

Long-Term Cognitive Disorders in Head Trauma Patients at Yaounde General Hospital and Yaounde Central Hospital, Cameroon

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Abstract

Background and Aim: Traumatic brain injury (TBI) represents the primary cause of death and disability before the age of 35. The after-effects, especially cognitive disorders, can persist over the long term and compromise the socio-professional reintegration of victims. This study aimed to evaluate cognitive disorders at one year and more in head trauma patients at the Yaounde General Hospital and the Yaounde Central Hospital. **Materials and Methods:** We conducted a cross-sectional study. Head injury patients aged 18 years or older, with an initial Glasgow score < 13 and/or a progressive intracranial lesion, managed between January 2021 and December 2022 were included. Evaluation was performed at one year and more. The variables were sociodemographic data, details of initial trauma management and long-term outcome. Cognitive impairment was assessed using a battery of tests, including the Montreal Cognitive Assessment Test (MoCA), the Mini-Mental State Examination (MMSE), the International HIV Dementia Scale (IHDS) and the Dubois' 5 Words. The data were analyzed using IBM-SPSS 25 software. Chi-square tests were used to identify associated factors, which were then subjected to multimodal logistic regression. **Results:** A total of 112 head injured patients were included. median age was 36 years. Males predominated (sex ratio 9.2). Road traffic accidents accounted for 57.1% of the cases. A quarter (25.9%) of patients were admitted within the first six hours. The TBI was moderate in 59.8% of cases. CT scans were abnormal in

92.0% of cases. Treatment was surgical in 58.0% of cases. The median time between the trauma and the evaluation was 19 months (range 13 to 40). Two-thirds (68.8%) of patients had persistent long-term complaints. Twenty-three participants (21.3%) had not returned to work. Cognitive disorders were found in 58.0% of participants. Associated factors were low educational level (OR = 3.590; CI_{95%} [1.098 - 11.731]; p = 0.034), long duration of coma (OR = 2.984; CI_{95%} [1.298 - 6.859]; p = 0.010) and presence of sequelae at discharge (OR = 4.727; CI_{95%} [1.916 - 11.660]; p = 0.001). **Conclusion:** Cognitive disorders are common in long-term head injury patients. They must always be taken into account, and their assessment will be essential for the better subsequent management necessary for the socio-professional reintegration of patients.

Keywords

Traumatic Brain Injury, Long-Term, Cognitive Disorders, Socio-Professional Reintegration

1. Introduction

Traumatic brain injury (TBI) represents the primary cause of death and disability before the age of 35 [1] [2]. In Cameroon, the mortality rate for moderate and severe TBI is 16% and 77% respectively [3]. Road accidents are the main cause, with motorcyclists being more vulnerable [4]. In France, cognitive disorders occur at a rate of 30% - 70%, affecting one or more intellectual functions at a time [5]. These sequelae are frequent and long-lasting, compromising socio-professional reintegration and affecting the daily lives of patients and their families. We have found few publications in Africa and Cameroon on brain injury. The aim of this study was to evaluate cognitive impairment in patients with head injury in two hospitals in the city of Yaounde.

2. Materials and Methods

This was a cross-sectional study of head trauma patients treated at the Yaounde General and Central Hospitals over a twenty-four (24) month period from 1er January 2021 to 31 December 2022.

The study included all patients aged 18 and over, suffering from a moderate to severe TBI with an initial Glasgow coma score of less than 13 on admission and/or an intracranial lesion on the initial CT scan (hematoma, contusion, meningeal hemorrhage), contacted and evaluated during the recruitment period. Recruitment took place from January to May 2024. Non reachable and aphasic patients were excluded.

Sociodemographic data included: age, sex, level of education, occupation, marital status and place of residence. Clinical data included: time of admission, mechanism of injury, mode of transport, initial Glasgow score, duration of coma, functional signs, physical signs and associated trauma. The paraclinical data concerned the lesions observed on the brain scan. Therapeutic data included: type of treatment, duration of hospitalization and sequelae at discharge. Long-term outcome

included time from injury to assessment, persistent complaints, return to work and cognitive disorders. Cognitive disorders were assessed using the Montreal Cognitive Assessment Test (MoCA), the Mini-Mental State Examination (MMSE), the International HIV Dementia Scale (IHDS) and Dubois 5 words with no education adjustment. Every participant having an abnormal score with at least one test was considered having cognitive disorders.

