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Original scientific paper

Relationship between Socio-Demographic Indices and CT-diagnosed Aetiologies of Seizure in Katsina State, Nigeria

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Abstract

Background: Seizure disorder is a global health concern which tends to be influenced by social and demographic factors. **Objectives:** This study assessed the influence of these factors on the various seizure aetiologies seen on a brain CT. **Methods:** Ethical clearance was obtained from the Federal Teaching Hospital Katsina and then the retrospective study of 442 brain CT images with positive findings of seizure aetiologies from December 2019 to August 2021 was performed. The socio-demographic parameters of the patients were retrieved from the patients' records. **Results:** The seizure aetiologies that dominated the study were ischemic stroke, hemorrhagic stroke, cerebral atrophy, skull fracture and traumatic brain injury with 81 (18 %), 60 (14 %), 55 (12 %), 41 (9 %) and 43 (10 %) respectively. The first decade of life recorded the highest frequency of seizure aetiologies, there was a decline in the second decade and then the frequency of etiologies increased with the increase in age. There was male gender preponderance with 65%. The Hausa ethnic group dominated the study with 93% of the total subjects. The frequency distributions of urban and rural dwellers were 60% and 40% respectively. Twenty per cent of the total subjects were housewives with stroke comprising 52% of their seizure aetiologies. **Conclusion:** Chi-square (at 95% CI) showed that there was a statistically significant dependence between the frequencies of brain CT-diagnosed seizure aetiologies with age, gender and occupation but not geographical location. Due to the high frequency of stroke, it is recommended that special attention should be given, especially among housewives.

Keywords: seizure disorder, aetiologies, soci-odemographic factors, computed tomography (CT)

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Introduction

Seizures are manifestations of involuntary uncontrolled surge in localized or generalized discharge of neurons in the brain[1,2]. This spontaneous uncontrolled depolarization of neurons causes abnormal motor or sensory activity and even loss of consciousness. When it is recurrent, it is referred to as epilepsy and it has been seen to have social and cultural stigma especially in countries like India and Pakistan[3]. It is estimated that about eight to ten per cent of the population will experience seizure once in a lifetime but only about two to three per cent of patients develop epilepsy[4]. Epilepsy is regarded as a public health emergency because it is a serious disease in Africa due to its late diagnosis and inadequate management[1, 3]. The World Health Organization (WHO) estimated that there are about fifty million people living with epilepsy worldwide and that eighty per cent of them belong to low and middle income countries[1, 5]. About three to six million affected individuals exist in the United States and in Nigeria; there is an estimated prevalence of about eight in every one thousand individuals[6].

Seizures could be generalized or partial; generalized seizures have multiple foci in the deep structures of both cerebral hemispheres and the brain stem and cause loss of consciousness, whereas partial seizures have a focal origin, often in the cerebral cortex, and may or may not involve altered consciousness. However, partial seizures may progress to generalized seizures[7, 8]. Seizures can be caused by the traumatic brain injury (TBI), developmental anomalies, brain infection, brain tumours, genetic, stroke and idiopathic[9, 10]. Seizures seriously affect the lifestyle of affected persons; as it has been reported that victims tend to suffer, become depressed, anxious and cognitively impaired [9, 11]. It has also been reported that seizure disorder is influenced by socio-demographic factors such as age, gender, economic status, occupation, geographical variation, educational level and beliefs[2, 3, 12, 13-15].

Goldstein et al.[16] reported females to be predominant and characterized by high levels of socio-economic deprivation. Kisk et al.[2] reported higher related TBI seizure in males while immune disorder lesions, juvenile myoclonic and temporal lobe epilepsy are more frequent in females and the females have lower literacy level and are unemployed. Panagariya et al.[5] reported a male preponderance of epilepsy in 2.1:1 male-to-female ratio. And further explanation is that the higher male to female ratio can be attributed to higher incidence of head trauma and alcohol abuse in men. Ullah et al.[17] reported high prevalence in male patients in urban areas with majority of the patients having low socioeconomic status. Boggs[14] reported higher incidence in males than females and that age related seizures are more frequent in men than women while higher rates in female were reported by Winkler et al.[18]. Miskov[15] explained that reason for gender difference was not understood but it might be related to hormones and that seizure disorder has a negative effect on a relationship with a spouse by making the affected partner have low self-esteem.

