

# The Increase in Prostate Specific Antigen Levels And It's Effect On Patient's Complete Blood Count In Okigwe Imo State, Nigeria

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**Abstract-** The increase of Prostate Specific Antigens levels and It's effect on patient's complete blood count was carried out in Okigwe Imo State. A total of 200 patients were examined Blood specimen was collected aseptically using standards microbiological laboratory techniques. The patients were examined for, prostate specific Antigen (PSA) (quantitative) and complete blood count (CBC) tests. Out of 200 patients tested for PSA level in study area, 119 (59.5%) patients were positive with PSA level of 4.0ng and above and 81(40.5) patients were negative with PSA level below 4.0 ng/ml. 71-80 years of age had the highest number of positive PSA of 45(21.0) while 21-30 years of age were all negative to PSA testing. In leucocytes, Erythrocyte and hemoglobin levels were shown that the most affected age groups was 80 years above. Mean Corpuscular Volume and Neutrophils of the patient's results were normal. Higher in age did not show much difference in Monocytes and Eosinophil but shown decreased in the younger age especially the age of 31 – 40 years group. The impact of PSA on hemoglobin level in the study population was showed that patients from the age of 60 years below had a little increase in PSA while patients from 70 years and above had decrease in hemoglobin and the PSA levels was increasing with age. It was shown that the higher the PSA level the lower the hemoglobin due to the high presence of heamaturia. Early detection of Prostate Specific Antigens can help the patient and the urologist in the treatment and as well prevent the patient from other complications.

**Index Terms-** Prostatitis, PSA, diagnosis, CBC, age and heamaturia

## I. INTRODUCTION

Prostatitis is the microscopic inflammation of the tissue of the prostate gland and it is a diagnosis that spans a broad range of clinical conditions (Paul, 2017). The human prostate is a part of the male reproductive system. It is located anterior to the rectum, distal to the urinary bladder and wraps around the urethra. Due to its anatomical position, infectious agents can reach the prostate mainly through the urine or as ascending sexually transmitted infections. Serum PSA of quantitative method is the main diagnostic laboratory techniques that shows

(Ogwuegbu *et al.*, 2018) sign of a possible malignant process in the prostate gland (Polascik *et al.*, 2005),

A complete blood count (CBC) is a series of tests used to evaluate the composition and concentration of the cellular components of blood. The complete blood count (CBC) is the most commonly ordered blood test in a healthcare set up. (CBC) provide information about the patient general health, check for infection, check for bleeding which may lead to anemia and to provide a baseline to compare with future CBC's check during and after treatment. It is commonly performed on an automated hematology analyzer using well mixed whole blood that is added to a chemical called EDTA to prevent clotting (Briggs, 2001) and concentration of the cellular components of blood. A CBC is a group of tests used to quantify the number of RBCs, determine the percentage and absolute number of the five white blood cell types, and identify early and abnormal blood cells. The cells which are responsible for homeostasis and tissue repair are called the mean platelet volume (MPV) (Briggs, 2009).

MPV is associated with a lot of inflammatory processes like subclinical inflammation (in coronary ischemia, prostatitis, preeclampsia and stroke) or overt inflammation (in rheumatoid arthritis and inflammatory bowel disease) (Chio *et al.*, 2011).

## II. AIM

This research is aimed at assessing the increase of prostate specific antigen levels and it's effect on patient's complete blood count in Okigwe Imo State, Nigeria

## III. OBJECTIVES

To achieve the above aim the following objectives were targeted.

These include:

To determine the prevalence of Prostatitis among patients reporting for urological deficiencies.

To assess the hematological characteristics of blood specimens of the prostatitis patients using Complete Blood Count (CBC) test.

#### IV. MATERIALS METHODS

**ETHICAL CLEARANCE:** The clearance to obtain specimens and work with the people in the hospital was given by the Head Medical Director in charge of the location after submitting the clearance letter from the Abia State University Uturu ethical clearance committee to the hospital.

