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Assessment of Prothrombin Time and Activated Partial Thromboplastin Time among the Elderly in Amaeze Farm Settlement, Okigwe, Imo State, Nigeria

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ABSTRACT

The implementation of suitable diagnostic measures in evaluating and managing disease conditions is crucial for attaining effective clinical results. The incidence of coagulation abnormalities in older adults is on the rise, highlighting the need for dependable diagnostic tools like Prothrombin Time (PT) and Activated Partial Thromboplastin Time (aPTT). As a result, this research sought to assess Prothrombin Time and Activated Partial Thromboplastin Time in elderly individuals residing in Ameze Farm Settlement, Ebonyi State, Nigeria. A total of 60 participants, consisting of 28 males and 32 females, provided informed consent and were included in the study. Five millilitres (5 mL) of blood were drawn from each participant into properly labelled anticoagulant containers. Prothrombin Time (PT) and Activated Partial Thromboplastin Time (aPTT) were measured using standard laboratory techniques. The findings indicated that the PT values for female participants aged 60–69 years and 70–79 years did not significantly differ ($P > 0.05$) from those of their male counterparts. However, male participants aged 80–89 years showed higher PT values compared to females in the same age category. Likewise, the aPTT values for male and female participants aged 70–79 years and 80–89 years were not significantly different ($P > 0.05$). Nonetheless, the aPTT values for male participants aged 60–69 years were significantly higher ($P < 0.05$) than those of their female counterparts. In summary, the results of this study indicated that PT and aPTT values among the elderly participants were generally elevated compared to established reference values, implying potential age-related changes in coagulation parameters within the study population.

Keywords:
Male,
Female,
Prothrombin time,
Coagulation,
Elderly

INTRODUCTION

The disruption of the delicate balance between clot formation and clot dissolution forms the basis of a wide spectrum of pathological conditions collectively referred to as coagulation disorders. These disorders have been significantly linked to both hemorrhagic and thrombotic complications (Beura *et al*., 2024). Several healthcare initiatives implemented across various African nations, including Nigeria, have greatly enhanced healthcare delivery and increased life expectancy, leading to a rising elderly population (Rafay *et al*., 2025).

As a result, there has been a rise in the clinical challenges associated with coagulation abnormalities in older adults, highlighting the need for improved diagnostic strategies (Mussbacher *et al*., 2024). Elderly individuals are an invaluable resource in every community,

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and their significance cannot be emphasized enough. They are often seen as reservoirs of knowledge and wisdom, continuing to contribute meaningfully to societal progress and development (Sirbu, 2022).

Regrettably, this demographic is especially susceptible to age-related changes in the hemostatic system, which may increase their risk of both thrombosis and bleeding disorders (Beura *et al*., 2024).

The effective treatment and management of diseases largely rely on precise and dependable diagnostic methods, especially for elderly patients. Prothrombin Time (PT) and Activated Partial Thromboplastin Time (aPTT) are crucial laboratory tests commonly utilized in diagnosing and managing coagulation disorders (Gurumurthy *et al*., 2025).

Prothrombin Time (PT) mainly assesses the functionality of the extrinsic and common coagulation pathways by measuring the duration required for blood clot formation. Extended PT values may suggest issues with clotting factors such as fibrinogen, factor V, factor VII, factor X, and prothrombin. Abnormal PT results may also suggest the presence of liver disease, vitamin K deficiency, or the effects of anticoagulant therapy (Gurumurthy *et al*., 2025). Activated Partial Thromboplastin Time (aPTT), on the other hand, evaluates the intrinsic and common coagulation pathways using specific activators to assess the functionality of coagulation factors associated with these pathways. It is considered highly sensitive for detecting certain coagulation abnormalities and monitoring anticoagulant therapy (Nnadozie *et al*., 2026). Given the clinical relevance and diagnostic value of PT and aPTT, their application in the diagnosis and management of coagulation abnormalities among elderly individuals remains highly indispensable.

MATERIALS AND METHODS

Study location and sample size

Amaeze Farm Settlement, located in Okigwe, Imo State, Nigeria, lies approximately within the geographical coordinates of **5.835° N latitude and 7.350° E longitude.** A total of 60 participants, comprising 28 males and 32 females who provided informed consent, were recruited for the study

Inclusion

Apparently healthy male and female residents of Amaeze farm settlement, who have reached the age of 60 and above, were recruited for the study.

Collection of blood samples

A precise volume of 5 ml of venous blood was collected and placed into EDTA containers with the aid of a disposable syringe and needle. To avoid coagulation and cell lysis, the blood sample was mixed thoroughly, and the plasma was subsequently transferred into separate bottles.

Determination of Prothrombin Time (PT)

Precisely 0.1 mL of citrated plasma was transferred into sterile test tubes and incubated at 37 °C for 10 seconds. Concurrently, the calcium thromboplastin reagent was warmed to 37 °C. Following this, 0.1 mL of the warmed calcium thromboplastin reagent was quickly added to the plasma, and the stopwatch was activated immediately. The tube was gently tilted at intervals until clot formation was observed. The clotting time was noted in seconds, and the entire process was conducted in triplicate for each sample.

Determination of Activated Partial Thromboplastin Time (APTT)

Exactly 0.1 mL of citrated plasma was transferred into a small glass test tube that held 0.1 mL of well-mixed kaolin-cephalin reagent. The combination was mixed thoroughly and incubated at 37 °C for 2 minutes, with the tube being tilted intermittently. After this, 0.1 mL of pre-warmed 0.025 M calcium chloride ($CaCl_2$) was introduced, and the stopwatch was activated right away. The tube was then gently tilted. continuously until clot formation was observed. The time taken for clot formation was recorded in seconds, and the analysis was carried out in triplicate for each sample according to the method of Decie and Lewis (1994).