Age influences seizure disorder, about four to ten per cent of children suffer at least one seizure in the first 16 years with most seizures occuring due to fever, metabolic imbalance, head injury, CNS infection, perinatal complications, acute encephalopathy and family history[3]. The prevalence of seizures has been reported to be influenced by geographical variations and it is higher in developing countries as compared to developed countries and there is also higher prevalence in rural areas than in urban areas[1, 5]. Geographical location greatly influences the socio-economic status of the inhabitants of that area and the influence of geographical variation on seizure prevalence can also help to understand the gap in medical care[17].

Neuroimaging plays a profound role in the diagnosis of seizure disorders. Kotisaari et al.[19] strongly recommended that emergency imaging be carried out for seizure disorders. In this study, magnetic resonance imaging (MRI) and computed tomography (CT) are the imaging modalities were used. This study focused on the use of CT in seizure disorders because it is readily available which makes it to be considered as the gold standard imaging modality in developing countries for patients presenting to the emergency department despite the high radiation dose involved[20, 21]. Also, CT demonstrates various causes of brain seizure such as brain tumours, hematomas, cerebral infarction and hemorrhage, and structural and vascular anomalies. Sometimes a contrast medium is given intravenously, and the images with and without the medium can be compared to further facilitate the diagnosis[20, 22].

It is evident from the aforementioned studies that the impact of social and demographic parameters on seizure disorder patients varies from one society to another and these factors have shown to play a vital role in the care and management of the patients. Therefore, it was important that every society study these factors

in order to understand how they influence the aetiologies of seizure disorder in their locality. The application of this study in public health is that it revealed the vulnerable group concerning socio-demographics thereby provided further understanding of seizure disorder among the population for better patient management. The aim of this study was to assess the impact of the various socio-demographic characteristics of seizure disorder patients on the various seizure aetiologies on a brain CT.

Materials and Methods

Sample size

A sample size of 385 was calculated using an online sample size calculator by Creative Research Systems[23]. The sample size was calculated at 5% confidence interval and 95% confidence level.

The population used was based on the report of Akinsulore and Adewuya[24] that the prevalence of epilepsy in Nigeria varies from 5.3 to 35 in 1000. Therefore, the upper limit of 35 persons in 1000 was used to arrive at a population size of 7,000,000.

Data collection

Ethical approval with reference number FTHKTHREC. REG.NHREC/24/06/22C/038 was obtained from the Human Research and Ethics Committee of the Federal Teaching Hospital Katsina. The following ethical considerations were strictly abided by - anonymity of the subjects involved in the study; all information obtained was used only for this research and nothing else; readers cannot link any information obtained during the research to any of the subjects.

A retrospective study of 442 patients was performed covering the period from December 2019 to August 2021. The study involved only patients who had undergone brain CT scans and had positive findings of seizure aetiologies such as traumatic brain injury, subdural hematoma, epidural hematoma, stroke, subarachnoid hemorrhage, contusion, arteriovenous malformation (AVM) and brain tumours. The study excluded patients with seizure disorder but not being prescribed a CT scan and patients with seizure but not diagnosed with any brain pathology on the CT. The brain CT examination was performed using a similar protocol using a General Electric (GE) CT scanner (ST 1 Rev. ACTs) manufactured in 2018.

The findings of the brain CT images were reported by a team of four radiologists with experience varying between 5 to 10 years. The socio-demographic parameters of the patients such as age, gender, occupation and geographical location together with the brain CT reports were retrieved from the hospital's Electronic Health Records (EHR) using the patient's reference number and then documented on the data capture sheet.

Statistical analysis

Statistical analysis was performed using Microsoft Excel 2016. Tables and graphs were used to show the descriptive statistics while a Chi-square test (at 95% CI) was used to analyze the relationship between the frequencies of occurrence of the various seizure aetiologies versus the various socio-demographic variables.

Results

Table 1 shows the descriptive statistics of age. The mean and median ages were 41.8 and 41.0 years, respectively. Table 2 shows the frequency distribution of seizure aetiologies represented on CT images according to age. The age groups with the highest and second highest frequency of patients were 0–10 and 61–70 years with 72 (16.29%) and 69 (15.61%) respectively. The age group with the least frequency of seizure aetiologies was 11-20 years with 28 (6.33%). The CT seizure aetiologies arranged in descending order of frequency were 0 - 10 > 61–70 > 51–60 > above 70 > 21–30 > 31– 40 > 11–20 years. The seizure aetiologies in age group 0–10 years showed varying frequencies in pathologies of seizure disorder patients with the group others having the highest frequency with 36 (8.14%). The group referred to as "other" comprises patients with CT pathological findings such as hydrocephalus, hygroma, schizencephaly, arterial thrombosis, retinoblastoma, Sheehan syndrome, encephalocele and cerebral oedema.

