ISSN (Print): 2476-8316
ISSN (Online): 2635-3490
Dutse Journal of Pure and Applied Sciences (DUJOPAS), *Vol. 5 No. 2b December 2019*

Studies of Haematological Parameters in Aged Men of Eastern Zone of Kogi State, Nigeria

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Abstract
Assessment of Haematological parameter is important in the diagnosis, treatment monitoring and prevention of diseases related to blood cells. Thus, this work was aimed at providing information on the values of haematological indices in apparently normal ageing men residing within Kogi Eastern zone of Nigeria. This is as a result of the curiosity to know and make comparison between their hematological parameters with those of the standard/reference or normal laboratory values. These haematological parameters include RBC, WBC, HB, Platelets count, MCHC, MCH, MCV, etc. The subjects were divided into different groups based on their age range and the mean and standard deviation of each parameter was calculated. It has been shown that the haematological parameters among the males in the eastern part of Kogi State (Igala people) increased with age.

Keyword: PCV, MCH, Aged, MCV, WBC

INTRODUCTION
Haematology is the branch of medicine concerned with the study, diagnosis, treatment, and prevention of diseases related to the blood. It involves treating diseases that affect the production of blood and its components, such as blood cells, hemoglobin, blood proteins, and the mechanism of coagulation(Merck, 2012).Blood is one of the body fluid that delivers necessary substances such as nutrients,antibodies, oxygen to the cells and also transports metabolic waste products away from those same cells (Robert *et al*., 2006).

Blood is circulated around the body through blood vessels by the pumping action of the heart. In animals with lungs, arterial blood carries oxygen from inhaled air to the tissues of the body, and venous blood carries carbon dioxide, a waste product of metabolism produced by cells, from the tissues to the lungs to be exhaled.Blood accounts for 7% of the human body weight with an average density of approximately 1060 kg/m^3, very close to pure water's density of 1000 kg/m^3(Alberts and Bruce, 2012, Shmukler and Michael, 2004).

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The average adult has a blood volume of roughly 5 litres, which is composed of plasma and several other cells (Elert *et al*., 2012).

Insufficient red blood cell (anemia) can be the result of bleeding, blood disorders like thalassemia, or nutritional deficiencies; and may require blood transfusion. Several countries have blood banks to fill the demand for transfusable blood. A person receiving a blood transfusion must have a blood type compatible with that of the donor.Sickle-cell anemiais a disease which occurs when a person inherits two abnormal copies of the haemoglobin gene, one from each parent (NHLBI, 2015).

Leukemia is a group of cancers of the blood-forming tissues and cells.Non-cancerous overproduction of red cells (polycythemia Vera) or platelets (essential thrombocytosis) may be premalignant.Myelodysplastic syndromes involve ineffective production of one or more cell lines.

Hemophilia is a genetic illness that causes dysfunction in one of the blood's clotting mechanisms. This can allow otherwise inconsequential wounds to be life-threatening, but more commonly results in hemarthrosis, or bleeding into joint spaces, which can be crippling.Ineffective or insufficient platelets can also result in coagulopathy (bleeding disorders).Hypercoagulable state (thrombophilia) results from defects in regulation of platelet or clotting factor function, and can cause thrombosis.

Blood is an important vector of infection. HIV, the virus that causes AIDS, is transmitted through contact with blood, semen or other body secretions of an infected person. Hepatitis B and C are transmitted primarily through blood contact. Owing to blood-borne infections, bloodstained objects are treated as a biohazard.Bacterial infection of the blood is bacteremia or sepsis. Viral Infection is viremia. Malaria and trypanosomiasis are blood-borne parasitic infections.

Packed cell volume (PCV)is the volume of red blood cells in blood expressed in percentage. It is normally about 45% for men and 40% for women (Purves *et al*., 2004). Erythropoietin is secreted by the kidney. So, by extension, low level of red blood cells points to a problem with the integrity of the kidney cells (Jekmann, 2004).

Hemoglobinis the iron-containing oxygen-transport metalloprotein in the blood cell of almost all the vertebrates. It carries oxygen to body parts for the metabolism of glucose in order to generate energy (Sidell and Kristin, 2006).

White blood cell (WBC)are the cells of the immune system that are involved in protecting the body against both infectious disease and foreign invaders. All leukocytes are produced and derived from a multipotent cell in the bone marrow known as a hematopoietic stem cell (Maton *et al*., 1997). The number of leukocytes in the blood is often an indicator of disease. The normal white cell count is usually between 4 and 11 × 10^9/L (Bruce *et al*., 2002). An increase in the number of leukocytes over the upper limits is called leukocytosis, and a decrease below the lower limit is called leukopenia.

This research work is aimed at providing information on the variations of hematological parameters with age among the men of Kogi East senatorial district.

EXPERIMENTAL DESIGN:

Blood samples were collected from sixtyvolunteered donors (men) in the eastern part of Kogi State (Igala-Land). This area is made up of the following LGAs and Towns: Idah, Dekina and Ankpa. They were aged between 25 – 75 years. Questionnaire was used to collect the demographic characteristics of the subjects for analysis; English and Igala languages were used for communication. The total questionnaires given out to respondents were 65. All the questionnaires were recovered from the respondents but 60 questionnaires were accepted and used as being valid for the analysis, and thus, given the validity rate of 92.3%. The remaining three questionnaires were rendered invalid due to errors made by the respondents. Ten (10) questionnaires were given to control subjects from people aged 25 – 34 years old. All the questionnaires were accepted and used as being valid for the analysis and thus given the validity rate of 100%.

