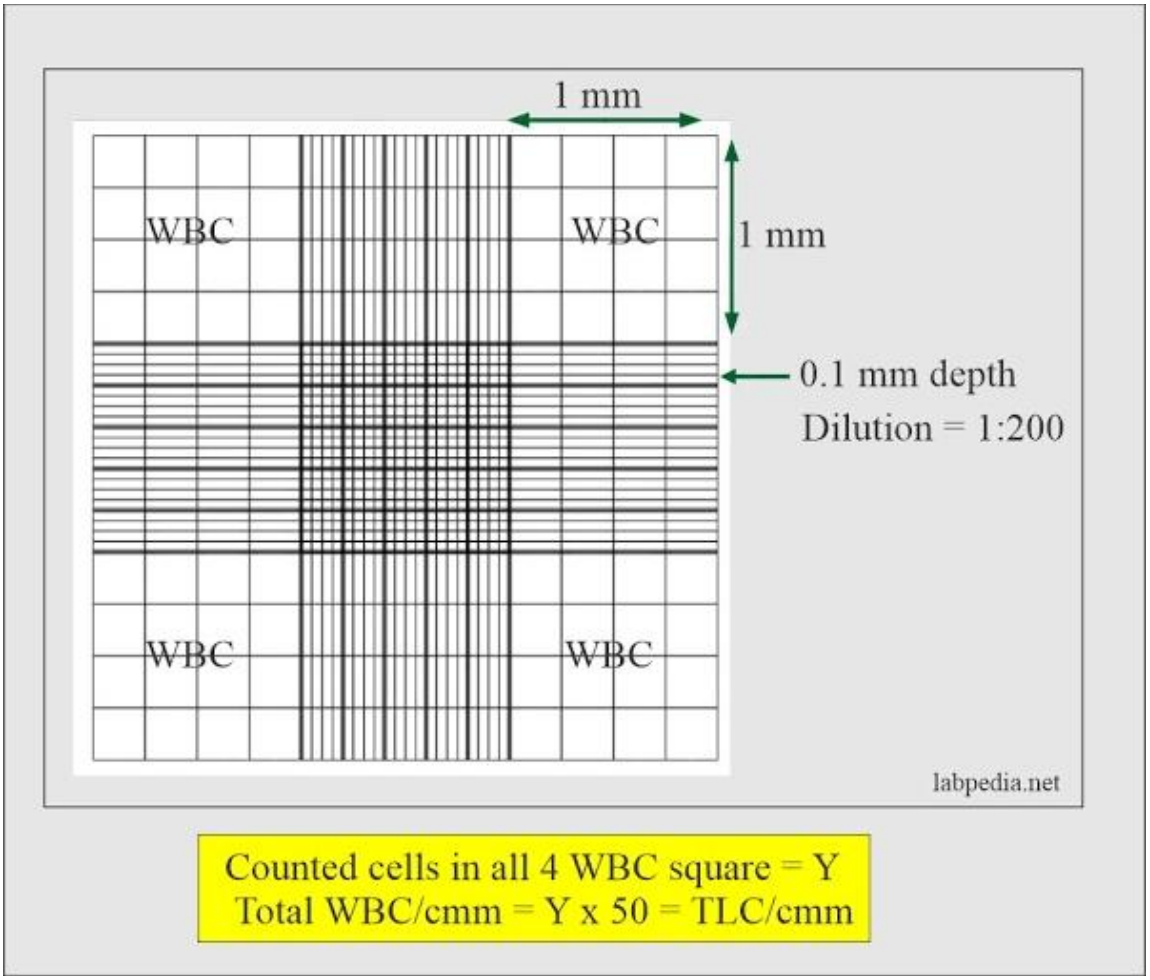
Pathological variation :
Thrombocytopenia–Occur when platelet quantity is reduced and are caused by decrease a production in the bone marrow and accelerated destruction of platelets.
Laboratory findings - platelet count is usually below 60000 platelets per cubic mm and bleeding time is prolonged.
Thrombocytosis - condition characterized by an increase in the number of of circulating blood platelets.
Laboratory findings - platelet count is increased
Clotting time and clot retraction or normal.
Haemophilia - blood disease characterized by prolonged coagulation time and hemorrhagic tenancies.
Laboratory findings - prolonged coagulation time
Bleeding time normal.
Von willebrand disease - a unique disorder that was described originally by Erich von willebrand in 1926 can result from inherited defects in concentration and structure of Von willebrand factor.
Laboratory findings - clotting time usually normal may be slightly for long
Bleeding time shows variation
Prothrombin time normal.[5,6,7,8{
Methods : [21,22]
Total erythrocytes counting :
Aim - to enumerate the total number of red blood cells of a given blood sample.
Methods : photoelectric counting method
Electric counting method
Haemocytometer accounting method..
Haemocytometer counting method :
Requirements - hemocytometerchamber ,cover slip , light microscope, RBC pipette ,RBC diluting fluid (Haeyem's lution for physiological saline 0.85% NACL).
Procedure : blood should be carefully drawn to the 0.5 mark of the RBC pipette