No patient was reported to have presented with AVM, SAH and subdural hematoma in this age group. The age group 61-70 years recorded the second highest frequency with 69 (15.61%). The highest reported pathology in this age group was ischemic stroke with 26 (5.88%). This was followed by patients with CT findings of cerebral atrophy with 16 (3.62%). No CT finding of acute epidural hematoma, subarachnoid hematoma (SAH), contusion and skull fracture for the age group 61-70. The highest recorded pattern in this age group was recorded as other with 8 (1.81%) while no patient was recorded to have the aetiologies of acute epidural hematoma, subdural hematoma and brain tumours. The overall highest CT patterning of finding was recorded as "other" with 95 (21.49%) which is followed by ischemic stroke with 89 (20.14%). The highest and second highest age groups with stroke patterns were recorded 61–70 and >70 years.

Table 1. **Descriptive statistics of study subjects' age**

Descriptive statistic	Age (years)
Mean	41.8
Median	41
Median Interquartile Range	41
Standard Deviation	25.1
Minimum	0
Maximum	107
Range	107

Table 3 shows the frequency distribution of the CT patterns of findings according to their gender. The male gender recorded 288 (65.16%) while the female recorded 154 (34.84%). In the male gender, the group "other" recorded the highest frequency with 49 (11.09%). It was followed by ischemic stroke with 14 (10.63%). In the female gender, the highest and second highest were 46 (10.41%) and 42 (9.50%) for others and ischemic stroke respectively. CT pattern of SAH was recorded with the least frequency in males while acute epidural hematoma had the least pattern in the female gender with 0 (0.00%).

Figure 1 shows the frequency distribution according to tribe. The majority was the Hausa tribe with 412 (93.21%). This was followed the Fulani tribe and others with each having 9 (2.04%) respectively. Figure 2 shows the frequency distribution according to the state of origin. Katsina state indigenes recorded the highest with 420 (95.02%) while indigenes from other states recorded 22 (4.98%).

Table 4 shows the frequency distribution of CT pattern according to residential (geographic) location. Individuals living in the state capital (urban area) recorded 256 (57.91%) while local government area (rural) inhabitants recorded 186 (42.08%). Computed tomography pattern labelled as other recorded highest and followed by ischemic stroke with 59 (13.35%) and 54 (12.22%) for state capital residents and 36 (8.14%) and 35 (7.92%) for local government residents respectively.

Table 5 shows the distribution according to their occupation. The highest frequency was recorded in housewives with 90 (20.36%), followed by businessmen and women with 67 (15.16%). The least was recorded in widows with 7

Table 2. **Frequency distribution of the CT Pattern of Findings According to Age**