#### V. STUDY POPULATION

A total of 200 people were sampled in the location: the 200 patients were screened from Okigwe. (God Heals Hospital Okigwe). Their ages ranges from 21- 80 and above with 7 class intervals and they were placed in age bracket of 10 intervals (eg, 21-30, 31-40 etc).

#### VI. SPECIMEN COLLECTION FOR PROSTATE SPECIFIC ANTIGEN (PSA) TEST

1. About 3ml of Venous Blood of the target individual was withdrawn and put into a clean serum gel test tube (plan) and allowed to stand for 10-15 minutes to clot.
2. The blood specimen was capped and labeled.
3. This serum was collected with pipette and stored at 20°C until required for use according to the manufacturer's of the equipment instruction (cheesbrough, 2006).

#### VII. MATERIALS AND REAGENT FOR PSA TEST USING MICROPLATE READER

1. Antibody –coated microtiter plate with 96 wells
2. Zero buffer, 12 ml
3. Reference standard containing 0, 2, 4, 15, 50, and 100 ng/ml PSA, Liquid standard.
4. Enzyme Conjugate Reagent. 12 ml
5. TMB Substrate, 12 ml
6. Stop Solution, 12ml
7. Wash Buffer Concentrate ,15 ml
8. Control Set.
9. Precision pipette, 0.04 - 0.2 and 1.0 ml
10. Distilled water.
11. Absorbent paper.
12. A microtiter plate reader with a bandwidth of 10nm and optical density range at 450nm (Cheng-Ching *et al.*, 2015).

#### VIII. EXAMINATION OF PSA USING MICROTITER PLATE READER

All reagents were brought to room temperature and mixed by gently inverting the containers severally before use. The washing buffer was prepared by mixing 1 volume of wash buffer Concentrate into 60 ml of distilled water. The desired number of coated wells for the test were secured in the holder 50ul of standards, specimen and control was dispensed into the appropriate wells. 100ul of Zero Buffer was dispensed into each well. They were thoroughly mixed for 30 seconds. The mixed

samples were incubated at room (18-25°C) for 60 minutes in an incubator. The incubated mixture was removed by emptying the plate contents into a suitable waste container for disposal. The emptied microtiter wells were rinsed 5 times with distilled water. The wells were strike sharply onto absorbent paper to removed all the residual water droplets used. 100ul of Enzyme Conjugate Reagent was dispensed into each well and gently mixed for 10 seconds. The wells were incubated at room temperature (18-25°C) for 60 minutes. The incubated mixture was emptied into a suitable waste container. The well was rinsed and emptied 5 times with distilled water with washing buffer. The wells was stroked sharply onto absorbent paper to removed residual water droplets used. 100ul of TMB Reagent was dispensed into the wells and gently mixed for 10 seconds. It was incubated at room temperature for 20 minutes. The reaction of the mixture was stopped by adding 100ul of Stop Solution in each well and gently mixed for 30 seconds to make sure that the blue color changes to yellow color completely. It was read using microtiter plate reader at 450 density within 15 minutes (Cheng-Ching *et al.*, 2015).

#### IX. EXAMINATION FOR COMPLETE BLOOD COUNT (CBC)

- 3ml of Venous Blood of the patient was withdrawn and put into in a clean ethylenediamine tetre-acetic acid (EDTA) anticoagulant test tube bottle.
- The whole blood was well mixed in the sample tube by gently rotating the tube for 3 – 5 minutes.
- Sample “mode” button was selected.
- The sample tube was put under the aspiration pipette and the aspiration key was pressed for the aspiration of the blood sample.
- The instrument began analyzing the sample by displaying “testing” on the screen status bar.
- Complete blood count (CBC) was analyzed using an automated hematology analyzer at 20°C within 5 minutes.
- The sample test window click print button was pressed to print the test report. (Chhabra, 2017)

#### X. RESULTS

The Prostate Specific Antigen quantitative results in study area were presented in Table. Table 1 : In Okigwe, out of 200 patients tested for PSA using quantitative method 119(59.5) patients are positive with PSA level of 4.0ng and above and 81(40.5) patients were negative with PSA level below 4.0ng. 71-80 years of age had the highest number of positive PSA of 45(21.0) while 21-30 years of age were all negative to PSA testing.

