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Research Article

Prevalence, Risk Factors and Presentations of Central Nervous System Pathologies Amongst Adult Patients Undergoing Magnetic Resonance Imaging Scan at Military Hospital Yaounde

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Abstract

Objective: To assess the Prevalence, risk factors and presentations of central nervous system pathologies amongst adult patients undergoing magnetic resonance imaging scan at military hospital Yaoundé.

Materials and Methods: This study was a descriptive retrospective study for the 6 passed months from November 2024 to April 2025, carried out at Military hospital Yaounde among adult participants who performed an MRI scan of the brain and the spinal cord. A structured form was used to collect data which was saved in USB key and later analysed using SPSS version 23.0 An ethical clearance was obtained from St Louis university institute Yaoundé. An authorization obtained from the delegation of public health and from the director of Military hospital Yaounde. And participants' information was kept private to maintain confidentiality.

Results: There were 45 participants. Majority were males 73.% in the aged range of 41-50 35.6%.The prevalence was 62%. There was equally a significant association beteween age and prevalence of having a CNS disorder (p value 0.000). the highest risk factor was hypertension 66.7% followed by Diabetics mellitus 51.5%. There was equally a significant relationship between hypertension and the prevalence of having a CNS disorder (p value 0.000)

Conclusion: The most common risk factor for CNS disorder are hypertension followed by diabeties. There is equally a significant association between sociodemographic data and prevalence equally beteeen risk factors and prevalence. Majority had headache as clinical profile. The main CNS pathology diagnosed was spinal canal stenosis.

Keywords: Prevalence; Risk Factors; CNS Disorders; MRI Findings

Introduction

Central Nervous System pathologies account for 30 new cases per 100,000 persons annually. Majority of CNS pathologies are uncommon, having a prevalence rate below the 6.0 new cases/100,000 population annual criterion that defines a rare disease. WHO's classification has now detected around 150 CNS pathologies worldwide [1]. According to (Elsingergy., *et al.* 2021) data on the prevalence of CNS pathologies in developing African countries, including South Africa (SA), are limited but some studies suggest that the CNS prevalence is much higher in these countries, with an estimate of ~10 per 100, especially in remote, underserved rural areas where there is a lack of medical resources unlike in the developed world. Furthermore [2] 347,992 (95%) African cases of brain and CNS disorders were reported, which was a significant increase from 54.35% to 95% for the years. The global prevalence of CNS disorder in Cameroon is estimated at 389/1000 (38%). In Cameroon pooled data on CNS disorder are scarce [3].

Base on (Olivier., *et al.* 2018) the predominant risk factors for CNS disorders in developing countries, such as South Africa, include lower educational attainment, early immunosuppression, and advancing age. Additionally, cardiovascular factors, have been shown to adversely affect CNS function. According to [4] in Cameroon CNS disorder represents damage to the thoracic and lumbar region of the spine caused by trauma or an external force. These Traumatic causes include road traffic accidents, falls, and violence. According to [5] Stroke is equally a clinical syndrome of neurological deficit attributed to vascular injury of the central nervous system in Cameroon.

According to Ambady., *et al.* [6] they are many imaging modalities currently available to assist in the diagnosis of CNS disorder such as MRI, CT scan, PET. CTA produces images of blood vessels and tissues. Due to its ability to clearly track the course of blood products, CTA is often used as the first-line assessment of intracranial vasculature integrity, aneurysms and some CNS due to the presence of low, iso, hypo and hyperdence structures.

Although many studies have been conducted on the prevalence, risk factors and MRI presentation of CNS pathologies in patients undergoing MRI scan study, very little information's have been published in Cameroon.

Materials and Methods

Study design and setting

This was a descriptive retrospective study conducted at the Department of Medical Imaging, Military Hospital Yaoundé (MHY), Cameroon.

Study population and period

The study included adult patients (aged 18 years and above) who underwent MRI scans of the brain and/or spinal cord at MHY between November 2024 and April 2025.

Inclusion and exclusion criteria

Patients were included if they were adults with complete medical and MRI records. Pediatric patients (under 18 years), patients with incomplete demographic or clinical data, and patients whose MRI images were degraded by motion artifacts were excluded.