Age	AVM	Acute Epidural Hematoma	SAH	Chronic Subdural Hematoma	Brain Tumour	Acute Subdural Hematoma	Contusion	Traumatic Brain Injury	Skull Fracture	Cerebral Atrophy	Hemorrhagic Stroke	Ischemic Stroke	Other	Total
0 - 10	0 (00.00%)	1 (00.23%)	0 (00.00%)	0 (00.00%)	3 (00.68%)	0 (00.00%)	3 (00.68%)	5 (01.13%)	6 (01.36%)	9 (00.20%)	4 (00.90%)	5 (01.13%)	36 (08.14%)	72 (16.29%)
11 - 20	0 (00.00%)	0 (00.00%)	1 (00.23%)	0 (00.00%)	0 (00.00%)	0 (00.00%)	1 (00.23%)	6 (01.36%)	6 (01.36%)	2 (00.45%)	2 (00.45%)	2 (00.45%)	8 (01.81%)	28 (06.33%)
21 - 30	0 (00.00%)	1 (00.23%)	1 (00.23%)	0 (00.00%)	0 (00.00%)	1 (00.23%)	2 (00.45%)	8 (01.81%)	21(04.475%)	1 (00.23%)	12 (02.71%)	4 (00.90%)	7 (01.58%)	58 (13.13%)
31 - 40	0 (00.00%)	1 (00.23%)	1 (00.23%)	0 (00.00%)	2 (00.45%)	3 (00.68%)	3 (00.68%)	9 (00.20%)	7 (01.58%)	2 (00.45%)	4 (00.90%)	4 (00.90%)	15 (03.39%)	51 (11.54%)
41 - 50	2 (00.45%)	2 (00.45%)	0 (00.00%)	0 (00.00%)	2 (00.45%)	1 (00.23%)	3 (00.68%)	4 (00.90%)	1 (00.23%)	2 (00.45%)	7 (01.58%)	12 (02.71%)	7 (01.58%)	43 (09.73%)
51 - 60	0 (00.00%)	0 (00.00%)	2 (00.45%)	2 (00.45%)	1 (00.23%)	1 (00.23%)	2 (00.45%)	6 (01.36%)	2 (00.45%)	5 (01.13%)	17 (03.85%)	14 (03.17%)	9 (00.20%)	61 (13.80%)
61 - 70	1 (00.23%)	0 (00.00%)	0 (00.00%)	2 (00.45%)	1 (00.23%)	3 (00.68%)	0 (00.00%)	2 (00.45%)	0 (00.00%)	16 (03.62%)	11 (02.49%)	26 (05.88%)	7 (01.58%)	69 (15.61%)
>70	0 (00.00%)	0 (00.00%)	0 (00.00%)	2 (00.45%)	0 (00.00%)	1 (00.23%)	0 (00.00%)	4 (00.90%)	2 (00.45%)	20 (04.52%)	3 (00.68%)	22 (04.98%)	6 (01.36%)	60 (15.61%)
Total	3 (00.68%)	5 (01.13%)	5 (01.13%)	6 (01.36%)	9 (00.20%)	10 (02.26%)	14 (03.17%)	44 (09.95%)	45 (10.18%)	57 (12.90%)	60 (13.57%)	89 (20.14%)	95 (21.49%)	442 (100%)

AVM: Arteriovenous Malformation
SAH: Subarachnoid Hemorrhage

Table 3. **Frequency distribution according to gender**

CT Findings	Frequency Distribution		Total
	Male	Female	
AVM	2 (00.45%)	1 (00.23%)	3 (00.68%)
Acute Epidural Hematoma	5 (01.13%)	0 (00.00%)	5 (01.13%)
SAH	1 (00.23%)	4 (00.90%)	5 (01.13%)
Chronic Subdural Hematoma	6 (01.36%)	0 (00.00%)	6 (01.13%)
Brain Tumour	4 (00.90%)	5 (01.13%)	9 (02.04%)
Acute Subdural Hematoma	8 (01.81%)	2 (00.45%)	10 (02.26%)
Contusion	13 (02.94%)	1 (00.23%)	14 (03.17%)
Traumatic Brain Injury	41 (09.28%)	3 (00.68%)	44 (09.95%)
Skull Fracture	37 (08.37%)	8 (01.81%)	45 (10.18%)
Cerebral Atrophy	32 (07.24%)	25 (05.66%)	57 (12.90%)
Hemorrhagic Stroke	43 (09.73%)	17 (03.85%)	60 (13.57%)
Ischemic Stroke	47 (10.63%)	42 (09.50%)	89 (20.14%)
Other	49 (11.09%)	46 (10.41%)	95 (21.49%)
Total	288 (65.16%)	154 (34.84%)	442 (100%)

Table 4. **Frequency distribution according to residential area**

CT Findings	Frequency	State Capital	LGA
AVM	3 (00.68%)	2 (00.45%)	1 (00.23%)
Acute Epidural Hematoma	5 (01.13%)	3 (00.68%)	2 (00.45%)
SAH	5 (01.13%)	5 (01.13%)	0 (00.00%)
Chronic Subdural Hematoma	6 (01.36%)	2 (00.45%)	4 (00.90%)
Brain Tumour	9 (02.04%)	6 (01.36%)	3 (00.68%)
Acute Subdural Hematoma	10 (02.26%)	8 (01.81%)	2 (00.45%)
Contusion	14 (03.17%)	6 (01.36%)	8 (01.81%)
Traumatic Brain Injury	44 (09.95%)	20 (04.52%)	24 (05.43%)
Skull Fracture	45 (10.18%)	25 (05.66%)	20 (04.52%)
Cerebral Atrophy	57 (12.90%)	28 (06.33%)	29 (06.56%)
Hemorrhagic Stroke	60 (13.57%)	38 (08.60%)	22 (04.98%)
Ischemic Stroke	89 (20.14%)	54 (12.22%)	35 (07.92%)
Other	95 (21.49%)	59 (13.35%)	36 (08.14%)
Total	442 (100%)	256 (57.91%)	186 (42.08%)