The age distribution of the patients in relation to the Leukocyte, Erythrocyte and hemoglobin levels in Okigwe were shown in (Fig 1) which they were not affected in the younger age. The most affected ages were the age of 80 years above which they were affected in Leucocytes, Erythrocytes and hemoglobin estimation. (Fig 2): Shows the MCV and Neutophils of the patients in Okigwe, it was observed that the result were all negative. (Fig 3) The MCHC and Lymphocyte in the studied

populations in Okigwe, it was observed that patient of 80 years and above had decrease in MCHC and a little decrease in lymphocyte. (Fig 4): The age distribution of RDW and MPV of the patient in Okigwe. It was also shown that patient from the age of 80 years and above had a little decrease in MPV and increase in RDW. The Monocyte, Eosinophil and Basophil of the patient in Okigwe shows in Fig 5 and it explained the patient's results on Monocyte, Eosinophil and Basophil, it was observed that higher in age did not show any much difference in Monocyte and eosinophil but shown a decrease in the younger age especially the

age of 31-40 years. Then Basophil was not seen all ages. (Fig 6): the levels of PCV and MCH of the patient in Okigwe, their result shown normal in the age of 60 years below while 70 years and above had decrease in both PCV and MCH. (Fig 7): the Impact of PSA on Hemoglobin level in Okigwe shows that Patient from the age of 60 years below had a normal level of Hb with little increase in PSA while patient from 70 years and above had decrease in Hemoglobin and the PSA levels was increasing with age.

**Table 1: Age distribution of PSA levels in target population in Okigwe, Imo State.**

| Age      | No. Patient Examine d | Normal 0-4ng/dl | 4.1-10  | 10.1-20 | 20.1-30 | 30.1-40 | 40.1-50  | 50.1-60  | 70.1-100 | Above 100ng/dl | PSA Positive patient |
|----------|-----------------------|-----------------|---------|---------|---------|---------|----------|----------|----------|----------------|----------------------|
| 21-30    | 5(2.5)                | 5(6.1)          | 0(0.0)  | 0(0.0)  | 0(0.0)  | 0(0.0)  | 0(0.0)   | 0(0.0)   | 0(0.0)   | 0(0.0)         | 0(0.0)               |
| 31-40    | 12(6.0)               | 11(13.6)        | 1(5.9)  | 0(0.0)  | 0(0.0)  | 0(0.0)  | 0(0.0)   | 0(0.0)   | 0(0.0)   | 0(0.0)         | 1(0.8)               |
| 41-50    | 18(9.0)               | 10(12.3)        | 1(5.9)  | 1(6.2)  | 2(16.7) | 1(5.3)  | 1(5.0)   | 2(12.5)  | 0(0.0)   | 0(0.0)         | 8(6.7)               |
| 51-60    | 35(17.5)              | 15(18.5)        | 4(23.5) | 5(31.2) | 2(16.7) | 2(10.5) | 4(20.0)  | 3(18.7)  | 0(0.0)   | 0(0.0)         | 20(16.8)             |
| 61-70    | 50(25.0)              | 22(27.1)        | 8(47.0) | 5(31.2) | 2(16.7) | 7(36.8) | 3(15.0)  | 2(12.50) | 1(11.1)  | 0(0.0)         | 28(32.5)             |
| 71-80    | 60(30.0)              | 15(18.5)        | 3(17.6) | 5(31.2) | 5(41.7) | 7(36.8) | 10(50.0) | 5(31.20) | 5(55.5)  | 5(50.0)        | 45(21.0)             |
| Above 80 | 20(10.0)              | 3(3.7)          | 0(0.0)  | 0(0.0)  | 1(8.3)  | 2(10.5) | 2(10.0)  | 4(23.50) | 3(33.3)  | 5(50.0)        | 17(14.3)             |
| Total    | 200(100)              | 81(40.5)        | 17(8.5) | 16(8.0) | 12(6.0) | 19(9.5) | 20(10.0) | 16(8.0)  | 9(4.5)   | 10(5.0)        | 119(59.5)            |

- Positive PSA level refers to those with PSA value of 4.0ng/l and above
- Those in brackets are the percentage values.