Analysis was performed using SPSS version 25 software. Quantitative variables were expressed as mean $\pm$ standard deviation; qualitative variables were expressed as numbers and percentages. The search for associated factors was carried out using Chi-square tests followed by multimodal logistic regression with a significance threshold set at 5% ($p < 0.05$).

Our study was approved by the Ethics Committee of the University of Douala. Participants were informed and gave their free and informed consent before data collection.

3. Results

3.1. General Consideration

We identified 425 medical records of patients with TBI that met the inclusion criteria. Among these, 43 patients died during hospitalization, and 23 records lacked a telephone number. Of the 359 records retained, 234 patients were managed at HCY (65.2%) and 125 at HGY (34.8%). Fifty-seven (57) phone numbers could not be reached (calls and SMS with no response). Among the 302 individuals contacted, there were 13 incorrect respondents and 9 patients who had died during long-term follow-up.

Among the 280 patients reached, we evaluated 114 patients, of whom 2 were excluded due to aphasia. The final study population consisted of 112 patients, including 74 (66.1%) from HCY and 38 (33.9%) from HGY. **Figure 1** presents the patient flow diagram.

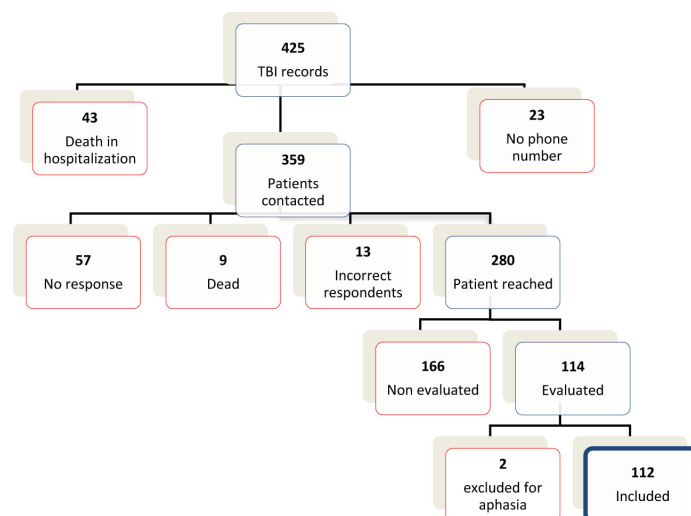


Figure 1. Flow diagram.

3.2. Socio Demographic Data

A total of 112 patients were included, with a median age of 36 (27 - 47) years (range 18 - 65). The 18 - 29 age group was represented by 36.6%. Males were more commonly represented, with a frequency of 90.2% and a sex ratio of 9.2:1.

In terms of occupation, 82.1% of the participants had a paid job prior to the trauma and 15.2% were pupils or students. We counted 70.5% of participants with primary or secondary education (**Table 1**).

3.3. Clinical, Paraclinical and Therapeutic Data

Only 25.0% were treated within the first 6 hours. Half the patients (48.2%) were admitted to hospital more than 24 hours after the trauma. Road traffic accidents (RTAs) were the main cause of injury (57.1%), followed by assaults (23.2%). Motorbikes were involved in 76.6% of road accidents. The median Glasgow score was 12 (10 - 13), (range 5 to 15). TBI was moderate in 60.7% of cases. The median duration of coma was 3 (0 - 5) days, (range 0 to 34 days), with 37.5% of patients in coma for more than 3 days. Isolated TCE occurred in 64.3% of cases. The most frequently associated traumatic injury was facial in 17.9% of cases.

The brain scan perform rate was 97.3%. Lesions were found in 92.0% of cases, 61.1% of which were hemorrhagic, dominated by parenchymal contusions (21.3%) and 30.8% were bony.

More than half the participants (58.0%) underwent surgery. Craniotomy (40.0%) was the main type of operation, with extradural hematoma the dominant indication (35.4%). The median length of hospitalization was 10 (8 - 14) days (range 3 to 56). At discharge, 35.7% of participants had sequelae (**Table 1**).

3.4. Long-Term Outcome

The median time between the trauma and the assessment was 19 (14 - 26) months (range 13 to 40). Two-thirds (68.8%) of the patients had persistent long-term complaints of which we identified six types: headaches, forgetfulness, asthenia, motor deficit, epileptic seizures and deafness. The proportion of forgetfulness was 39.8%. among the participants, 21.3% had not returned to their previous job and 3.7% had changed jobs (**Table 1**).

Table 1. Population characteristics.