(1.58%). The occupations arranged in descending order of frequency are housewives > businessmen > farmers > students > others > preschool children > civil servants > retired > N.A. > widow. Occupations belonging to the others group include a: butcher, engineer, mechanic, islamic scholar, village head, electrician, motorcycle rider and driver.

Table 6 shows the hypothesis, Chi-square test at 0.05 level of significance for the various inferential statistical tests. The Chi-square test showed whether there was independence between the various socio-demographic parameters and frequencies of occurrence of the various aetiologies of seizure.

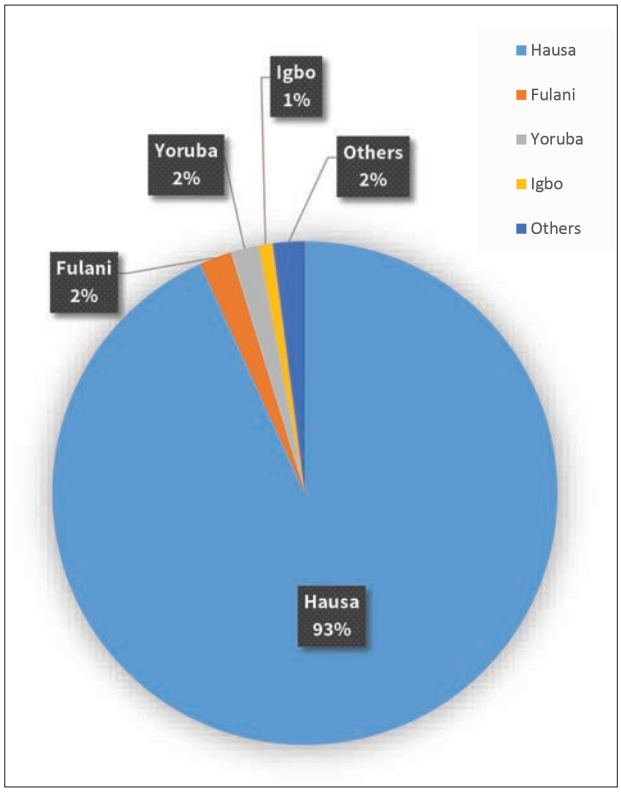

Fig 1. **Frequency distribution according to tribe**

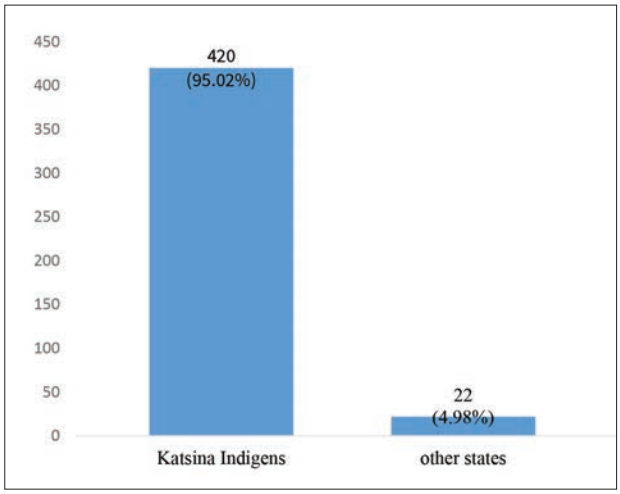

Fig 2. **State of origin**

Discussion

Four hundred and forty-two patients with CT-diagnosed seizure aetiologies were studied retrospectively with emphasis on their social and demographic factors. The frequency in the age groups 0-10 and 60–70 years were higher than the other age groups which showed that the subjects in the first decade of life (youngest) and geriatric subjects were more prone to seizure disorders. Furthermore, the increase in the frequency of the subjects after the decline in the second decade of life also revealed that the prevalence increases with an increase in age. Also, after performing the Chi-square test (at 95% CI), age was shown to have a significant statistical influence on the frequencies of occurrence of the various aetiologies of seizure disorder (See Table. 6). Studies with similar findings were that of Hu et al.[25], Beghi and Giussani[26] while Ogoke et al.[27] were not in agreement with this finding. Birth-related complications and falls while playing might explain the skull fractures, contusions and traumatic brain injuries in the youngest age group while other pathologies seen were brain tumours. Advanced age-related conditions such as stroke (with the majority being ischemic) and cerebral atrophy explain the high frequency seen in the age groups above sixty years of age.

