

Computerized Tomographic Presentation of Geriatric Brain with Motor Function Impairment and Behavioural Changes in Nigerian Population

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Abstract Aging is characterized with its own challenges. Geriatric patients have been identified with behavioural changes and motor function impairment in many studies across the globe and Nigeria is not an exception. A prospective cross-sectional design was adopted while a primary method of data collection was used to elicit information from the geriatric patients, who had presented for CT scan of the brain between January 2019 and December 2019. Descriptive and inferential statistics were employed to analyze the data collected. Findings indicate that the distribution for behavioural changes as well as motor function impairments was 15.4% and 84.6% respectively. The major behavioural changes observed were outburst and mistrust (10.8%) and severe memory lapses (4.8%). The major motor function impairments observed were sudden collapse/loss of consciousness (42.7%), paraplegia (26.1%), right-sided body weakness (7.5%), difficulty in walking (4.0%), slurred speech/aphasia (3.0%) and left-sided body weakness (1.1%). There was significant association between the gender of the geriatrics and the behavioural changes and motor function impairments observed ($\chi^2 = 17.312$, $df = 4$, $P = .002$). Chronic cerebral atrophy was suggested as the possible cause of behavioural changes

among the geriatrics while cerebral infarct and cerebral haemorrhage were suggested as the possible causes of the motor function impairments among the geriatrics. There is substantial empirical evidence showing strong association between CT presentation of geriatric brain and behavioural changes and motor function impairments in geriatrics and age-related factors. Thus, urgent care and attention should be given to geriatric population in Nigeria to facilitate a healthy life while they age.

Keywords Geriatric, Computerized Tomography, Motor Function Impairment, Behavioural Changes, Memory Lapses

1. Introduction

Background of Study

The population of people aged above 60 years is growing in Nigeria. According to the United Nations, there were 5 million Nigerians aged 60 and above in 2019, with

the number expected to rise to 6% in 2025 and 9.9% in 2050. This translates to 6.4 million, 11.5 million, and 25.25 million people over the age of 65[1]. According to Mudiare [2], Nigeria has the highest number of old individuals over the age of 60years in the sub-Saharan African region. With this increase in the growth of the aging population, the number of people that will need health care will undoubtedly increase. Evidences around the world have also shown that this period is often marked by sudden physical, emotional and dramatic behavioural changes which could be scary and worrisome to family members in particular [3,4].

Scientifically, it is believed that, as one ages, changes are bound to occur in the lifestyle, emotions and even behaviour of the person [5]. This is because aging in an individual entails a multifaceted physical, psychological, and social process changes. However, researchers have pointed out that aging is not an illness, but rather a stage of life in which there occurs a regressive biological process in growth and development, resulting in diminished survival and adjustment abilities [6].

Distinct areas of the brain are responsible for different bodily functions implying that, the brain controls all the bodies' functions, behaviour and thinking. Basically, there are three types of functions, namely, autonomic functions, motor functions and cognitive functions. Autonomic functions refer to the control system that acts largely unconsciously and regulates autonomic bodily functions such as breathing, heart rate, digestion, body temperature regulation, hormone regulation, etc. On the other hand, the motor functions refer to the control system that controls or deals with the precise movement of muscles with the intent to perform a specific act, as our body muscles allow us to move, balance, and speak. Finally, the cognitive function is concerned with brain-based skills such as recognition of faces, sounds, and smells, learning, memory, comprehension of speech, decision-making, planning, and organization that are required in the acquisition of knowledge, manipulation of information, and reasoning, as well as thoughts and emotions [7].

It is widely assumed that the ability to perform all these functions that are carried out by the brain deteriorates as people get older. However, age-related losses in mental capacities are very diverse among individuals, and while average declines may be found across the population, this reflects a significant decline in some, a little decline in most, and no decline at all in others. Some components of function do not tend to deteriorate with age, while others do, on average. Previous researches have recognised varying manifestations of motor impairment that is common in elderly persons [8,9].