Sample Preparation:

Human blood samples were collected from 40 volunteered donors, men aged 25years and above of people of Eastern part of Kogi State. Whole blood samples were collected through venipuncture, drawing the blood into test tubes containing an anticoagulant (EDTA) to prevent it from clotting and another free bottle for the biochemical test. The samples were transported to a laboratorywhere they were centrifuged at 4000 rpm for 5minutes using uniscope laboratory centrifuge model SM 112 to obtain the serum required for some analysis.Complete Blood Count was being performed in a hospital using an Abbott Cell-Dyn 1700 automatic analyzer.

Determination of Complete Blood Count

The blood was well mixed (though not shaken) and placed on a rack in the analyzer. This instrument has flow cells, photometers and apertures that analyze different elements in the blood. The cell counting component counts the numbers and types of different cells within the blood. The results were printed out or sent to a computer for review.Blood counting machines aspirate a very small amount of the blood sample 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 could identify them, this is flow cytometry. The two main sensors used were light detectors and electrical impedance. The instrument measured the type of blood cell by analyzing data about the size and aspects of light as they pass through the cells (called front and side scatter).

Statistical Analysis

Data was initially sorted out manually and tabulated, then entered into the computer using bonferon comparison test of graph pad with statistical software and the mean value determined. The differences were considered significant at $p<0.05$. Comparison of mean values in relation to age distribution was done using analysis of variance (ANOVA).

RESULTS

Variation of Packed cell volume with age

In figure 1, there is nosignificant increase ($p < 0.05$) in packed cell volume in the test age group2 (35-44) years and age group3(45-54)years when compared to the control group 1(25-34)years while and a significant decrease in the other groups as the age increases, indicating that among the Igala people, the packed cell volume decreases with age.

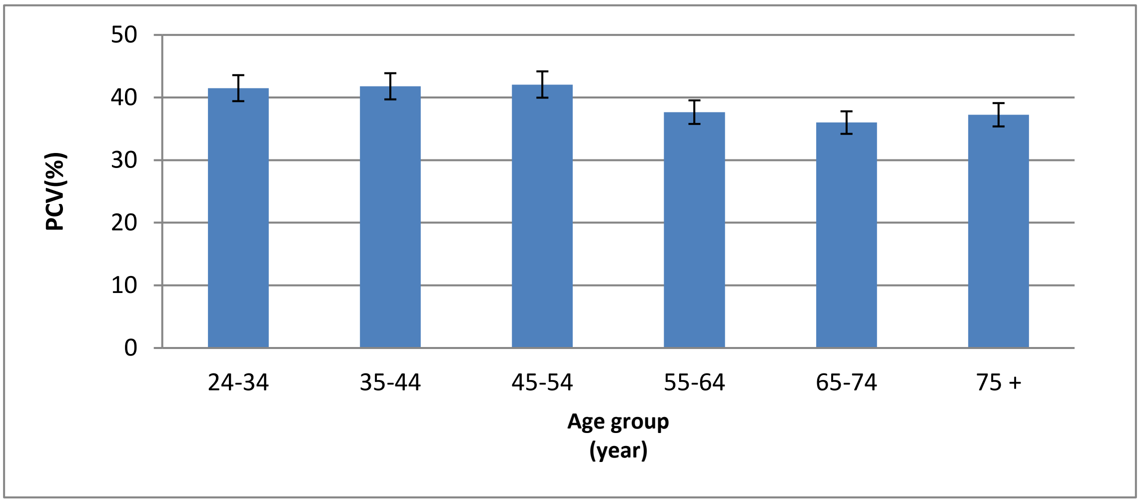
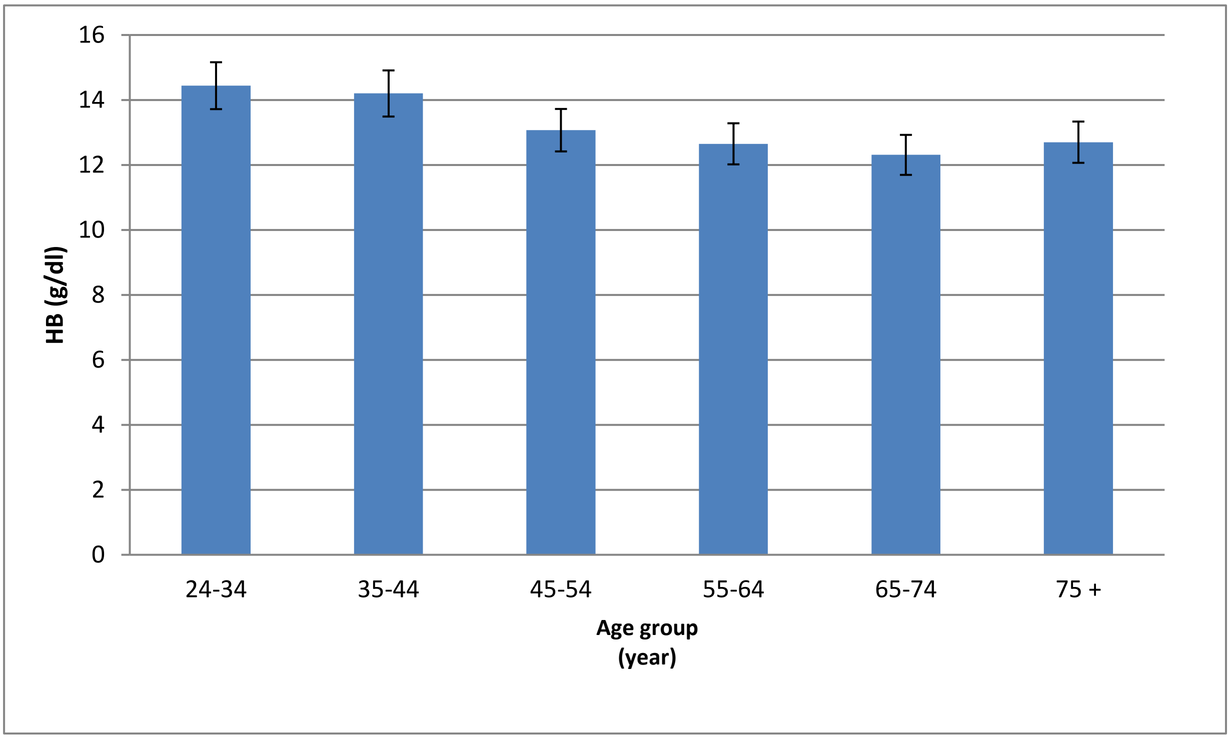