- An isotonic solution normal saline for him solution should be drawn to the or not one mark to the dilute the blood
- The blood and diluting fluid are mixed by shaking the pipette vigorously in a horizontal position for 2 to 3 minutes to ensure complete haemolysis of WBC.

- 2-4 drops of mixture fluid are discarded and the end of the pipette.
- The tip of the pipette is touched to the slide of the hemocytometer chamber and a drop of fluid will run under the cover glass.
- Wait for about 2-3 minutes as erythrocytes require settling time to AC I'm a single level.
- Counting method - total number of cells in five squares in the centre of the counting chamber is determined under the high dry objective of the microscope 40x.
- Calculation - RBC per micro litre or mm cube equal to number of cells in 5 square (80 small squares)xdilution number x reciprocal of volume.
- Dilution number equal to 0.5 :100 is equal to 20
- Reciprocal of volume equal to 50
- RBC/microlitre equal to no.x200x50.
- Normal RBC range in human males - 4.7 to 6.1 billion cells per microlitre
- Normal RBC range in human females - 4.2 to 5.4 million cells per microlitre.



White blood cell count :
Aim - to numerator the total number of leukocyte of a given blood sample



Materials - hemocytometer chamber ,cover slip, light microscope, WBC pipette, WBC diluting fluid 1% HCL or 1% glacic acetic acid.

Procedure - brush should be carefully drawn to the 0.5 mark of the WBC pipette.

- WBC reagent should be drawn to the 11 mark to dilute the fluid
- The blood and diluting fluid and mixture by shaking the pipit vigorously in a horizontal position for 2 to 3 minutes 24 complete haemolysis of RBC
- Two to four drops of mixture fluid are discarded and the end of the pipette.
- The tip of the pipit is touched to the slide of the thehemocytometer chamber and a drop of fluid will run under the cover glass
- Wait for about 2 to 3 minutes as leukocytes require setting.

Counting -Total number of cells in squares at the corner of Counting chamber is determined under the low objective of the microscope 10x

Calculation : WBC per micro L or m m cube equal to number of cells in squares 64 small squares per 4 x dilution number x reciprocal of Chamber depth

Dilution number equal to 0.5 :10 =20

Depth of the chamber =1/10mm

RBC /microlitre = No./4x20x10.

Normal WBC range - are normal number of WBC in the blood 4500 -11500 WBC per microlitre.[21,22]

Platelet count–

Principal - a platelet count is the enumeration of platelets which are tiny cells smaller than RBC which help the blood clot and it may include in the CBC or complete blood count if the the physician sees it as necessary and anticoagulated blood sample is drawn from a patient which needs to be venous blood due to the nature of the test then it is fixed with the reagent in one is to 20 ratio that is 0.2 ml blood made up with creative ml dilation fluid just like WBC count dilution and charged into an improved hemocytometer chamber on both sides then the counting is performed under 40x objective in the area provided of RBC counting.