For instance, gait abnormalities and lower-limb disability are frequent among the elderly, and they can have a significant impact on their quality of life [8-10]. Several population-based studies have also revealed that adults over the age of 70, and even over 85, had a 35 percent prevalence of gait abnormalities [11]. Other motor

impairments that have been observed among the elderly are slurred speech, uncoordinated gait, and right or left sided body weakness, difficulty in walking and behavioural changes. However, the underlying mechanisms responsible for these motor impairments are still incompletely understood. This therefore calls for a study to be carried out on the brains of elderly people especially in Nigeria and its environs.

The development of computerized tomography (CT) enables researchers to investigate the link between brain structural alterations and motor dysfunction. This is because CT may be used to measure the volume or thickness of specific brain areas in real time, it can provide a window into the human brain as it ages. As a result, by comparing the brains of geriatric volunteers, researchers were able to discover that it is possible to achieve a better understanding of how changes in the brain may lead to changes in motor functions and behaviour. Similar related studies have been carried out in several countries, such as the studies of [12] in Brazil, [3] in Netherlands, amongst many others. However, none of such study has been carried out in Nigeria which has been reported to have the highest population of geriatrics over 60years. Furthermore, it is quite known that previous approaches in Nigeria have not focused on ascertaining the relationship between changes in the brain and motor function impairments among Nigerians. Based on the foregoing, the study seeks to carry out a CT presentation of geriatric brain with behavioural changes and motor function impairment in a Nigerian population.

In Obafemi Awolowo University Teaching Hospital, Ile-Ife, there are over a thousand elderly patients who come annually for age-related health issues. This was majorly motor function impairment, such as slurred speech, uncoordinated gait, right or left sided body weakness, difficulty in walking and behavioural changes. It is reported that an average of eight (8) out of fifteen (15) patients manifest these motor function impairments [2]. However, the underlying mechanisms responsible for this motor impairment are still incompletely understood especially by family member who most times resorts to prayer houses, self-medication and/or traditional medicine as a means for treatment [2].

Although studies have been carried out on behavioural changes among adults, observations revealed that there is racial difference in brain size, volume and intelligent quotient (IQ). This explains the need to carry out this study among African population. It was also noted that there could be racial-group differences in brain sizes, race, evolution and behaviour. African descend people (blacks) were shown to have brain capacity of 1267cm, those of European descend people(whites) with brain capacity of 1347cm while those of East-Asian descend people had 1364cm brain capacity. It is noted that this could affect IQ and behaviour among races. In fact, few studies have been carried out on the relationship between anatomical changes of the brain and motor impairment in geriatrics, but none of

such study had been carried out in Nigeria. It is therefore important to carry out a study that focuses on the relationship between the structural changes of the brain and motor impairment in geriatrics considering the fact that by comparing the brains of elderly patients with behavioural changes through the use of computerized tomography (CT), we may achieve a better understanding of how changes in the brain may lead to changes in motor functions, as well as proffer possible suggestions on how these motor functions could be ameliorated in elderly patients.

Therefore, the goal of study is to identify the common CT brain scan findings of geriatric patients with behavioural changes and motor function impairment in a Nigerian population, and determine the distribution of geriatrics studied according to the exhibited behavioural changes and motor function impairments. Thereby, the study will be beneficial to health workers, government and/or policy makers, family members as well as researchers. Also, the findings of the current study will provide empirical data on the distribution of geriatrics with motor function impairments and behavioural changes in Obafemi Awolowo University Teaching Hospital, Ile-Ife, South-West of Nigeria.

2. Methods

Research Design

A prospective cross-sectional approach was used, to see if there was a link between brain structural alterations and motor disability. This method, according to [13], gives an accurate account of the features of a certain individual, event, or group in a real-life setting with the goal of uncovering new meaning, identifying what exists, and the regularity with which it occurs. As a result, this design is suited for this research.