Characteristics	N = 112
Age (in years)	36 (27 - 47)
Gender (male)	101 (90.2)
Occupation	
Paid employment	92 (82.1)
Pupil/Student	17 (15.2)
Unemployed	3 (2.7)

Continued

Level of education	
Primary	20 (17.9)
Secondary	59 (52.7)
Superior	33 (29.5)
Residence place	
Urban	92 (82.1)
Rural	20 (17.9)
Admission delay	
<06 h	28 (25.0)
06 – 24 h	30 (26.8)
>24 h	54 (48.2)
Circumstances of occurrence	
Road traffic accident	65 (58.0)
Assault	26 (23.2)
Drop	12 (10.7)
Other	9 (8.1)
Glasgow Coma Scale	12 (10 - 13)
Duration of coma (in days)	3 (0 - 5)
Severity of TBI*	
Mild	31 (27.7)
Moderate	68 (60.7)
Severe	13 (11.6)
Associated trauma	
Isolated TCE	72 (64.3)
Craniofacial trauma	21 (18.7)
Other	19 (17.0)
CT Scan (realised)	103 (97.3)
Treatment (Surgical)	65 (58.0)
Duration of hospitalization (in days)	10 (8 - 14)
Sequelae at discharge (presents)	40 (35.7)
Evaluation delay (in months)	19 (14 - 26)
Persistent complaints (presents)	77 (68.8)
Resuming work	
Absent	23 (21.3)
Change	4 (3.7)

Data are in n (%) or median (quartiles: Q25 - Q75). *TBI = Traumatic brain injury.

3.5. Cognitive Disorders

Cognitive decline was assessed in each participant using 4 tests. The cognitive functions assessed were: visuospatial and executive functions, naming, memory, attention, language, calculation, abstraction, orientation, constructive praxis, motor speed and psychomotor speed. The overall prevalence of cognitive disorders was 58.0%. The frequency was 44.6% with the MoCA, 33.0% with the MMSE, 29.5% with the IHDS and 42.9% for the 5 Dubois words. Most of the patient had a mild cognitive impairment. **Figure 2** shows levels of cognitive disorders.

Bivariate analysis showed that age, return to work, level of education, Glasgow coma score, duration of coma, type of management and sequelae were significantly associated with cognitive disorders (p -value < 0.05). Multivariate analysis showed that primary education (**OR** = 3.590; $CI_{95\%}$ [1.098 - 11.731]; p = 0.034), secondary education (**OR** = 2.784; $CI_{95\%}$ [1.157 - 6.701]; p = 0.022), coma lasting more than 3 days (**OR** = 2.984; $CI_{95\%}$ [1.298 - 6.859]; p = 0.010) and the presence of sequelae (**OR** = 4.727; $CI_{95\%}$ [1.916 - 11.660]; p = 0.001) increased the risk of cognitive disorders. In addition, surgical management (**OR** = 0.438; $CI_{95\%}$ [0.198 - 0.966]; P = 0.041) was a protective factor (**Table 2**).