Materials - improved hemocytometer chamber, micropipette, venous blood, reagent ammonium oxalate 10 gram per ml preferably with filter paper, compound microscope.

Procedure -

- Once you prepare the ammonium oxalate by mixing it from a still standpoint because the agent has a tendency to settle down to the bottom of the flash then you can use it to into your dilute your blood which will destroy the red blood cell so that you can view the platelets as tiny shimmering fragments under microscope
- Next chat your chamber slowly via a 45 degree angle
- Place the Chamber inside a Petri dish with wet cotton and cover it up and cover it with the late and wait for 15 to 20 minutes
- Count the cells in the 5 Rs if there is no thrombocytopenia and multiply with thousand
- Is the cell count is less than 1 lakh then you need to count all the 25 boxes in the RBC counting area and multiply what you find by 200.
- **Calculation -** in case of platelets count the dilution in is the same as WBC count but the counting is performed in the RBC area the the VCF is 50 and DCF is 20 thus giving a multiplying factor for the cells counted as thousand.

Total number of cells counted X dilute factor X 1 by volume factor equal to cells per mm cube.[21,22,23]

Hematocrit–

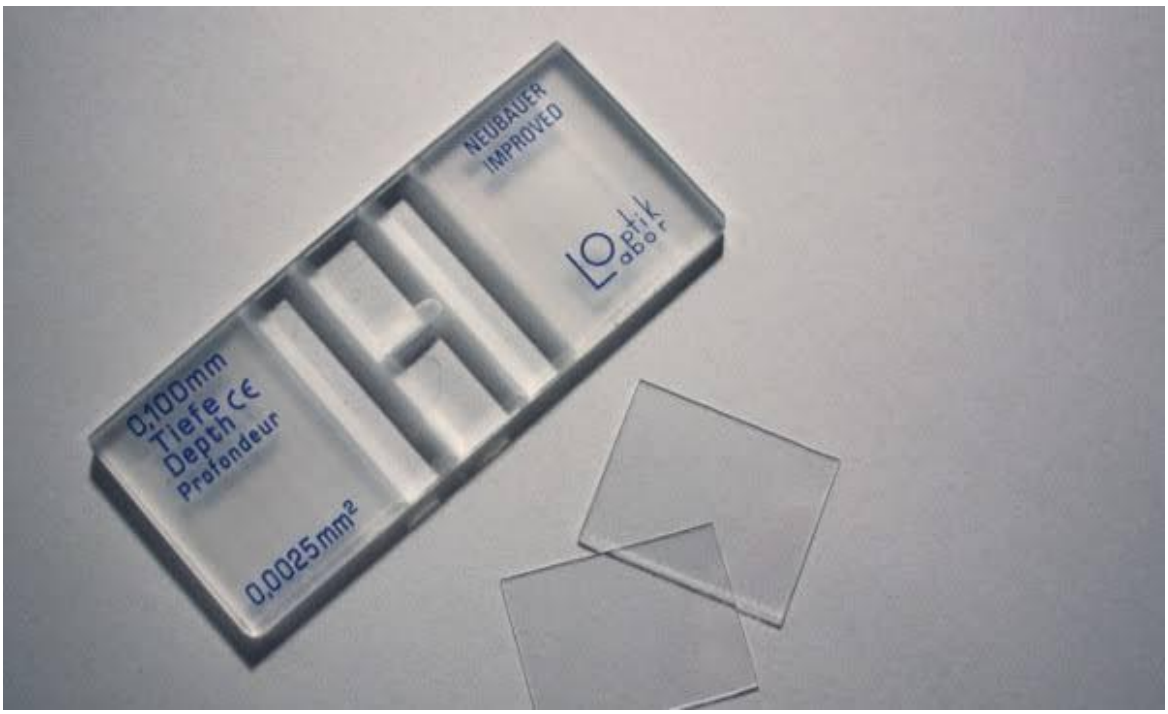
Principle - hematocrit literally means the judgement of blood in Greek and is a term coined by Swedish professor of physiology Magnus Blitz it is also called erythrocyte volume factor EVS which is a pro in which anticoagulated blood of the patient is drawn into a capillary tube and till its three fourth volume is filled with blood and then sealed by sealant clay on the opposite side on the tube where blood has been drawn.