Study Setting

This research was carried out at ObafemiAwolowo University Teaching Hospital, Ile-Ife, Osun State, South West Nigeria between January 2019 and December 2019. The choice of ObafemiAwolowo University Teaching Hospital, Ile-Ife, is based on the fact that the hospital has one of the busiest and highest care of geriatrics in southwest Nigeria, with hospital records showing that over a thousand patients present annually for age-related issues. The hospital is known to provide a 24-hour CT, provides immediate scan result collection and has the highest patient referrals in south west Nigeria. Thus, it is reported to be the busiest, most affordable, reliable CT centre in Osun state, South West Nigeria.

Target Population and Selection Criteria

The population of this study were all elderly (geriatrics) patients, aged 65 years and above, presenting with slurred speech, inability to move one part of the limb, uncoordinated gait, sudden collapse, loss of consciousness, mistrust, outburst indicated on their request cards being referred for CT scan of the brain. However, individuals with known history of mental illness were excluded from the study. Normally adult population studies cover between ages 18 and 64 years while geriatric studies cover subjects of 65 years and above [14].

Equipment

The equipment employed for the purpose of this research study was a 16 slice GE Emotion Computerised tomography machine with syngo acquisition work station with inherent 3D reformation capabilities having:

Serial number: 29008050456

Model: GE-EMOTION GSY-00879

Date of manufacture: AUGUST 2009

Type: IEC701-1: Complies with NNRA Radiation performance standards.

Ethical Considerations

Ethical approval was sought from the Osun State Health research Ethics committee (in the Ministry of Health, Osun State, Nigeria) with a reference number: OSHREC/PRS/569T/158. The participants consented to have understood the goals of the study and they voluntarily participated while information collected was made confidential and strictly used for the research purpose.

Data Collection

A primary method of data collection was used to elicit information from the clinical request cards and case notes of geriatric patients (i.e. clinical indications, patient medical history and bio data and demographic information), who had presented for CT scan of the brain fitting into the selection criteria between January 2019 to December 2019. After the scan, the images were sent to Radiologist console for reporting. For the purpose of this study, two radiologists were in charge of the report. All the findings were recorded and documented using data capture sheet.

Scanning Technique

Supine, AP and lateral scouts were taken and helical mode was used for adult brain CT scan.

SCAN PROTOCOL

CT-BRAIN PROTOCOL:

Patient positioning: Scout	Supine, Head in Head Rest lateral (90 degrees), anterior posterior (180degrees)
Start	angle of mandible
End	vertex of skull
KVp	135
Ma	300
Algorithm	Standard
Rotation Time	1.0sec
Slice Thickness	5mm
Window Width/Window Level	100/35 soft tissue3000/650 bone
Intravenous Contrast(if indicated)	Non-ionic contrast 370 50mls hand injected

Patient Positioning

With the patient lying in the supine position, tilt the patient’s head to get the Radiographic Base Line perpendicular to the cradle. Head straps were used to maintain the correct position and to hold still during the examination for patient’s comfort also. Centre to the glabella with the help of the lacer light. Frontal (AP) and lateral scouts were taken. Scan parameters were planned, Start scans was taken from the bottom of C1 and scanned through the vertex of the skull.

Method of Data Analysis

The data from the spreadsheet was reorganized in an orderly fashion to make it easier to process with the Statistical Package for Social Sciences (SPSS) version 23.0 and Microsoft Excel 2016. Tables were used to present the demographic information gathered as well as the results of the brain CT scan. The findings were presented in the form of tables, charts, and frequency tables using descriptive statistics. Association between gender and motor function impairments was tested using Chi-square.

3. Results

The results obtained from the study were analysed, presented and interpreted with the aim of achieving the

objectives of the study.

Demographic Characteristics of Participants

The socio-demographic characteristics of the participants are shown in Table 1. Males made up more than half of the participants (57.6%; n = 371). The mean age of the participants was 82 years (± 10.7) and majority were married (60%; n = 386). Majority of the participants were Muslims (70%; n = 371). In addition, more than half (65%; n = 418) were hypertensive.