Fig. 1: Bar chart showing packed cell volume with age groups, n=60

Variation of Haemoglobin with age

Figure 2 shows significant decreases (p> 0.05) in the tests group 2 (35-44)yrs, group3 (45-54)yrs, group 4 (55-64)yrs, group 5 (65-74)yrs and group 6 (75years- above) of haemoglobin concentration when compared to the control group 1(25-34)yrs. This increase in Hb was with respect to the age.

Fig.2: Bar chart showing hemoglobin with age, n=60



Variation of Total white blood cell with age

In figure 3, there is no significant difference (p > 0.05) in test groups 2(35-44) and 3(45-54). A slight increase in white blood cell was observed in group 5 and group 6 while a decrease occurred in group 4, though non- significant when compared to the control group 1.

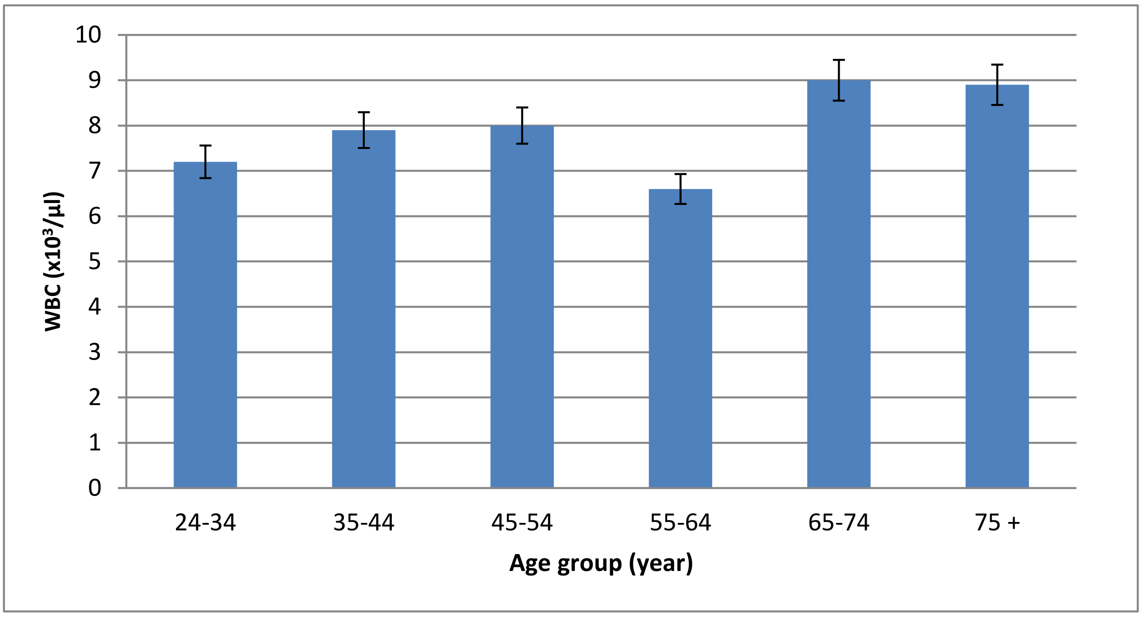
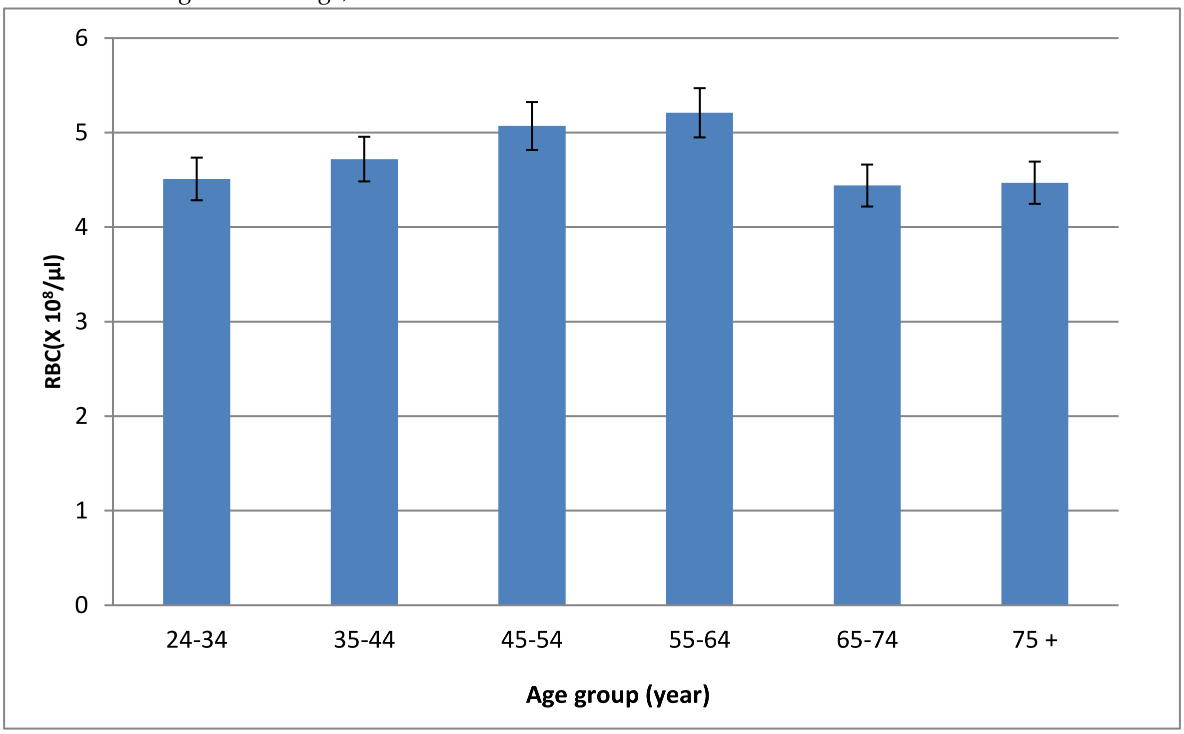