Materials - patients venous blood, capillary tube,microhematocrit centrifuge.

Approved silent play ,gloves, one of the measuring apparatus.

Procedure

- Fill the tube with blood three fourth of its volume
- See the opposite side of the tube which is not contain contaminated with blood
- Prepare balance for it in the centrifuge and insert it into the slot where the sealed clay part faces outside



Centrifuge as stated above in read using one of the methods stated in case you are using a handheld PCV reader the zero line is adjusted just about the sealant between sealant and beginning of the RBC packet cells and the beginning of the plasma line is set on the hundred line mark then read the size of the package cell volume and report in percent in case you're using a sample ruler the length of the red cell column in mm is divided by the length of the total column of the tube and reported in percentage.[24,25]

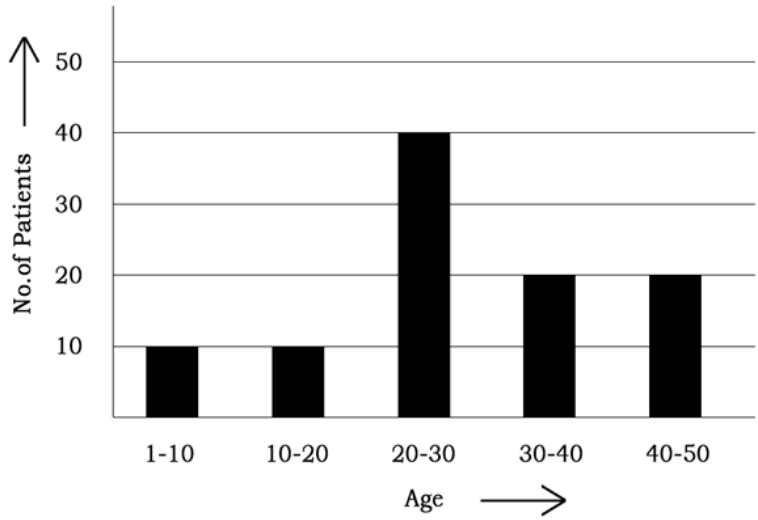
Results and general discussion :

- Around 100 patients are taken and are studied.
- Number of males are 50.

- Number of females are 50.
- In 50 males there are 10 children
- In 50 females there are 10 children.

Number of patients	Gender	Percentage
50	Males	50%
50	Females	50%

this table explains the total patients and their gender.



Patients and their age

S.no	No.of patients	Age
1	10	1-10
2	10	10-20
3	40	20-30
4	20	30-40
5	20	40-50

This table shows the age of the patients.

Lifestyle of patients

Number of patients	Smoking	Alcohol	Diseased
100	20	20	60

Disease name	Males	Females
Smoking	10	-
Alcoholic	10	10
Iron deficiency	5	5
Diabetes	10	5
Fever	10	10
Pregnancy	-	10
Covid19	7	8

this table shows disease patients and their gender

Blood count variation in smoking patients

Components	**Observation results**	**Genetically confirmed**
Leukocytes	**+5%**	+11%
Neutrophils	+ 5%	+11%
Lymphocytes	**+ 6%**	**+13%**
Monocytes	**+4%**	+16%
Eosinophils	+2%	No
Basophils	+6%	**No**
Thrombocytes	+2%	No
Erythrocytes	**0.3%+**	No
Hematocrit	+0.8%	+3%
Hemoglobin	0.8%	+3%

MCV	+0.6%	+3%
Mchc	**-0.04%**	**-0.7%**

- this table source the increase in the blood components and decrease in MCHC in both males and females.