Distributions of Geriatrics According to the Exhibited Behavioural Changes and Motor Function Impairments

Figure 1 shows that the behavioural changes and motor function impairments observed in the participants could be categorised into 5 groups. Category A were those who presented with only behavioural changes (15.4%; n = 99); category B were those who presented with motor function impairments (23.3%; n = 150); category C were those who presented with double aspects of motor function impairments (18.6%; n = 120); category D were those who presented with progressive aspects of motor function impairments/sudden collapse (20.2%; n = 130) while category E presented with slurred speech, limb weakness & loss of consciousness (22.5%; n = 145).

Table 1. Socio-Demographic Characteristics of the Participants (n = 644)

Variables	Options	Frequency (N)	Percentage (%)
Gender	Male	371	57.6
	Female	273	42.4
	Total	644	100
Age (years)	60 – 70	92	14.3
	71 – 80	243	37.7
	81 – 90	153	23.8
	91 – 100	124	19.3
	101 and above	32	5.0
	Total	644	100
Marital status	Single	-	-
	Married	386	60.0
	Divorced	129	20.0
	Widowed	129	20.0
	Total	644	100
Religion	Christianity	129	20.0
	Islam	451	70.0
	African traditional religion	64	10.0
	Atheist	-	-
	Total	644	100
Hypertensive history	Hypertensive	418	65.0
	Non-hypertensive	129	19.9
	Not aware	97	15.1
	Total	644	100

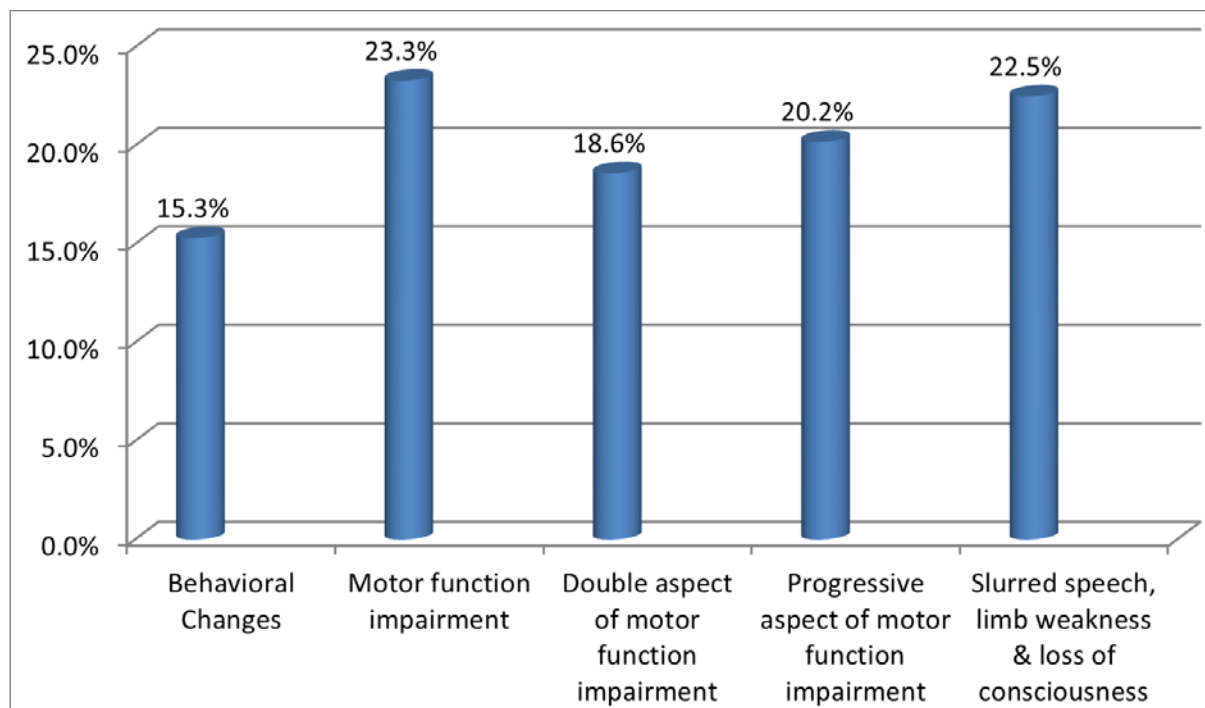
**Figure 1.** Categories Of Behavioural Changes and Motor Function Impairments Observed In Participants (n = 644)