Sample size and sampling

A total of 45 patients records meeting the inclusion criteria were purposively sampled during the study period.

Data collection

A structured data collection form was used to extract information from patient files and MRI reports. Variables included socio-demographic data (age, gender), clinical presentations (e.g., headache, motor deficit), documented risk factors (hypertension, diabetes, trauma), and specific MRI findings (e.g., spinal canal stenosis, tumors, stroke). Data were stored securely on a password-protected USB drive.

Data analysis

Data were analyzed using IBM SPSS Statistics version 23.0. Descriptive statistics (frequencies, percentages, and means) were used to summarize the data. Chi-square tests were applied to assess the association between socio-demographics, risk factors, and the prevalence of CNS pathologies. A p-value of <0.05 was considered statistically significant.

Ethical considerations

Ethical clearance was obtained from the St. Louis University Institute Yaoundé. Administrative authorization was secured from the Regional Delegation of Public Health and the Director of MHY. Patient confidentiality was strictly maintained by anonymizing all data extraction forms.

Results

Socio-demographic characteristics of study participants

Variables	Categories	Frequency(n)	Percentage (%)
	Male	33	73.3
Gender			
	Female	12	26.7
	Total	45	100
Age	>20	5	11.1
	21-30	07	15.6
	31-40	03	6.7
	41-50	16	35.6
	>50	14	31.1
	Total	45	100

Table 1: Sociodemographic data characteristics of the respondent Military Hospital Yaounde May 2025.

The table one above shows the total number of participants 45 which shows that a greater part of the population 33(73.3%) were male and were of age range 41-50 16 (35.6%).

Association between socio-demographic data and prevalence of CNS

From table two above it is notice that the p value of age with respect to prevalence is 0.000 which is less than 0.05. this shows that there is a statical significant relationship between age and prevalence. Regarding gender there is no statical significant relationship between gender and prevalence (p value 0.746).

Variable	Categories	Total participants	Presence of CNS pathology		Chi Square (X*2)	p- value
			Positive (%)	Negative (%)		
	Male	33	21	12	0.105	0.746
Gender						
	Female	12	07	05		
	Total	45	28	17		
Age	>20	05	05	00	30.984	0.000
	21-30	07	06	01		
	31-40	03	00	03		
	41-50	16	03	13		
	<50	14	14	0		
	total	45	28	17		

Table 2: Association between prevalence and socio-demographic data among study participants at military hospital yaounde may 2025.

Risk factors of CNS pathology among respondent underwent MRI scan

Variable	Category	Frequency	Percentage %
Diabetic milletus	Diabetic	30	51.5
	Non-Diabetic	15	48.5
Hypertension	Hypertensive	35	66.7
	Non-hypertensive	10	33.3
HIV	Reactive	11	24.4

	Non-reactive	34	75.6
Smoking	Smoker	15	33.3
	Non-smoker	30	66.7
Drink alcohol	Alcohol consumer	24	55.3
	Non consumer	21	46.7
A brain/spine injury?	Yes	27	60.0
	No	18	40.0

Table 3: Risk factors of of the respondent undergoing MRI scan at Military Hospital Yaounde May 2025.

The table three above represents the distribution of various risk factors among patients with suspected CNS pathologies. A Majority of participant were hypertensive 35(66.7%). Similarly, 30(51.5%) were diabetic. Regarding HIV majority were negative 34(75.6%). Regarding their life style 30(33.3%) were not smokers and 24(55.3%) were consumers of alcohol. Most of the participants were victims of a brain injury 27(60%).