Statistical analysis

Data generated from the study were analyzed using SPSS Version 25 in triplicate. Mean PT and aPTT values were compared using Student's t-test. $p < 0.05$ was considered significant.

RESULTS AND DISCUSSION

The prothrombin times of male and female elderly residents of the Eboha Farm Settlement are shown in Table 1. The results show that the prothrombin time recorded for female residents aged 60-69 and 80-89 years old in Amaeze Farm Settlement was significantly lower ($p<0.05$) than that reported for their male counterparts. However, the prothrombin time of male residents in the farm settlements aged 70-79 years old was not significantly different ($p>0.05$) from that reported for their female counterparts.

Table 1: Prothrombin Time of Male and Female Elderly

	No. of participants		Prothrombin Time (sec)		
Age (years)	Males	Females	Male	Female	P-value

60-69	18	23	17.23±0.29	14.28±2.04	0.0050
70-79	6	6	17.56±0.17	17.30±0.16	0.3169
80-89	4	3	19.10±0.15	18.16±0.06	0.1713

The activated partial thromboplastin time recorded for male and female elderly residents of Eboha farm settlement is shown in Table 2. The results indicate that the activated partial thromboplastin time reported for elderly male residents of EFS was significantly higher ($P<0.05$) than that reported for their female counterparts. However, the APTT recorded for those aged 70-79 and 80-89 years was not significantly different ($P>0.05$) from that reported for their female counterparts.

Table 2: Activated Partial Thromboplastin Time of Male and Female Elderly

	No. of participants		**Activated Partial Thromboplastin Time (sec)**		
Age (years)	**Males**	**Females**	**Male**	**Female**	**P-value**
60-69	18	23	36.83±0.13	28.54±4.85	0.0001
70-79	3	5	37.56±0.14	37.13±0.16	0.1216
80-89	5	3	37.96±0.03	37.30±0.00	0.1072

Prothrombin time (PT) is identified as one of the most popular blood-clotting laboratory tests in clinical practice nowadays. This is because it rapidly evaluates fundamental determinants within the coagulation cascade as a universal approach to blood clotting elements. PT is primarily used to evaluate the integrity of the extrinsic and common coagulation pathways and is particularly sensitive to deficiency or functional impairment in coagulation factors II (prothrombin), V, VII, and X, as well as to significantly reduced fibrinogen concentration (Levy *et al*., 2014). One major factor that affects procoagulation and anticoagulation pathways is age, which is known to induce measurable changes in coagulation parameters (Franchini *et al*., 2006).

The difference in the PT and aPTT reported for old men and women for each of the age category could be as a result of certain physiological distortions which are linked to age. The reportedly high PT observed for men in the age category of 60-69 years old in comparison with that of their female counterparts, could have been as a result of a silent reduction in coagulation factor efficiency or hepatic functions saddled with the task of synthesizing molecules which are obvious among the aged persons. It should be of note that PT evaluates the extrinsic and common pathways of coagulation and is often influenced by factors such as hepatic function, vitamin K status, and clotting factor activity (Diyatri *et al*., 2026).

The statistically insignificant PT recorded for participants aged 70–79 years could be attributed to the fact that coagulation activity in the extrinsic pathway may become more stabilized between genders at an advanced age. This is consistent with the finding of Zervas *et al*. (2026), which, although it affirmed that ageing is associated with increased activation, reported that PT maintains a relatively narrow range owing to compensatory physiological mechanisms maintaining haemostatic balance.

The increased PT observed among men aged 80–89 years compared to their female counterparts could be a result of progressive impairment in the efficiency of the coagulation cascade among men at an advanced age. Poor hepatic function, nutritional deficiencies, chronic inflammation, and reduced clotting factor levels have been implicated in prolonged PT in older adults (Lippi *et al*., 2014). The observed difference, though significant, could imply that ageing strongly influences coagulation in men more than in women at extreme ages.

Lack of or dysfunctional factors VIII, IX, XI, and XII may affect the common coagulation pathways, as assessed by APTT. The higher APTT among males in Table 2 may suggest slower intrinsic pathway activity, though the lack of statistical significance indicates that the variation could be due to biological variability within the study population. The statistically non-significant difference observed in the APTT between males and females in the 70–79 age category is in line with previous assertions that coagulation parameters may remain stable in some aged populations despite advancing age (Zervas *et al*. (2026)).

The APTT reported for males aged 80–89 years was significantly higher than that reported for their female counterparts. The prolonged APTT reported for males may be attributed to age-driven distortions in intrinsic coagulation factor activity or decreased efficiency of hemostatic regulation in elderly males. Research efforts have implicated aging in endothelial dysfunction, chronic low-grade inflammation, as well as altered coagulation factor concentrations, all of which are capable of contributing to extend clotting time in old age (Zervas *et al*., 2026); Lippi et al., 2014).

It is established through this study that coagulation parameters tend to increase with advancing age, especially among males in the oldest age group. The significantly prolonged PT and APTT among participants aged 80–89 years may be a result of reduced haemostatic efficiency and enhanced susceptibility to coagulation abnormalities in advancing ageing. Our findings support the fact that aging is linked to progressive changes in

haemostatic function, which have the potential to predispose aged individuals to bleeding as well as thrombotic complications.

CONCLUSION

The study evaluated Prothrombin Time (PT) and Activated Partial Thromboplastin Time (aPTT) and revealed that elderly male and female residents of Ameze Farm Settlement exhibited PT and aPTT values that were higher than the established reference ranges for these coagulation parameters.

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