Table 2 shows the clinical indications of behavioural changes and motor function impairments observed in the studied participants. Findings revealed that 42.7% of the participants had sudden collapse/loss of consciousness (n = 275), 26.1% had paraplegia (n = 168) and 10.8% had outburst and mistrust (n = 70). These constituted the most identified indicators. On the other hand, right-sided body weakness (7.5%; n = 48), severe memory lapses (4.8%; n = 31), difficulty in walking (4.0%; n = 26), slurred speech/aphasia (3.0%; n = 19) and left-sided body weakness (1.1%; n = 7) were the least observed indicators.

4. Association between Gender and Motor Function Impairments among the Studied Geriatrics

Table 3 shows the association between gender of participants and the category of the behavioural changes

and motor function impairments. Findings indicate that behavioural changes and double aspects of motor function impairments was higher for males (19.4% and 19.7% respectively) than for females (9.9% and 17.2% respectively). It also showed that motor impairments and loss of consciousness was higher for females (29.3% and 23.4% respectively) than for males (18.9% and 21.8% respectively). This variation was statistically significant (P = .002).

Table 4 revealed that the major indications of behavioural changes observed in a higher percentage of males than females was outburst and mistrust (72.9%), severe memory lapses (67.7%), difficulty in walking (57.7%), sudden collapse/loss of consciousness (56.7%), paraplegia (54.2%) and right-sided body weakness (52.1%). On the other part, the major indications of behavioural changes observed in a greater percentage of females than males were left-sided body weakness (57.1%) and slurred speech/aphasia (52.6%). However, this variation was not statistically significant (P = .143).

Table 2. Common Behavioural Changes and Motor Function Impairments Observed In Participants (n = 644)

Variables	Options	Frequency (N)	Percentage (%)
Indication	Severe memory lapses	31	4.8
	Outburst and mistrust	70	10.8
	Left-sided body weakness	7	1.1
	Slurred speech/aphasia	19	3.0
	Right-sided body weakness	48	7.5
	Paraplegia	168	26.1
	Difficulty in walking	26	4.0
	Sudden collapse/loss of consciousness	275	42.7

Table 3. Association between Gender of Participants and The Category of the Behavioural Changes and Motor Function Impairments (n = 644)

Category of behavioural changes and motor function impairments	Gender		x ²	Df	P-value
	Male N (%)	Female N (%)			
Behavioural changes	72(19.4)	27 (9.9)	17.312	4	.002
Motor function impairments	70(18.9)	80(29.3)			
Double aspects of motor function impairments	73(19.7)	47(17.2)			
Progressive double aspects of motor function impairments/sudden collapse	75(20.2)	55(20.1)			
Slurred speech, limb weakness and loss of consciousness	81(21.8)	64(23.4)			

Table 4. Association Between Gender of Participants and The Indication of the Behavioural Changes and Motor Function Impairments (n = 644)

Variables	Options	Gender		x ²	df	P-value
		MaleN (%)	FemaleN (%)			
Indication	Severe memory lapses	21 (67.7)	10 (32.3)	10.910	7	.143
	Outburst and mistrust	51 (72.9)	19 (27.1)			
	Left-sided body weakness	3 (42.9)	4 (57.1)			
	Slurred speech/aphasia	9 (47.4)	10 (52.6)			
	Right-sided body weakness	25 (52.1)	23 (47.9)			
	Paraplegia	91 (54.2)	77 (45.8)			
	Difficulty in walking	15 (57.7)	11 (42.3)			
	Suddencollapse/loss of consciousness	156 (56.7)	119 (43.3)			