Association between risk factors and prevalence of CNS

Variable	Categories	Total participants	Presence of CNS pathology		Chi Square	p- value
			Positive(%)	Negative(%)		
Hypertension	Hypertensive	35	18	17	7.806	0.000
	Non-hypertensive	10	10	0		
	Total	45	28	17	13.661	0.005
Diabetes milletus	Diabetics	30	13	17		
	Non-diabetic	15	15	0		
	Total	45	28	17		
Alcohol consumption	Alcoholic	24	11	13	5.877	0.015
	Non- alcoholic	21	17	04		
	Total	45	28	17		
Smooking	Smoker	15	13	02	5.720	0.17
	Non-smoker	30	15	15		
	Total	45	28	17		
Head injury	Yes	27	18	09	0.567	0.451
	No	18	10	08		
	total	45	28	17		
HIV	Yes	11	11	0	8.839	0.003
	No	34	17	17		
	Total	45	28	17		

Table 4: Association between risk factors and prevalence of CNS among study participants at Military Hospital Yaounde may 2025.

From table four above with respect with hypertension we can observe a (p value of 0.000) which shows statistically that there is an association between hypertension and the risk of having a CNS pathology. With respect to diabetic milletus there is equally an association (p value 0.00) which is >0.005 thus there is an association. According to the lifestyle alcohol consumption and smoking there is no association (p values 0.015 and 0.17) respectively these values are < 0.005 indicating that there is no significant relationship between them. With respect to head injury and HIV there is no significant association (p values 0.451 and 0.003) respectively.

Clinical profile of CNS pathology among respondent undergoing MRI scan

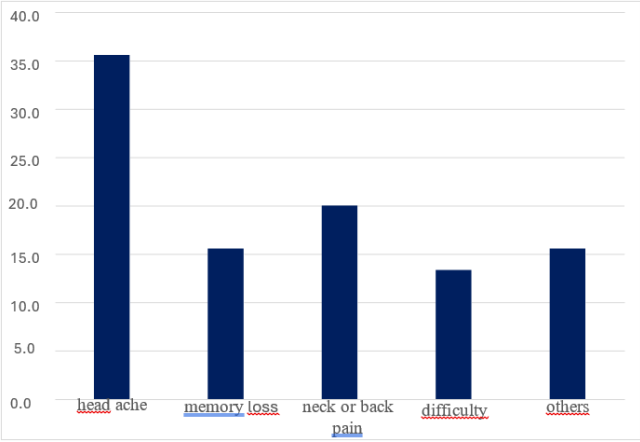

Figure 1: Clinical profile of CNS Pathology.

Above Figure illustrates the various clinical presentation profile by patients who underwent MRI for a suspected CNS pathologies. The most commonly reported symptom was headache affecting approximately 16(35.6%) of the patients, neck or back pain followed closely reported by about 9(20%) of patients. Memory loss accounted roughly for 7(15%) of the patients. 6(13.3%) presented with difficulty in walking. Other factors such as vision loss, dizziness, seizure account for 7(15.6%) they were the less common.

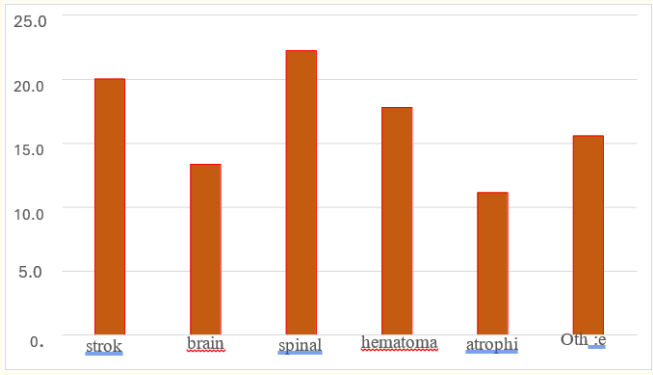

Figure 2: MRI findings of cns pathology.

MRI findings of CNS pathology among respondent undergoing MRI scan

The figure above represents the various MRI findings among patient who underwent MRI imaging for CNS evaluation. The most frequently observed finding was spinal cord stenosis accounting for 10(22.2%) followed by stoke with a value of 09(20%). Hematoma account for 8(17.8%) and atrophie 5(11.1%) were equally diagnosed. Other findings such as mylopathie, discopathie account for 7(15.6%).

Discussion

The purpose of this study was to assess the prevalence, risk factors and presentations of central nervous system pathologies among adult patients who underwent a magnetic resonance imaging scan at military hospital Yaounde. The principal investigator had 100 questionaires 68 were answered but only 45 were analysed be caused they data were complete and meet up the standard for analysis to be done.