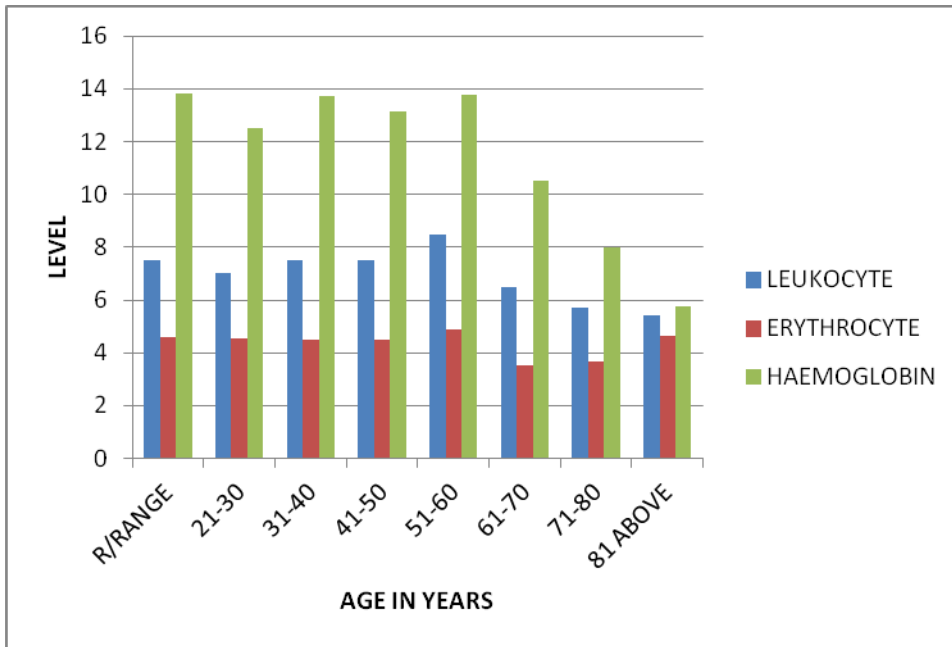


Fig. 1: The age distribution of the patients in relation to the Leukocyte, Erythrocyte and hemoglobin levels in Okigwe