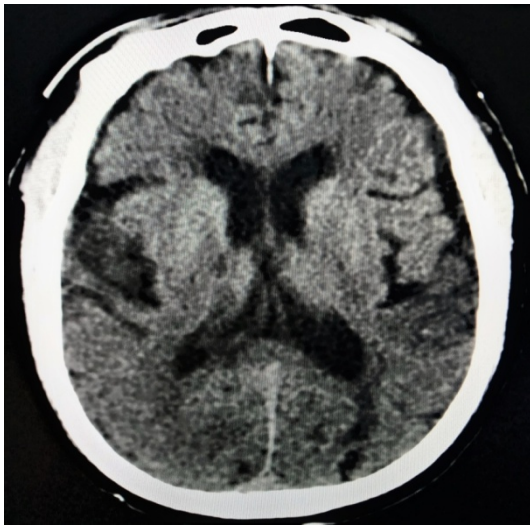
Common CT Findings in Geriatric Patients with Impairments in the Area of Study

Figure 2. An axial CT Brain image demonstrating chronic cerebral atrophy

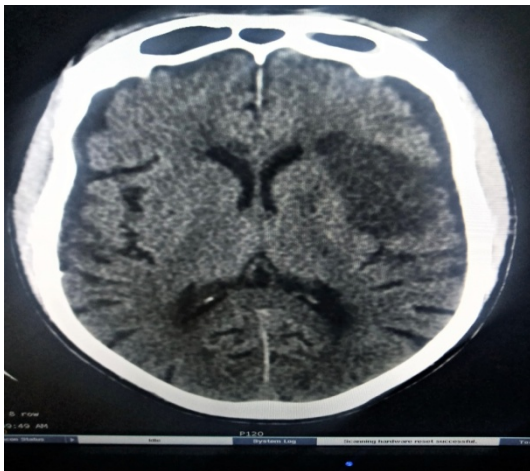


Figure 3. An axial CT Brain image demonstrating cerebral infarct

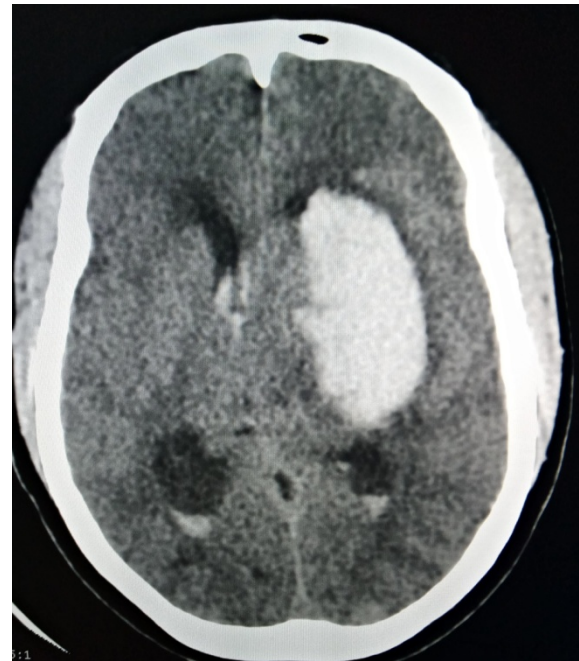


Figure 4. An axial CT brain image demonstrating cerebral haemorrhage

As shown in Table 5, findings revealed that chronic cerebral atrophy could be the possible cause of behavioural changes among geriatrics presenting with behavioural changes. Cerebral atrophy refers to the continuous loss of brain cells or decrease in size of the brain or wasting away of any part of the brain. It can affect the entire brain or some part of the brain which can lead to reduced brain mass and loss of neurological functions. Cerebral atrophy occurs as a result of brain injury, neurological disease such as Alzheimer's disease, cerebral palsy and infection to the brain (check the demonstrating image in figure 2). The major causes of brain infarcts are blocked artery, bursting or leaking of a blood vessel (haemorrhagic), mechanical compression and vasoconstriction.