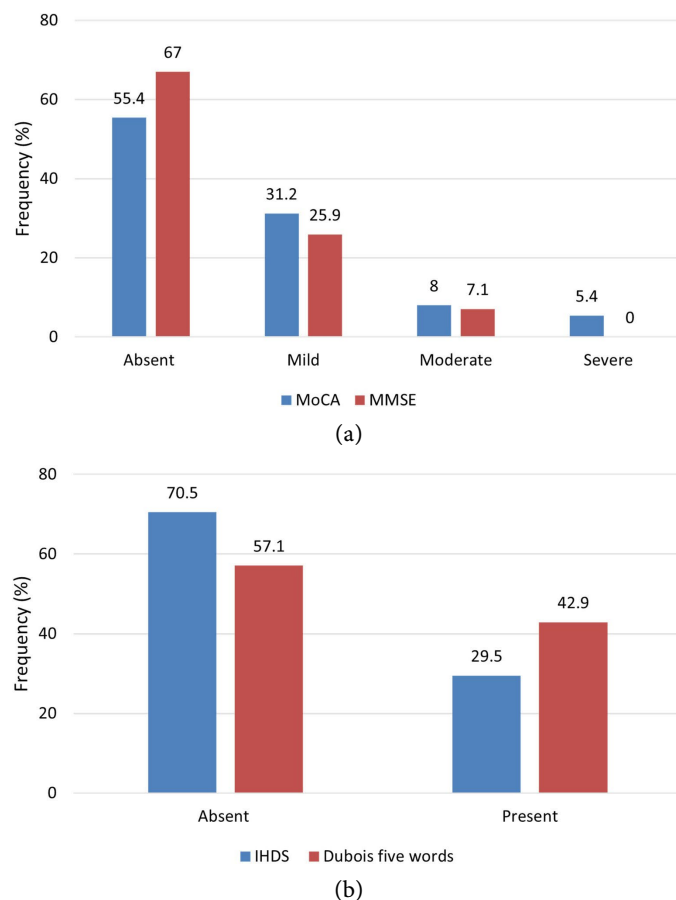


Figure 2. Levels of cognitive disorders. (a). MoCA (Montreal Cognitive Assessment) and MMSE (Mini-Mental State Examination); (b). IHDS (International HIV Dementia Scale) and Dubois' five words.

Table 2. Multivariate analysis.

Variables	OR [CI 95%]	p-value
Age (in years)		
≥ 40	2.072 [0.912 - 4.708]	0.082
Return to work		
No	2.617 [0.949 - 7.217]	0.063
Level of education		
Primary	3.590 [1.098 - 11.731]	0.034
Secondary	2.784 [1.157 - 6.701]	0.022
Glasgow Coma Scale		
3 - 8	0.642 [0.172 - 2.391]	0.509
9 - 12	2.800 [0.836 - 9.378]	0.095
Duration of coma (in days)		
≥4	2.984 [1.298 - 6.859]	0.010
Treatment		
Surgical	0.438 [0.198 - 0.966]	0.041
Sequelea		
Presents	4.727 [1.916 - 11.660]	0.001

4. Discussion

Cognitive disorders of head injury patients have received little attention in our context. Our study set out to determine the prevalence of cognitive disorders and their associated factors in community brain injured patients recalled for hospital assessment one year or more after the injury.

4.1. Characteristics of the Population

Our series consisted of 112 head trauma patients, with a median age of 36 years. Bello *et al.* found an average of 33 years [6], Thomas *et al.* 44 years [7]. The male predominance in our study is found in other authors such as Djientcheu *et al* (60%) [3] and Konaté *et al* (93%) [8]. The young male population is the most active and therefore the most at risk of trauma. Half of the victims were employed in the tertiary sector. This sector includes, in particular, transport, which, through RTAs, is the main circumstance in which TBIs occur. Ruet *et al.* reported a population dominated by blue-collar workers (48.1%) [9]. The level of education was primary or secondary in 70.5% of cases. Minoo *et al.* found that 64% of their population had a school education. A low level of schooling is a factor in the onset of cognitive problems after a head injury [10].

Only 25.0% were treated within the first 6 hours. Bello *et al.* documented that 35.0% of patients were attended to within 03 hours of the trauma [6]; all of our participants were transported by non-medical means, unlike the 45.7% who were

transported by ambulance in Douala in 2011 [4]. The delay in treatment can be explained on the one hand by the poor functioning of our emergency medical assistance services and on the other by the fact that neurosurgery services are concentrated in major cities and take in trauma patients referred from other towns or even other regions of the country. Road accidents were the main cause of trauma. Motorbikes were involved in 76.6% of these. Transport by motorbike taxi is widespread in Cameroon, both in the cities and in rural areas, as it is in many other countries in the region. The trauma was moderate in 60% of cases, with a median coma duration of 3 days.

The brain scan showed lesions in 92% of cases, dominated by hemorrhagic lesions.

As a result, 58% of patients received surgical treatment. These results are similar to those found in the literature, with intracranial lesions being independent of the Glasgow coma score.

The median observation delay was 19 months, and two-thirds of patients had persistent long-term complaints, dominated by forgetfulness (40%) and headaches (20%). Failure to return to work was observed in 21% of patients. Bello *et al.* found 30% [6], Ruet *et al.* [9] 64% at one year. The latter study was carried out on a population of severe head trauma patients only.

4.2. Cognitive Disorders: Prevalence and Risk Factors

Cognitive impairment was assessed in each participant using 4 tests for a global evaluation. The overall prevalence of cognitive disorders was 58.0%. Their frequency was 44.6% with the MoCA. Bello *et al.* found a prevalence of cognitive disorders of 40% using the MoCA [6]. Annoni *et al.* obtained a proportion of 60% of TCE patients with cognitive disorders, which had a major impact on the resumption of professional activities [11]. However, Bagirana *et al.* found 28.4% cognitive impairment in injured patients at 6 months (compared with 6.6% in controls) [12]. This could be explained by the broader spectrum of cognitive functions explored by our various tests.