Blood count variations in alcoholic patients

Parameters	**Levels**
WBC	Decreased
RBC	**Decreased**
Hemoglobin	Decrease
hematocrit	Decrease
Platelet	**Decrease**
MCV	**Increase**
MCH	Not determined

	Patient Results	**Reference Range**
WBC	323.79	4.5-10.5 x 10^3/µL
RBC	2.98	4.2-5.8 x 10^6/µL
Hgb	9.3	13.5 -16.5 g/dl
Hct	28.5	40-49.0%
MCV	95.6	80-100 fl
PLT	43	150-450 x 10^3/µL

blood count variations in in Covid19 patient

Blood count variations in typhoid patients : 20patients

Parameter	**Number of patients**
WBC	
Normal WBC	5
Leukocytosis	**10**
Leukopenia	5
Differential count	
Normal neutrophils	5
Neutrophilia	15
Neutropenia	-
Normal Eosinophils	18
Hemoglobin	
Normal hemoglobin	8
Anaemia	12
Platelet count	
Normal platelets	8
Thrombocytopenia	7

Blood count variations in pregnancy condition

Parameters	**T1**	**T2**	**T3**	**P**
RBC	4.30	**4.35**	**4.06**	**0.001**
Hemoglobin	**10.8**	**10.6**	**10.8**	**0.04**
Hematocrit	**34.8**	**34.4**	**35.1**	**0.002**
MCV	82.6	85.1	86.1	0.001
MCH	25.1	26.6	26.1	**0.001**
Mchc	30.4	30.8	30.7	**0.6 17**

MCV - mean corpuscular volume , MCH - mean corpuscular hemoglobin , MCHC - mean corpuscular hemoglobin concentration , T – trimester , p – percent.

II. Discussion :

The research is done in a periodic time of 6 months in SLOKHA general Hospital near Vijayawada .

- Total hundredpatients are taken and studied the blood count variations in normal and diseased patients.
- In alcoholic patients this study observed and highlighted several correlations between changes of the some variables complete blood count and the time of problematic alcohol consumption where MCV and MCH are correlated positively with the time of alcohol misuse whereas WBC RBC hemoglobin and hematocrit are correlated negatively.
- Anaemia was found in approximately 50% of alcohol abuses Hindi study.
- In this study smoking patients have increased blood leukocytes ,neutrophils , Lymphocytes and monocytes as well as increased hematocrit hemoglobin and mean corpuscular volume the observational smoking relationships were long term for white blood cells and short term for red blood cells.
- Anemic patients have typical hemoglobin of less than 13.5 gram per 100ml in men in less than 12.0 gram per 100 ml in women.
- In fever patients leukocytes are elevated which is white blood cell count,granulocytosis and neutrophilia.
- All patients with covid-19 demonstrated striking numeric and marklogic white blood cell count changes which were different between mild and severe disease States more severe disease was associated with significant neutrophilia and lymphopenia which was intensified in critically ill patients have normal white blood cell count morphology most pronounced in monocytes and Lymphocytes was associated with more mild disease.
- In pregnancy patient platelets are increased and pregnancy increases the risk of clotting and delivery can increase risk of hemorrhage in patients with coagulation disorders.
- Eating food rich in iron Folic acid vitamin B12 copper vitamin increases red blood cell count.
- Patients with low blood count as suggested iron rich food diet
- Patients with hi more than average blood count given antibiotic treatment to reduce the risk of bleeding.

III. Conclusion :

Blood is a type of connective tissue is a complex of mixture of cells Chemicals and fluid blood transports substances throughout the body and helps to maintain a stable internal environment the blood includes red blood cells white blood cells platelets and plasma there are about 1 billion blood cells in two or three drops of blood for every 600 red blood cells there are 40 platelets in one white cell. Blood is also referred as fluid of growth because it carries nutritive substances from the digestive system and hormones from endocrine gland to all the tissues and it all is also referred as fluid of health because it protects the body against diseases and gets rid of the waste product . Blood monitoring is quite necessary to reduce the risk of diseases.

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