Table 5. Common CT Findings on the Causes of Behavioural Changes and Motor Function Impairments in Geriatrics

S/N	Categories Of Behavioural Changes And Motor Function Impairment	Computerized Tomographic (CT) Findings	Freq. N (%)
1	Severe memory lapses	Chronic cerebral atrophy	31(4.8)
2	Outburst and mistrust	Chronic cerebral atrophy	70(10.8)
3	Left-sided body weakness	Cerebral atrophy, cerebral infarct	7 (1.1)
4	Slurred speech/aphasia	Cerebral atrophy, cerebral infarct at the level of the frontal lobe of the brain	19 (3.0)
5	Right-sided body weakness	Mild cerebral atrophy, cerebral infarct at the level of left cerebral hemisphere	48 (7.5)
6	Paraplegia	Extensive fronto-parietal cerebral infarct, extensive cerebral infarct	168(26.1)
7	Difficulty in walking	Luconale cerebral infarct	26 (4.0)
8	Sudden collapse/loss of consciousness	Chronic, extensive cerebral haemorrhage	275 (42.7)

Dizziness, severe headaches, confusion, disorientation, or significant memory loss are all common signs of brain damage, as are irregular or slurred speech, trouble understanding, loss of balance/coordination, inability to walk, and weakness in the arm, leg, and face (especially one-sided). An injury to the brain can cause changes in emotion, and behaviour and also affect motor functions of the body. Injury to the affected part of the brain affects the particular function that part of the brain performs. In the course of this research, it was observed, that among patients who presented with left side body weakness, the right side of the brain was harmed, while the left side of the brain was affected in those who presented with right-sided bodily weakness.

The findings from the study also indicates that cerebral infarct could be the possible cause of the motor function impairments among geriatrics presenting with motor function impairments and double aspects of motor function impairments. Cerebral infarct (see figure 3) refers to death of brain tissues, caused by lesion or injury which leads to blockage of an artery that supplies blood to a particular part of the brain. The blockage decreases the flow of blood and oxygen to the brain, resulting in brain cell damage and death. If the brain does not get blood circulation back quickly, it leads to permanent brain damage which results in major motor function impairment among geriatrics [15].

Furthermore, the findings indicate that cerebral haemorrhage could be the possible cause of the motor function impairments among geriatrics presenting with progressive slurred speech, sudden collapse, limb weakness and loss of consciousness. A cerebral haemorrhage occurs when a blood artery in the brain ruptures, causing bleeding. The haemorrhage compresses brain tissue (as shown in figure 4), causing damage to brain cells and eventually death. A pictorial presentation is displayed in Picture 4.

5. Discussion

The study revealed that the distribution for behavioural changes among the geriatric presenting for CT scan at Obafemi Awolowo University Teaching Hospital, Ile-Ife, South West of Nigeria was 15.4% while those presenting with motor function impairments was 84.6%. These findings imply that the situation at hand is a case of emergency and needs an urgent attention from policy makers and stakeholders in the health sector. This becomes very important when one considers the implication that this silent killer could have on the population of geriatrics in Nigeria (5.6% of the country's population) as recorded by the [16].

In addition, the findings revealed that the major behavioural changes that were observed in the geriatrics were outburst and mistrust (10.8%) and severe memory lapses (4.8%). Also, the study shows that the major motor function impairments that were observed in the geriatrics

were sudden collapse and loss of consciousness (42.7%), paraplegia (26.1%), right-sided body weakness (7.5%), difficulty in walking (4.0%), slurred speech/aphasia (3.0%) and left-sided body weakness (1.1%). These findings are consistent with the study of [6,17] who revealed that, as one ages, changes are bound to occur in the lifestyle, emotions and even behaviours of the person. It also agrees with that of [9-11]. However, it is vital to note that aging is not an illness, but rather a stage of life in which a retrograde biological process in growth and development occurs, resulting in diminished survival and adjustment abilities. As a result, one of the most essential ways of caring for geriatrics is to understand how changes in the brain can lead to changes in motor capabilities.