The frequency of male subjects was higher than the female subjects with a male-to-female ratio of 1.87:1. This implied that seizure disorders were more prevalent in the male gender than the female. Chi-square test (at 95% CI) revealed that there was a statistical significant interdependence between gender and the various CT diagnosed seizure aetiologies (see Table. 6). Studies which agreed that seizure disorder was more prevalent in men than women were Kishk et al.[2], Voitiuk[13], Beghi[28] and Ersoy et al.[29] , while Ogoke et al.[27] and Acharya et al.[30] were not in agreement with this finding. Stroke and cerebral atrophy were major contributors to seizure disorder in both the male and female genders, however, traumatic brain injury and skull fracture were seen as more frequent CT patterns in males than females. A possible explanation might be that since the male subjects are the breadwinners, this puts the males at a higher risk of road traffic accidents (RTA) than the female subjects while they go about fending for their families. An alternative explanation might be the concealment of the condition by the female gender in order to avoid the social stigma of recurrent seizure[28].

Nigeria is a multiethnic country which is evident by the different ethnic groups seen in this study. This is a classical picture of how Nigerians of different ethnicities live together all around the country. This study was conducted in the Katsina metropolis which accounted for why the majority of the study subjects were Katsina indigenes (95.02%) and were mostly Hausa tribe

Table 5. **Frequency distribution of brain CT pattern of findings according to occupation**

Occupation	AVM	Acute Epidural Hematoma	SAH	Chronic Subdural Hematoma	Brain Tumour	Acute Subdural Hematoma	Contusion	Traumatic Brain Injury	Skull Fracture	Cerebral Atrophy	Hemorrhagic Stroke	Ischemic Stroke	Other	Total
H/w	1 (00.23%)	0 (00.00%)	3 (00.68%)	0 (00.00%)	3 (00.68%)	1 (00.00%)	0 (00.00%)	1 (00.23%)	0 (00.00%)	17 (03.85%)	15 (03.40%)	34 (07.69%)	15 (03.39%)	90 (20.36%)
Students	0 (00.00%)	1 (00.23%)	1 (00.23%)	0 (00.00%)	2 00.45%)	0 (00.00%)	4 (00.90%)	8 (01.81%)	16 (03.62%)	6 (01.36%)	7 (01.58%)	5 (01.13%)	14 (03.17%)	64 (14.48%)
Businessmen	0 (00.00%)	1 (00.23%)	0 (00.00%)	2 00.45%)	0 (00.00%)	3 (00.45%)	3 (00.68%)	9 (02.04%)	9 (02.04%)	4 (00.90%)	17 (03.85%)	11 (02.49%)	08 (01.81%)	67 (15.16%)
Farmers	0 (00.00%)	1 (00.23%)	0 (00.00%)	2 (00.45%)	0 (00.00%)	2 (00.45%)	5 (01.13%)	9 (02.04%)	6 (01.36%)	13 (02.94%)	8 (01.81%)	16 (03.62%)	03 (00.68%)	65 (14.71%)
C/S	2 00.45%)	0 (00.00%)	1 (00.23%)	0 (00.00%)	1 (00.23%)	3 (00.23%)	1 (00.23%)	7 (01.58%)	6 (01.36%)	2 (00.45%)	7 (01.58%)	7 (01.58%)	05 (01.13%)	42 (09.50%)
Children	0 (00.00%)	1 (00.23%)	0 (00.00%)	0 (00.00%)	1 (00.23%)	0 (00.00%)	0 (00.00%)	4 (00.90%)	5 (01.13%)	4 (00.90%)	3 (00.68%)	3 (00.68%)	23 (05.20%)	44 (09.95%)
Retired	0 (00.00%)	0 (00.00%)	0 (00.00%)	0 (00.00%)	0 (00.00%)	0 (00.00%)	0 (00.00%)	1 (00.23%)	0 (00.00%)	4 (00.90%)	0 (00.00%)	5 (01.13%)	03 (00.68%)	13 (02.94%)
Widows	0 (00.00%)	0 (00.00%)	0 (00.00%)	0 (00.00%)	0 (00.00%)	0 (00.00%)	0 (00.00%)	0 (00.00%)	1 (00.23%)	1 (00.23%)	0 (00.00%)	4 (00.90%)	00 (00.00%)	06 (01.36%)
Other occupations	0 (00.00%)	1 (00.23%)	0(00.00%)	0 (00.00%)	1 (00.23%)	1 (00.00%)	1 (00.23%)	5 (00.90%)	2 00.45%)	5 (01.13%)	3 (00.68%)	3 (00.68%)	22 (04.98%)	44 (09.95%)
N.A.	0 (00.00%)	0 (00.00%)	0 (00.00%)	2 00.45%)	1 (00.23%)	0 (00.00%)	0 (00.00%)	0 (00.00%)	0 (00.00%)	1 (00.23%)	0 (00.00%)	1 (00.23%)	2 (00.45%)	07 (01.58%)
Total	3 (00.68%)	5 (01.13%)	5 (01.13%)	6 (01.36%)	9 (02.04%)	10 (02.26%)	14 (03.17%)	44 (09.95%)	45 (10.18)	57 (12.90%)	60 (13.57%)	89 (20.14%)	95 (21.49%)	442 (100%)