The factors significantly associated with cognitive impairment in our population were primary education level (**OR = 3.590**), secondary education level (**OR = 2.784**), coma lasting more than 3 days (**OR = 2.984**) and presence of sequelae (**OR = 4.727**) at hospital discharge. In addition, surgical management (**OR = 0.438**) was a protective factor. Bagirana *et al.* found a significant association between the severity of the initial trauma and cognitive disorders [12]; unlike Bello *et al.* who found no association between the type of cognitive disorders and the severity of the initial trauma [6]. Minoo *et al.* found severity of initial trauma and lack of school education to be significantly associated with cognitive impairment in adult brain injured patients [10].

5. Conclusion

Cognitive disorders are common in the long term in people with head injuries. It

is always important to think about these problems, and it is vital to assess them if we are to improve the subsequent care needed to help brain injured people reintegrate into society and the workplace.

6. Study Limitations

It is acknowledged that the present study is subject to a number of limitations, owing to its long-term nature. The necessity of the files being correctly completed and stored in the archives was a key factor. The exclusion of patients or carers who had changed telephone number was a consequence of the study's central focus on consultations in health facilities. Given that less than half of the patients contacted were evaluated, the study's population was limited to the inhabitants of three main towns: the city of Yaounde and its suburbs, and the towns of Douala and Ebolowa (Cameroon). However, the head injury patients treated in these reference hospitals come from all over the country.

Authors' Contributions

Conception of the subject: Vincent De Paul Djientcheu, Faustin Yepnjio, Loïc Sonwa Wagoum.

Data collection and participant evaluation: Faustin Yepnjio, Loïc Sonwa Wagoum.

Drafting the article: Faustin Yepnjio, Leonard Ngarka, Loïc Sonwa Wagoum, Nadine Arielle Lekane Tsafack, Ernestine Renee Bikono Atangana, Arnaud Douanla, Stephanie Diane Mintya, Claude Carine Ngassam.

Data analysis: Leonel Sonwa Lontsi.

Reviewing and correction of the manuscript, approving the final version of the manuscript: all authors.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendix

Ethical clearance



REPUBLIQUE DU CAMEROUN
Paix - Travail - Patrie
UNIVERSITE DE DOUALA

REPUBLIC OF CAMEROON
Peace - Work - Fatherland
UNIVERSITY OF DOUALA



INSTITUTIONAL ETHICS COMMITTEE FOR RESEARCH ON HUMAN HEALTH

N° 492 CEI-UD/07/2024/T

Douala, le 26 Juillet 2024

CLAIRANCE ÉTHIQUE

Le Comité d'Éthique Institutionnel de la Recherche pour la Santé Humaine de l'Université de Douala (CEI-UDO) en sa session du 26 Juillet 2024, a examiné le projet de recherche intitulé «**Troubles cognitifs et qualité de vie à long terme des traumatisés crâniens à l'Hôpital Général et à l'Hôpital Central de Yaoundé**» soumis par **SONWA WAGOUN Loïc**, tenant lieu de Thèse de Doctorat en Médecine Générale à l'Institut Supérieur de Technologie Médicale (ISTM) de Yaoundé.

Le présent projet de recherche est d'un intérêt scientifique certain et ne présente aucun risque pour le participant. Les objectifs et la méthodologie de l'étude sont clairement décrits. Le principe de confidentialité des données est respecté. Les compétences requises pour la supervision des travaux de recherche sont présentes.

Au vu de ce qui précède, le CEI-UDO approuve pour une durée d'un an, la mise en œuvre de la présente version du protocole.

SONWA WAGOUN Loïc est responsable du respect scrupuleux du protocole et ne devrait y apporter aucun amendement aussi mineur soit-il, sans avis favorable du CEI-UDO. Les investigateurs sont tenus de collaborer avec le CEI-UDO pour le suivi des aspects éthiques du protocole approuvé. Le rapport final du projet de recherche devra être déposé au CEI-UDO pour archivage.

La présente clairance éthique est délivrée pour servir et valoir ce que de droit. Elle peut être annulée en cas de non-respect de la réglementation en vigueur et des recommandations sus-mentionnées.

Ampliations

- MINSANTE



LE PRESIDENT

Pr. Léopold Gustave LEHMAN

NB : Il n'est délivré qu'un seul exemplaire de la clairance éthique.

N° 0977/Minsante/SESP/SG/DROS of April 16, 2012

Campus de Logbessou, 3^e étage du bloc pédagogique de la FMSP.

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