Fig.3: Barchart showing total WBC with age, n=60

Variation of the Red blood cell with age

In figure 4, there is a steady increase in the red blood cell ($p < 0.05$) in test groups 2, 3 and 4 with group 4 having the highest concentration of red blood cell compared to the control group 1 and then a sharp decline in groups 5 and 6 when compared to the control group 1.

Fig.4: Barchart showing RBC with age, n=60



Variation of the lymphocyte with age

Figure 5 shows steady decreases of lymphocytes in all groups when compared to the control group 1 except group 5 (65-74) where there is a non- significant increase.

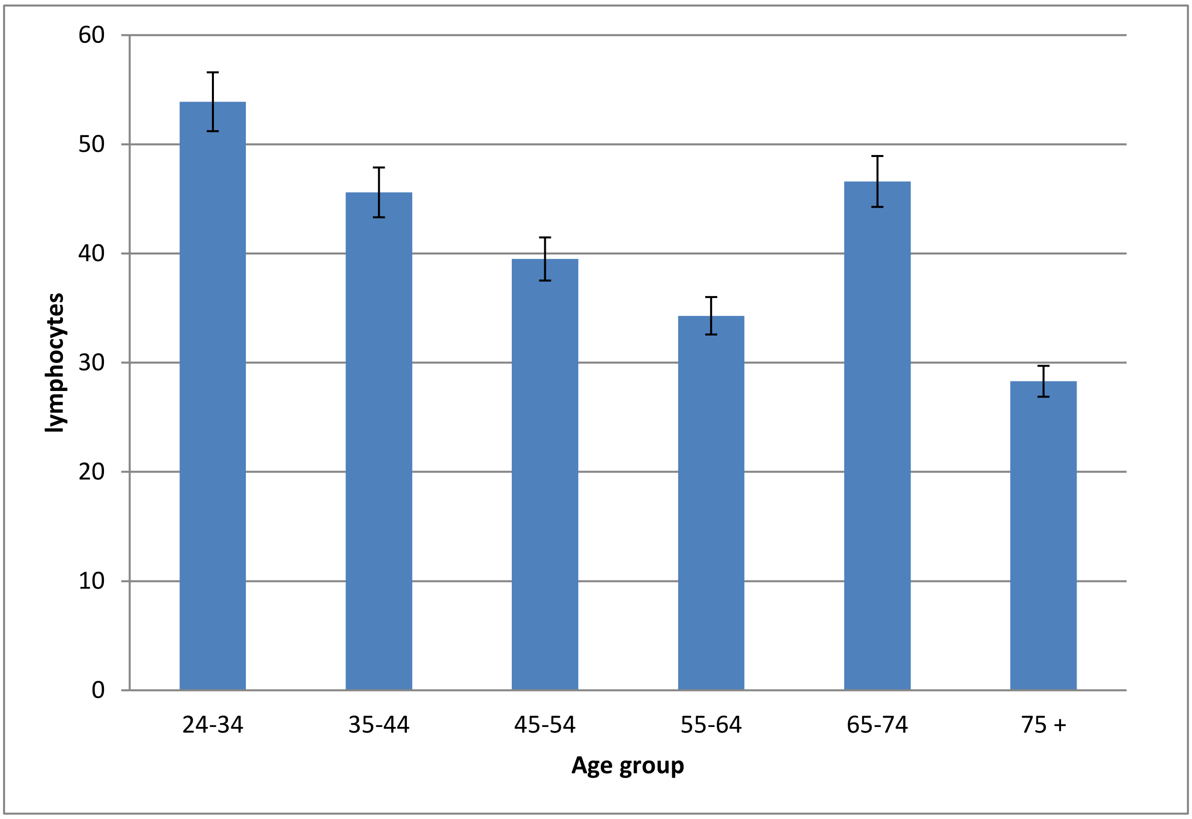


Fig. 5: Barchart showing lymphocyte with age, n=60

Variation of the neutrophils with age