Table 6. **Hypothesis testing of socio-demographic parameters**

Parameter	Hypothesis	Calculated Chi-square (X^2) value	Value from X^2 Table at α of 0.05	Degree of freedom (df)	Remark
Age	H_0: The frequency of occurrence of the various patterns of findings and age are independent of each other. H_I: The frequency of occurrence of the various patterns of findings and age are dependent on each other.	264.093	101.879	84	H_0 is rejected, H_I accepted.
Gender	H_0: The frequency of occurrence of the various patterns of findings and gender are independent of each other. H_I: The frequency of occurrence of the various patterns of findings and gender are dependent on each other.	55.651	21.026	12	H_0 is rejected, H_I accepted.
Tribe	93.21 % of the study subjects are Hausa tribe.				
Residential area	H_0: The frequency of occurrence of the various patterns of findings and residential area are independent of each other. H_I: The frequency of occurrence of the various patterns of findings and residential area are dependent on each other.	15.209	21.026	12	H_0 is accepted.
Occupation	H_0: The frequency of occurrence of the various patterns of findings and occupation are independent of each other. H_I: The frequency of occurrence of the various patterns of findings and occupation are dependent on each other.	276.355	113.145	90	H_0 is rejected, H_I accepted.

(93.21%). Therefore, this is a study of the Hausa tribe of Katsina state. The Fulani tribe is the other ethnic group in Katsina state. The low frequency of the Fulanis with respect to the Hausas might be because the Fulanis are mostly living in rural areas since they are nomadic. An alternative explanation might be that because of the intermarriage between the Hausas and Fulanis, a thin line between the two ethnic groups might be difficult to establish leading to subjects with Fulani ancestry claiming Hausa in order to blend with the majority and referring to the ethnic group as Hausa-Fulani. No inferential statistical testing was performed in order to test for independence between the tribe and seizure disorder aetiologies due to the aforementioned.

Urban dwellers dominated the study with 57.91% and the majority lived in the Katsina metropolis. In this study, rural dwellers which constituted 42.08% were considered all subjects living in the local government areas and interior villages. Chi-square (at 95% CI) was used to statistically test if there was any influence of residential location on the frequency distribution of the pattern of findings which revealed that there was no relationship (see Table. 6). Similar studies not in agreement with this study which showed preponderance of rural of dwellers were Mukuku et al.[1], Panagariya et al.[5] and Hu et al.[25]. A review by Espinosa-Jovel et al.[31] has also showed predominance amongst rural dwellers. A possible explanation for urban dwellers' preponderance might be the location of the facility since it is located in the state capital. Alternatively, it might be associated with the cost of having the procedure which includes transportation and accommodation bills. Aetiologies of seizures such as stroke, cerebral atrophy, skull fracture and traumatic brain injury dominated the pattern of findings for both the urban and rural geographical locations.