Socio-demographic characteristics of study participants

According to table 1 above, out of 45 participants 73.3% were male. This high propotion of male participants can be attributed to the fact that the majority of individuals undergoing MRI scans in this setting are military personnel, and there are generally high men in the military compared to women. This finding is in contrasts with the study conducted by Tabue-Teguo., *et al*. in (2018) on the topic entitled; The pattern of neurological diseases in elderly people in outpatient consultations in Sub-Saharan Africa

where only 49.2% of participants were males. This difference may be because the study was not conducted in the same zone and the inflow of male coming for consultation were low.

With regard to age, majority were in the aged range of (41-50) 35.6%. This can be because this study area is mostly made of people of this aged range and because the area is known to have a MRI machine. This study is inline with a study carried out by Smith., *et al*. on "The Prevalence of Asymptomatic and Symptomatic Spinal Cord Compression on Magnetic Resonance Imaging in 2021 where 35.3% of participants were affected by a CNS disorder. This may be because at advancing aged neuronal aging begins to be more pronounced due to family stress, peak career and the life style smoking, alcohol consumption.

Association between socio-demographic data and prevalence of CNS

A significant relationship was observed between age and prevalence of CNS pathology (P value 0.000). This is because the occurrence of CNS increases with increasing age. As people ages, neurological aging begins to be more pronounced conditions like early onset neurodegenerative diseases can manifest around this time and they are exposed to accumulated risk factors. This is in line with a study carried out by Ding., *et al*. in 2022 in India on the topic Global, regional, and national burden and attributable risk factors of neurological disorders whose (p value < 0.001) were age had a significant relationship with CNS. This alignment may be because both study had similar age group and were exposed to the same risk factors.

Risk factors of CNS pathology among respondent underwent MRI scan

With respect to risk factors, the most common risk factors were hypertension was 66.7%. This is because hypertension weakens and narrows cerebral arteries which reduces blood flow to the brain which may lead to vessel rupture. This is inline with a study carried out by Feigin., *et al*. in 2020 who carried a study on the topic the global burden of neurological disorders where Metabolic risks, including high systolic blood pressure was 72.1%. This similarity may be because majority of people are hypertensive and have similar life style.

Association between risk factors and prevalence of CNS

The association between risk factors and prevalence, shows a statical significance between hypertension (p values 0.000). which is in contrary to a study carried out by Bitta., *et al*. on Burden of neurodevelopmental disorders in low and middle-income countries in 2025 whose p value was (P > 0.05). This may be because majority of people in this area did not have hypertension. There was no significant relationship between hypertension and prevalence of CNS pathology. This can be because they did not have the same aged group nor exposure to the same risk factors.

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MRI findings of CNS pathology among respondent undergoing MRI scan

Majority of participants were diagnosed of spinal canal stenosis 22.8%. The vertebrae may thicken this reduces the available space in the spinal canal especially as time advances. This is contrary to a study carried out by Daniel., *et al*. in 2022 in Cameroon who did a research on the topic entitled Spectrum of central nervous system infections in a tertiary health care centre which MRI findings was stoke 68.6%. This difference may be because more cerebral asked were pathological compared to spinal cord or majority of exams asked were cerebrale MRI and not spinal cord MRI.

Conclusion

There is a high prevalence (62%) of CNS pathologies among adult patients undergoing MRI scans at the Military Hospital Yaoundé, with a predilection for males aged 41 to 50 years. Hypertension and diabetes mellitus are the most significant risk factors driving this burden. Spinal canal stenosis represents the most common radiological diagnosis. These findings emphasize the critical need for public health interventions focused on the early detection and management of systemic hypertension and diabetes to mitigate

CNS complications. Furthermore, larger, multi-center prospective studies are recommended to fully map the CNS disease burden in Cameroon.

Limitations

The primary limitation of this study is the small sample size (n = 45), which restricts the generalizability of the findings to the broader Cameroonian population. Furthermore, the retrospective design is inherently subject to the quality and completeness of the medical records available.

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