In figure 6, there is an elevation of neutrophils in all groups when compared to the control group 1($p < 0.05$) except in group 5 (65-74) where there is a slight decrease. ($p > 0.05$). This increase in neutrophils could be as a result of stress due to the nature of work the Igala people do. It could also be as a result of infection leading to inflammation.

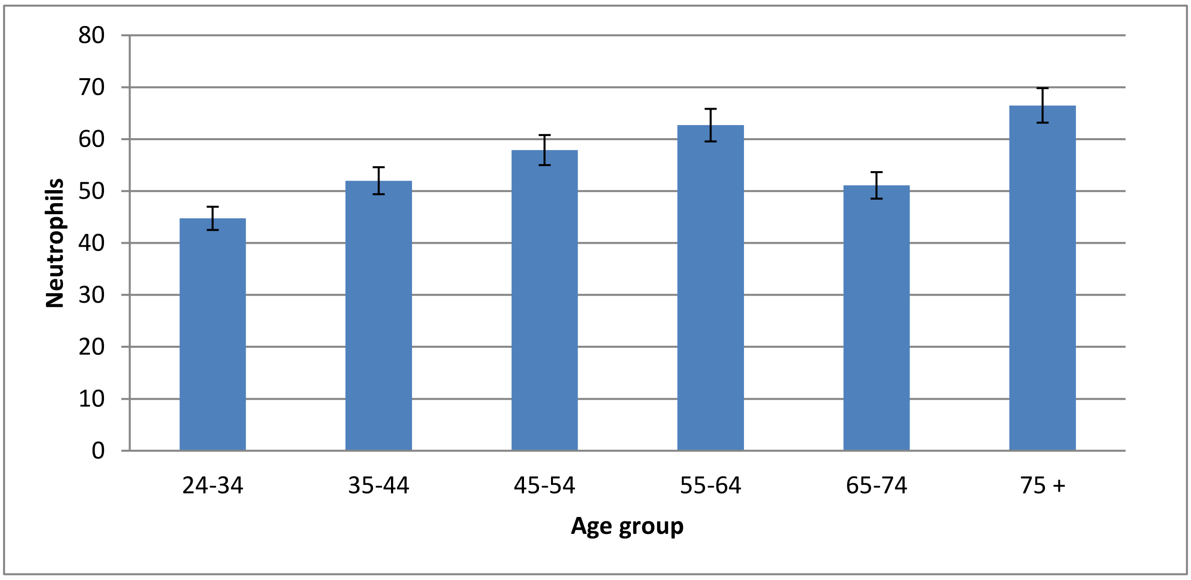


Fig.6: Barchart showing neutrophils with age, n=60

Variation of the platelet counts with age

In figure 7, there is an elevation of platelets in all groups ($p < 0.05$) with group 6 (75 years - above) having the highest platelet counts suggesting that platelet counts increases with age.

This is an indication of more consumption of starch food which may increase the sugar in the blood of the subjects