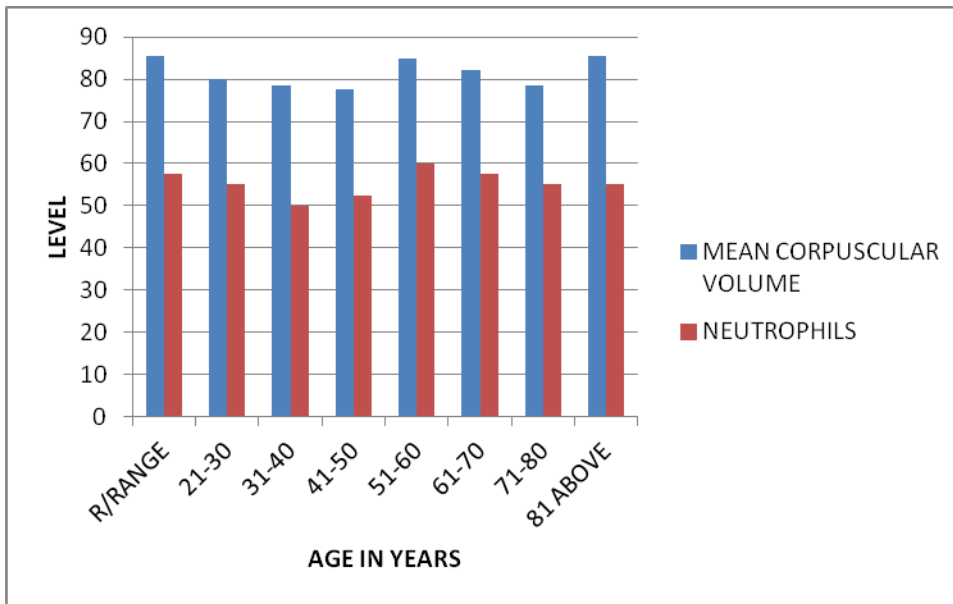


Fig.2 : Shows the MCV and Neutophils of the patients in Okigwe

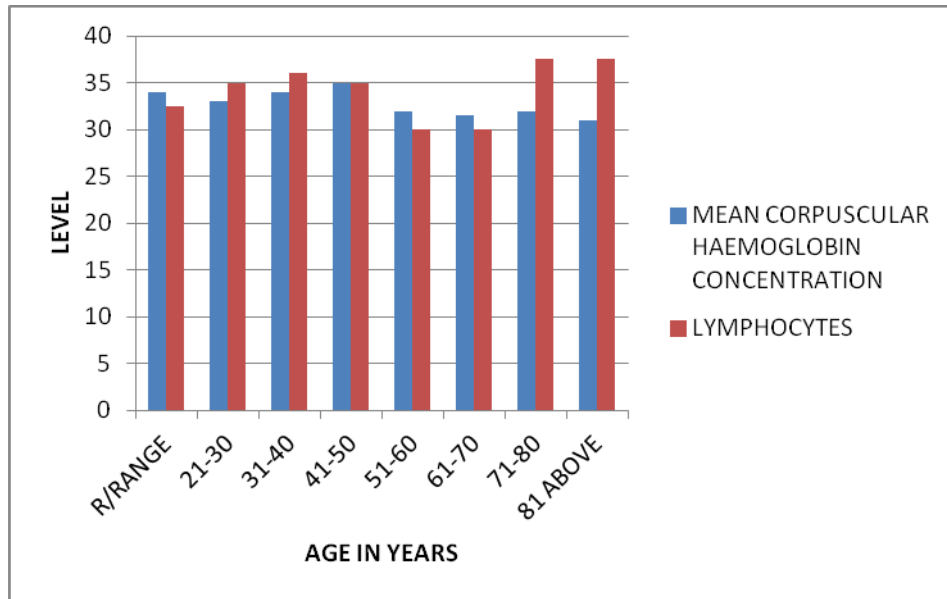


Fig. 3: The MCHC and Lymphocyte in the studied populations in Okigwe

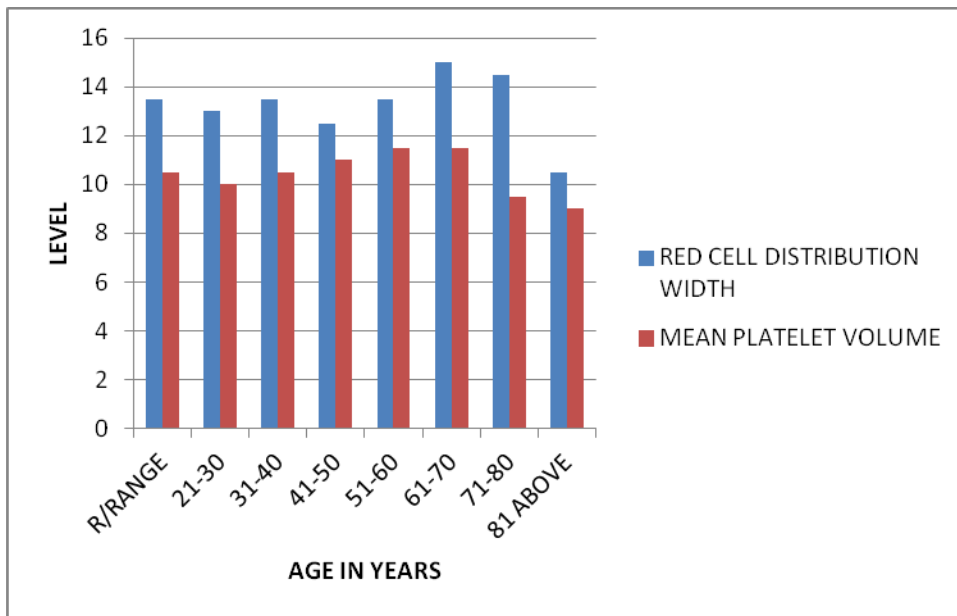


Fig. 4: The RDW and MPV of the patient in Okigwe

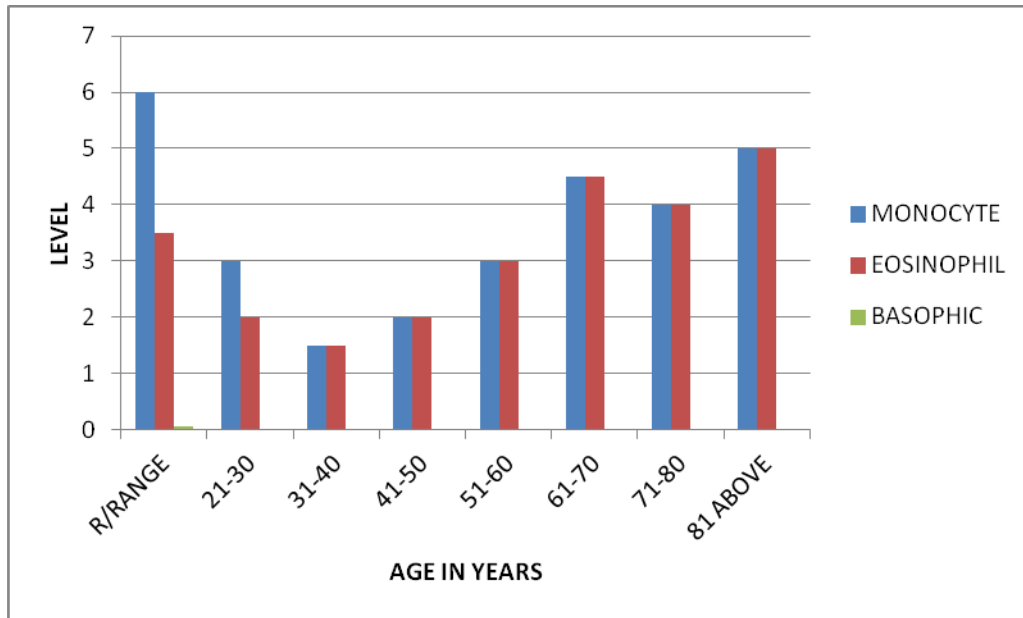


Fig. 5: The Monocyte, Eosinophil and Basophil of the patient in Okigwe

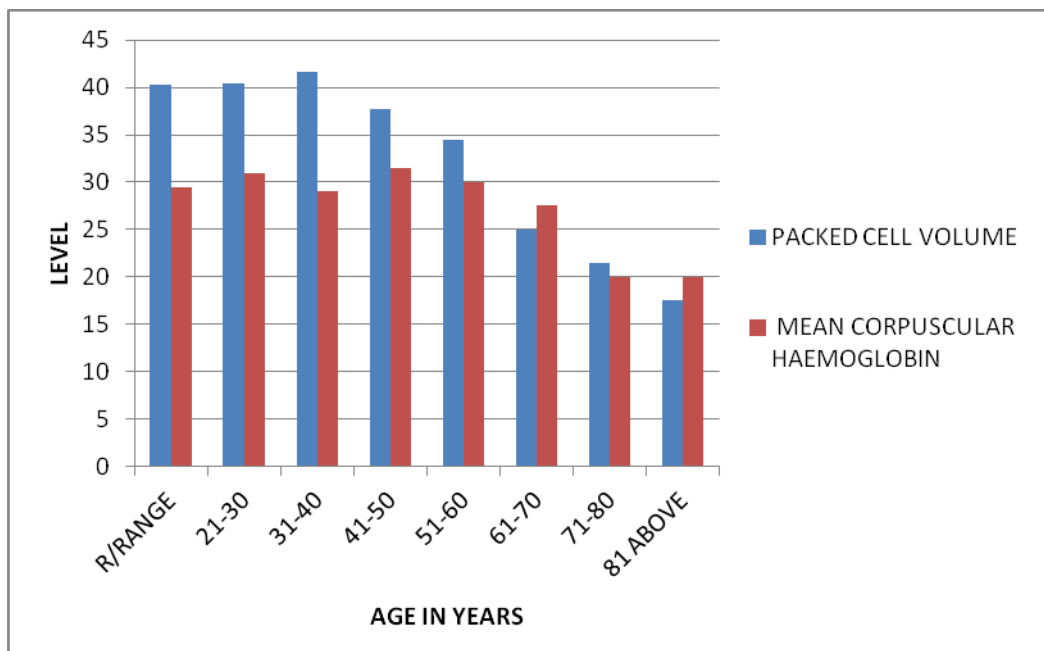


Fig. 6: The levels of PCV and MCH of the patient in Okigwe.

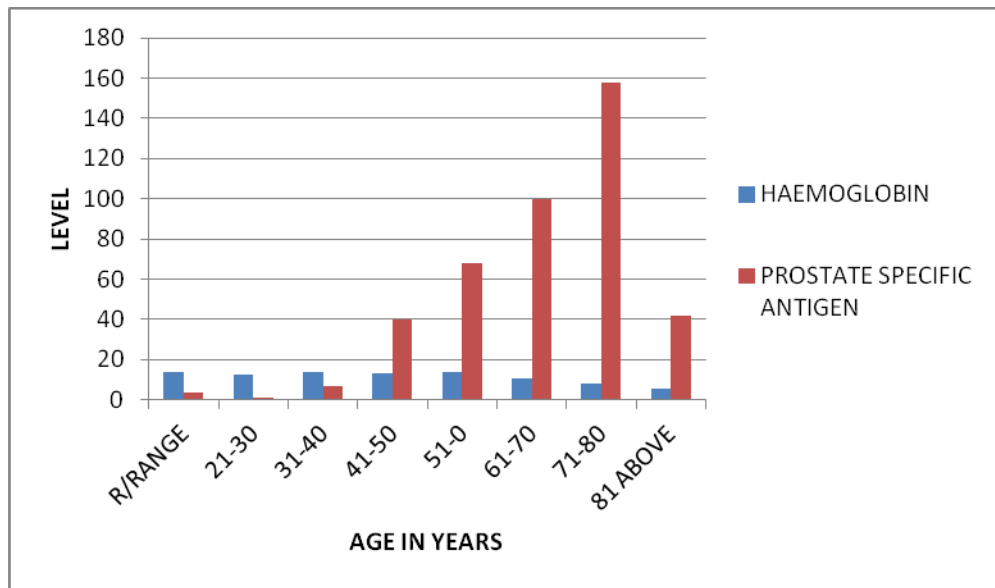


Fig. 7: Impact of PSA on Hemoglobin level in Okigwe.

## XI. DISCUSSION

In this study, prostate specific Antigen (PSA) screening test was carried out in Okigwe and Umuahia for a period of 6 calendar months. In Okigwe, the prevalence of PSA was 119(59.5%) patients are positive with PSA level of 4.0ng and above and 81(40.5) patients were negative with PSA level below 4.0ng. From 71-80 years of age had the highest number of positive PSA of 45(21.0) while 21-30 years of age were all negative to PSA testing. The results found in this work showed that age affects the levels but present result showed that the oldest group had prostatitis often; this is in accordance with those of Sharp *et al.*, (2010). Whereas Nickel *et al.*, (2001) found a slightly higher prevalence of prostatitis in the age group below 50 years than among man over 51 years of age. Anyway, older men also have a longer time to develop the disease than their younger counterparts (Ogwuegbu *et al.*, 2018).

In this research, it was observed that the their CBC especially the Hemoglobin were affected in their ages and the levels of their PSA results which showed that patients from 70 years and above had decrease in hemoglobin estimation and patients from 60 below had a normal level of hemoglobin estimation with decrease in PSA levels. Basophiles were not seen in all ages. Age and prostatitis showed a great effect on the patient's CBC which is in line with Felrker *et al.*, (2007).

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