The discovery from this study shows that there was a significant association between the gender of the geriatrics and the behavioural changes and motor function impairments observed. Specifically, it was observed that those who were males (who presented with behavioural changes) were higher than females (19.4% and 9.9% respectively). The higher proportion of males was also observed among geriatrics who presented with double aspects of motor function impairments (19.7% as against 17.2% for females). However, the findings showed that more females presented with motor function impairments (29.3% as against 18.9% for males) as well as slurred speech, limb weakness and loss of consciousness than males (23.4% and 21.8% respectively). This finding is consistent with that of [18], who stated that one of the main characteristics of the elderly population is heterogeneity, and that older people of the same age range have a wide range of risk of disability, cardiac and metabolic disease, cognitive impairment, insomnia, depression, hospitalizations, institutionalization, falls, and mortality[19,20].

The study also discovered that there was no statistically significant link between geriatrics' gender and the signs of behavioural changes and motor function deficits seen ($\chi^2 = 10.910$, $df = 7$ and $P = .143$). Nonetheless, the major indications of behavioural changes were observed. While males made up a higher proportion of the population than females. Outburst and mistrust (72.9%), severe memory lapses (67.7%), difficulty in walking (57.7%), sudden collapse/loss of consciousness (56.7%), paraplegia (54.2%) and right-sided body weakness (52.1%) were the major indications noted. The major indications of behavioural changes that were observed in a greater percentage of females than males were left-sided body weakness (57.1%) and slurred speech/aphasia (52.6%).

The study revealed that there were possible underlying causes of behavioural changes and motor function impairments in geriatrics presenting for CT scan at Obafemi Awolowo University Teaching Hospital, Ile-Ife, South West of Nigeria. Specifically, the findings indicate that chronic cerebral atrophy might be the possible cause of behavioural changes among geriatrics while cerebral infarct and cerebral haemorrhage were identified as the

possible causes of the motor function impairments among the geriatrics. These underlying causes have been adduced to be also caused by blood clot, fatty build up, atheromatous stenosis, etc. as suggested by [15]. These finding agrees with that of [21] in Goteberg, Sweden, who suggested that temporal lobe atrophy, which is frequently found on brain imaging in the aged, could be a significant brain pathology linked to motor difficulties in elderly women. It also coincides with the findings of [22].

6. Conclusions

The study aimed at identifying common CT brain scan findings of geriatric patients with behavioural changes and motor function impairments in a Nigerian population. Findings indicate that the distribution for behavioural changes and motor function impairments among geriatrics presenting for CT scan at the setting was 15.4% and 84.6% respectively. The major behavioural changes observed were outburst and mistrust and severe memory lapses. The major motor function impairments observed were sudden collapse/loss of consciousness, paraplegia, right-sided body weakness, difficulty in walking, slurred speech/aphasia and left-sided body weakness. There was significant association between the gender of the geriatrics and the behavioural changes and motor function impairments observed. However, the gender of the geriatrics has no statistically significant correlation with the indications of behavioural changes and motor function impairments observed. Chronic cerebral atrophy was suggested as the possible cause of behavioural changes among the geriatrics while cerebral infarct and cerebral haemorrhage were suggested as the possible causes of the motor function impairments among the geriatrics. Based on these findings, it can be concluded that there is substantial empirical evidence showing strong association between behavioural changes and motor function impairments in geriatrics and age-related factors. Thus, urgent care and attention should be given to geriatric population in Nigeria to facilitate a healthy life while they age.

7. Recommendations

The following suggestions are based on the findings of this study:

- i. Geriatrics who presents with behavioural changes and motor function impairment is hereby recommended for CT scan of the brain, as early diagnosis can help in the overall management of geriatric patients of this category.
- ii. Medical check-up should be adopted for geriatric population (from age 50 and above) in Nigeria. This could be initiated as a free or greatly subsidised healthcare programme for people within this age group.
- iii. Geriatric homes and medical facility is recommended to be created in Nigeria for effective management of geriatrics to live even more longer in good health.

Competing Interest

Authors declare none.

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