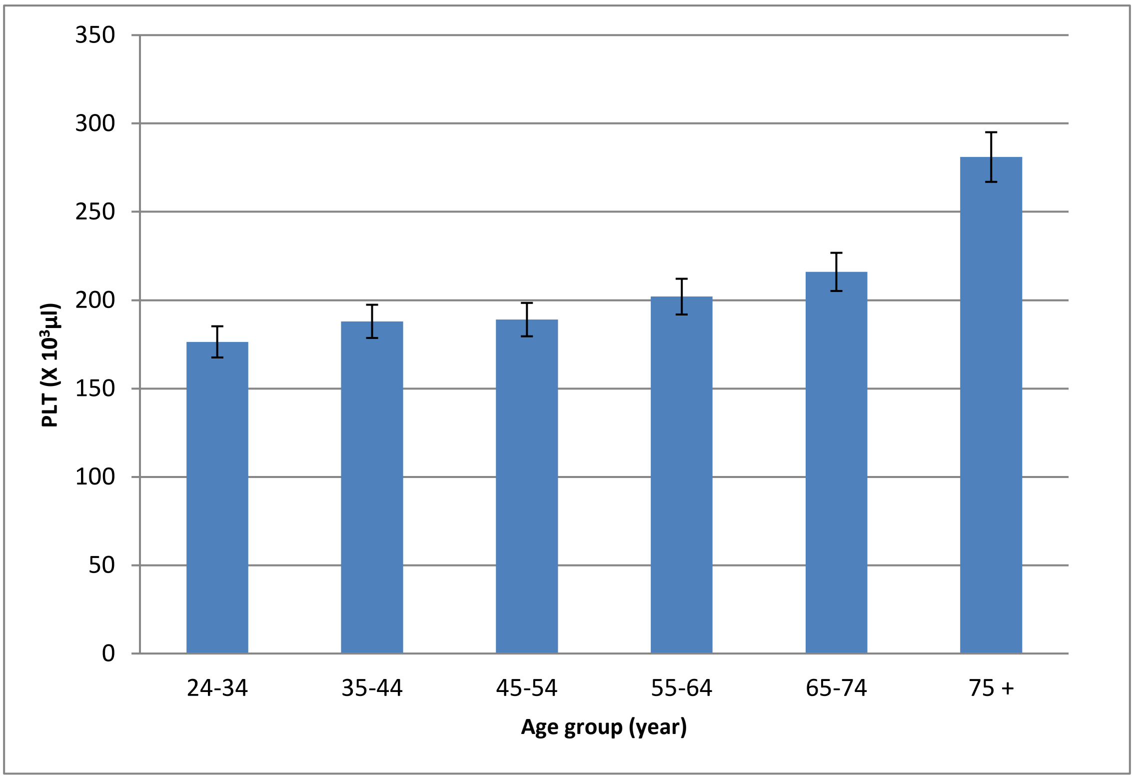


Fig.7: Bar chart showing platelets with age, n=60

Variation of the Mean Cell HaemoglobinCount with age

Figure 8 shows an increase in MCHC in group 2 and then a sharp decline in other groups as the age group increases though not significant when compared to the control group 1.

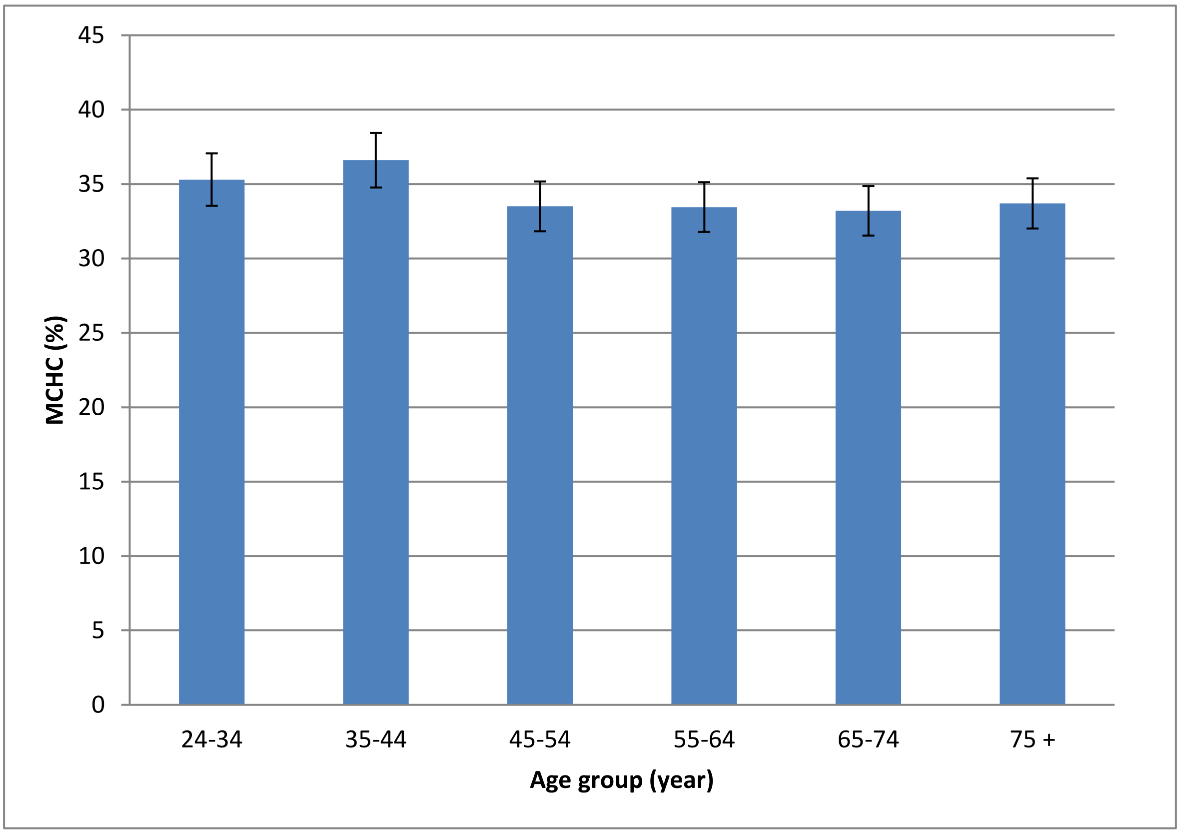


Fig. 8: Barchart showing Mean Cell Haemoglobin Count with age, n=60

Variation of the Mean Cell Haemoglobin(MCH) with age
Figure 9 shows a significant increase ($p < 0.05$) in MCH in group 2 and a non- significant decrease observed in group 6. Other groups show non- significant increases.