The occupations of the various subjects when arranged in descending frequency showed that housewives had the highest frequency. The various occupations in the study were housewives, businessmen, farmers, students, other occupations (butchers, mechanics, drivers, motorcycle riders, village heads and Islamic scholars), preschool children, civil servants, retired people, N.A. (not available) and widows. Housewives constituted 58.44% of the total female subjects. All the various occupations were associated with the generation of remuneration except for the housewives, students and widows. Therefore, this can indirectly infer that there is low income amongst this group of female individuals in this locality. Also, housewives constituted one-fifth (20.36%) of the total aetiologies of seizure implying that they might be more vulnerable than other occupations. Stroke (ischemic & hemorrhagic) dominated the CT seizure aetiology patterns seen in housewives: constituted 54.44% (see table 5). Hypothesis testing using the Chi-square test (at 95% CI) revealed that there was a significant statistical association between the various seizure aetiologies and occupation (see Table 6). Li et al.[32] and Hesdorffer et al.[33] are in agreement with this finding. Low economic status has been reported to affect the quality of life and the type of care such patients would get[34, 35].

The limitations of this study are as follows: it was a single center study, a relatively short interval of data collection, lack of data about comorbidities and only CT-diagnosed aetiologies of seizure were studied, the onset of a seizure and the number of patients with CT-diagnosed aetiologies that developed seizure were not taken into consideration.

Conclusion

This was a Hausa ethnic group study indigenous to the Katsina state of Nigeria. The various CT patterns of seizure etiologies were dominated by stroke (ischemic and hemorrhagic), cerebral atrophy, skull fracture and traumatic brain injury. Socio-demographic analysis revealed a male gender preponderance, seizure decline in the second decade of life but increased frequency of seizure etiologies was observed as age advances. Housewives were seen to be more vulnerable to aetiologies of seizure disorder than any other occupation since they constituted more than twenty per cent of the total study subjects and also more than fifty per cent of the total female subjects. A significant statistical association exist between socio-demographic indices (age, gender and occupation) and the various seizure aetiologies on CT images but not for geographical residential variation.

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Conflict of Interest

The authors have no competing interest to declare.

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VEZA IZMEĐU SOCIODEMOGRAFSKIH POKAZATELJA I CT-DIJAGNOSTICIRANIH UZROKA NAPADAJA U DRŽAVI KATSINA, NIGERIJA

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Sažetak

Uvod: Napadaji su globalni zdravstveni problem koji je podložan utjecaju društvenih i demografskih čimbenika.

Ciljevi: Ovom se studijom procjenjuje utjecaj ovih čimbenika na različite etiologije napadaja vidljive na CT-u mozga.

Metode: Etičko povjerenstvo Savezne nastavne bolnice Katsina odobrilo je istraživanje te je provedena retrospektivna studija 442 CT-a mozga s pozitivnim nalazima napadaja u periodu od prosinca 2019. do kolovoza 2021. Sociodemografski parametri preuzeti su iz kartona pacijenata.

Rezultati: Etiologije napadaja koje su dominirale u studiji bile su ishemijski moždani udar – 81 (18 %), hemoragijski moždani udar – 60 (14 %), cerebralna atrofija – 55 (1 %), prijelom lubanje – 41 (9 %) i traumatska ozljeda mozga – 43 (10 %). U prvom desetljeću života bilježi se najveća učestalost napadaja, u drugom desetljeću dolazi do pada, a potom učestalost napadaja raste s dobi. Veća je učestalost napadaja kod muškog spola – 65 %. Etnička skupina Hausa dominirala je istraživanjem s 93 % ukupnog broja ispitanika. Učestalost napadaja kod urbanih i ruralnih stanovnika bila je 60 % odnosno 40 %. Dvadeset posto ukupnog broja ispitanika bile su domaćice, kod kojih je moždani udar činio 52 % etiologije napadaja.

Zaključak: Hi-kvadrat (pri 95 % CI) pokazao je da postoji statistički značajna povezanost između učestalosti etiologija napadaja dijagnosticiranih CT-om mozga s dobi, spolom i zanimanjem, ali ne i geografskom lokacijom. Zbog visoke učestalosti moždanog udara, preporučuje se poseban oprez, osobito kod domaćica.

Ključne riječi: napadaji, etiologija, sociodemografski čimbenici, kompjuterizirana tomografija (CT)