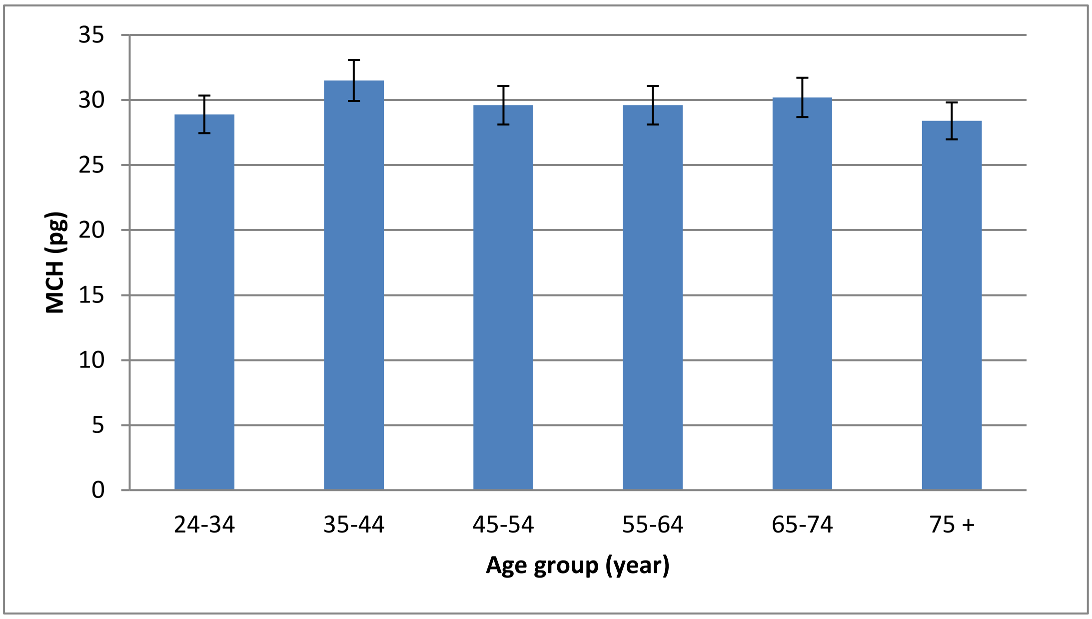


Fig.9: Barchart showing Mean Cell Haemoglobin with age, n=60

Variation of the Mean Cell Volume with age
In figure 10, no significant difference occurred in all groups when compared to the control group 1 except group 5 where a slight increase occurred.

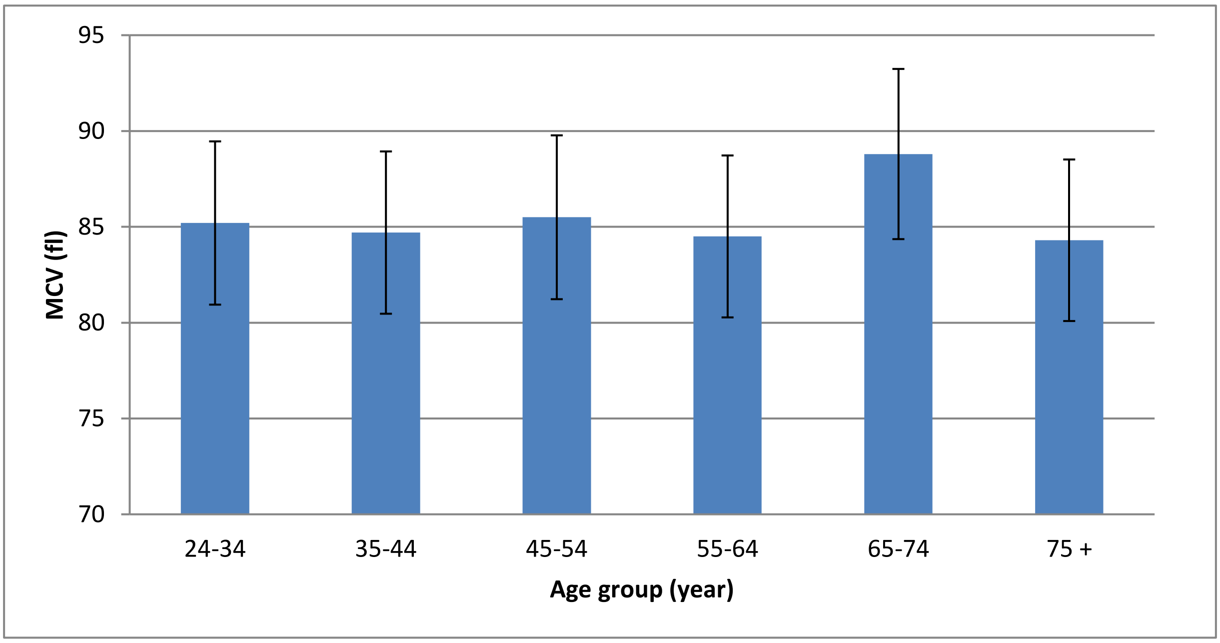


Fig. 10: Barchart showing Mean Cell Volume with age, n=60

DISCUSSION

Haematological parameters are those parameters that are related to the blood and blood forming organs (Bamishaiye *et al.*, 2009).Hematological parameters are good indicators of the physiological status (Khan and Zafar, 2005). Laboratory tests on the blood are vital tools that help detect any deviation from normal in the animal or human body (Ogunbajo *et al.*, 2009). Hematological values could serve as baseline information for comparison in conditions of nutrient deficiency, physiology and health status of farm animals (Daramola *et al.*, 2005).

This study showed that there were blood variations with respect to age. The PCV is the volume (%) of red blood cells in the blood. It is considered an integral part of a person's complete blood count result, along with the HC, WBC and platelet count. An estimated hematocrit as a percentage may be derived by tripling the HC and dropping the units. Therefore a single factor affecting anyone of these parameters will indirectly affect the other parameters. Comparison between the PCV, HC and RBC counts among the males of Kogi East in this study showed decreases with agewhich could be due to under-nutrition resulting in decreased production of RBC and protein malnutrition since the major food in the area is cassava flour (a.k.a Oje) (Edozien, 1965). The examination of blood gives the opportunity to investigate the presence of several metabolites and other constituents in the body of animals and it plays a vital role in the physiological, nutrition and pathological status of an organism (Doyle, 2006).

There was an increase in the neutrophil count as the age increased except in group 4(55-64 years) where we had a decrease. This could be as a result of physical stress or emotional stress due to the nature of job the people in that area engage in or could also be as a result of infections. Neutrophils are known to be the body's defense against pathogens; i.e. if microorganism enters the body, inflammation will definitely take place bringing the neutrophils and other immune system factor to the affected area. The platelet count of the subjects increased with age when compared with the control group1. This could be as a result of consumption of more energy calorie food which caused a rise in their blood sugar. Hyperglycemia can increase platelet reactivity by inducing non-enzymatic glycation of protein on the surface of the platelets (David and Schneider, 2009). The MCH, MCHC and MCV showed no significant difference when compared to the standard i.e. were found within the normal range.

CONCLUSION

Variation in hematological parameters among the male in the eastern part of Kogi State (Igala people) have been shown to increase with age based on the subjects analyzed. Apart from the genetic factor, the non- genetic factors such as nutrition, occupation and environmental factors may influence the haematological parameters.

REFERENCES

Alberts, Bruce (2012)Molecular Biology of the Cell. NCBI Bookshelf.

Bamishaiye, E. I., Muhammad, N. O., and Bamishaiye, O. M. (2009). Haematological parameters of albino rats fed on tiger nuts (Cyperusesculentus) tuber oil meal-based diet. The International Journal of Nutrition and Wellness, 10(1).Retrieved from http://ispub.com /IJNW/10/1/9293.

Dacie J. V and Lewis S. M. (1991). *Practical haematology* (7thedn.). Churchill Livingstone Edinburgh. Pp. 535 – 544.

Daramola, J. O., Adeloye, A. A., Fatoba, T. A. and Soladoye, A. O. (2005). Haematological and biochemical parameters of West African Dwarf goats. Livestock Research for

Rural Development, 17(8), 95.Retrieved January 22, 2014, from ttp://www.lrrd.org/lrrd17/8/dara17095.htm.

David J. and Schneider, MD (2009). Factors Contributing to increased Platelets Reactivity in People with Diabetes. Diabetes Care: 32(4): 525-527.

Doyle, D. (2006). William Hewson (1739-1774): The father of hematology. Br. J. Haematol. 133: 375-381.

Elert, Glenn and his students (2012)."Volume of Blood in a Human". The Physics Facebook. Archived from the original on 2012-11-01. Retrieved 2012-11-01

Jelkmann, W. (2004). Molecular biology of erythropoietin. *Internal Medicine*, **43**: 649-659.

Khan, T. A., and Zafar, F. (2005). Haematological Study in Response to Varying Doses ofEstrogen in Broiler Chicken. *International Journal of Poultry Science*, *4*(10), 748-751.

Maton, A., Hopkins, R. L. J., McLaughlin, C. W., Johnson, S., Warner, C. W., LaHart, D., & Wright, J. D. (1997). *Human Biology and Health*. Englewood Cliffs, New Jersey, USA: Prentice Hall.

Merck Manual (2012). *Haematologic reference ranges*. Mareck Veterinary Manual. Retrieved from http://www.merckmanuals.com

Ogunbajo, S. O., Alemede, I. C., Adama, J. Y., and Abdullahi, J. (2009). Haematological parameters of Savannah brown does fed varying dietary levels of flamboyant tree seed meal (p. 88-91). Proceedings of 34th Annual Conference of Nigerian Society for Animal reduction.

Robert B. Tallitsch; Martini, Frederic; Timmons, Michael J. (2006). Human anatomy (5th ed.). San Francisco: Pearson/Benjamin Cummings. p. 529. ISBN 0-8053-7211-3.

Shmukler, Michael (2004)."Density of Blood". The Physics Facebook. Retrieved 4 October 2006.

Sidell, B. and Kristin, O. (2006). When bad things happen to good fish: the lossof Haemoglobin and Myoglobin expression in Antarctic Icefishes. The Journal of Experimental Biology, **209**: 1791-1802.