Neuroscience & Medicine, 2024, 15, 92-105
https://www.scirp.org/journal/nm
ISSN Online: 2158-2947
ISSN Print: 2158-2912

Description of Post-Stroke Cognitive Disorders at Abidjan University Hospitals, Côte d'Ivoire

N'guessan N'cho Arthur[1*], Kouassi Kouamé Léonard[2], Ouattara Niemtiah[1], Tako Neme Antoine[1]

[1]Biology and Health Laboratory, Felix Houphouët-Boigny University, Abidjan, Côte d'Ivoire
[2]Department of Neurology CHU Yopougon, Felix Houphouët-Boigny University, Abidjan, Côte d'Ivoire
Email: *arthurncho65@gmail.com

How to cite this paper: Arthur, N.N., Léonard, K.K., Niemtiah, O. and Antoine, T.N. (2024) Description of Post-Stroke Cognitive Disorders at Abidjan University Hospitals, Côte d'Ivoire. *Neuroscience & Medicine*, **15**, 92-105.
https://doi.org/10.4236/nm.2024.152008

Received: April 12, 2024
Accepted: June 17, 2024
Published: June 20, 2024

Abstract

Stroke patients often experience motor deficits and cognitive problems after a stroke. Objective: To improve our understanding of the cognitive consequences of stroke. Method: a descriptive and analytical cross-sectional study was conducted over 12-month period in the neurology departments of the Cocody and Treichville Hospitals in Côte d'Ivoire. Results: Out of 724 patients admitted to the neurology department, 415 (57.32%) were stroke patients, of which 145 (34.94%) were screened. The frequency of global cognitive functioning impairment was 86.21%, significantly higher than the frequency of patients without impairment, which was 13.79%. The study focused on detailing the cognitive status of stroke patients in neurology departments, assessing several cognitive functions during the subacute phase of stroke. These functions included global cognitive functioning, executive functions, language and memory. The frequency of post-stroke cognitive impairment is high among stroke patients in Abidjan. This frequency is comparable to figures found in Subsaharian stroke populations. Demographic and clinical characteristics studied included age, gender, education level, employment status, vascular diseases and cerebral affected area. Among these characteristics, only the education level and the cerebral affected area have been found significant. Conclusion: The incidence of cognitive impairment after a stroke is significantly high among stroke patients in Abidjan.

Keywords

Cognitive Disorders, Subacute Stroke, Related Risk Factors

1. Introduction

Stroke is a major public health problem worldwide. According to [1], stroke is the most common neurological disorder in developed countries, where it is the leading cause of acquired non-traumatic physical disability, the second leading cause of dementia after Alzheimer's disease, and the third leading cause of death after myocardial infarction and cancer. A major cause of depression among patients and their families is the cost of care, estimated at 2.4% of total healthcare expenditure worldwide. Post-stroke cognitive dysfunction is the second most common cause of severe neurocognitive impairment after Alzheimer's disease (AD) [2]. Despite the significant consequences, such as poorer prognosis in terms of vitality and function, cognitive deficits after stroke are poorly understood. The consequences of these disorders lead to a significant risk of disability and subsequent institutionalization in most developed countries [3] [4]. Researchers have shown that cognitive symptoms after stroke are frequent in the acute phase (around 80% of surviving patients), and persist in 38% to 73% of cases [5] [6]. However, this symptomatology is often neglected compared to other possible deficits (motor and/or sensory) [7]. In the least developed countries, the impact of cognitive disorders is still poorly assessed because they are not a priority in national health programs [8]. In Côte d'Ivoire, as in less developed countries, data on post-stroke cognitive disorders are still insufficient. Our study is designed to contribute to a better understanding of cognitive disorders after stroke. In the present study, we determine the frequency and the risk factors related to the cognitive status of post-stroke patients treated in the neurology department of the University Hospitals of Cocody and Treichville (Côte d'Ivoire).

2. Method

2.1. Setting of the Study

This study describes the cognitive status of post-stroke patients seen in the neurology departments of the university hospital centers of Cocody and Treichville (Côte d'Ivoire). It is a cross-sectional and analytical study that lasted 12 months (from September 2020 to September 2021), excluding the month of June.

2.2. Method Description

We screened different cognitive functions (global cognitive functioning, executive functions, language and memory) among stroke patients. We determined the frequencies of patients with impaired functions and non-impaired functions. We first of all determined the frequencies of patients with global cognitive functioning impairment and patients without global cognitive functioning impairment by demographic characteristics (age group, gender, educational level, employment status) and by clinical characteristics (vascular diseases, and indexed stroke). For age group, we categorize patients into 2 groups: young (inferior to 65 years) and old (superior to 65 years). About gender, we categorize patients into 2 groups: men and women. Regarding educational level, patients were divided into 3 groups: low level (less than 7 years of education); medium level (less than 14 years of education); high level (at least 14 years of education). For employment status, patients were divided into 3 groups (public, private and liberal employment). Clinical characteristics were concerned with hypertension, diabetes, and cardiopathy for vascular diseases. The injured hemisphere and affected area were taken into account for indexed stroke. We then determined related stroke risk factors according to demographic and clinical characteristics of stroke patients by significant p-value.

2.3. Inclusion Criteria

Subjects included in the study were:
- Patients who gave written informed consent;
- Patients in the subacute phase of stroke (period of 5 to 15 days after stroke) are documented by computed tomography (CT) or brain magnetic resonance imaging (MRI);
- Patients without pre-stroke cognitive impairment (IQ code ≤ 3.4);
- Patients with sufficient visual, auditory, and verbal or written expression skills to perform neuropsychological tests adequately.

2.4. Technical Equipment

The cognitive status of the patients was assessed using the following psychometric tests:
- Informant Questionnaire on Cognitive Decline in the Elderly (IQ-Code) [9];
- Montreal Cognitive Assessment (MoCA), French version 7.1 [10];
- Frontal Assessment Battery (FAB) [11];
- French version of the Language Screening Test (LAST) [12];
- Digit Span Test (forward/backward) [13].

2.5. Statistical Analysis

Statistical tests were performed using R. Associations between variables were analyzed using the Chi square test. Binary logistic regression was used to identify possible risk factors for cognitive impairment after stroke. Graphs were presented using Excel 2019.

3. Results

During the period of the study, 724 patients were hospitalized. Among them, 309 patients (42.68%) were admitted for diverse neurological pathologies and 415 stroke patients (57.32%) were enrolled in the study. The latter's were selected based on selection criteria. Eventually, 145 patients (34.94%) aged 30 to 87 years were evaluated as shown by the flowchart (**Figure 1**).

3.1. Frequencies of Different Cognitive Functions

The frequency of patients with global cognitive functioning impairments was significantly higher (86.21%) than that of patients without impairment (13.79%). Global cognitive functioning is highly impaired after stroke. The frequency of

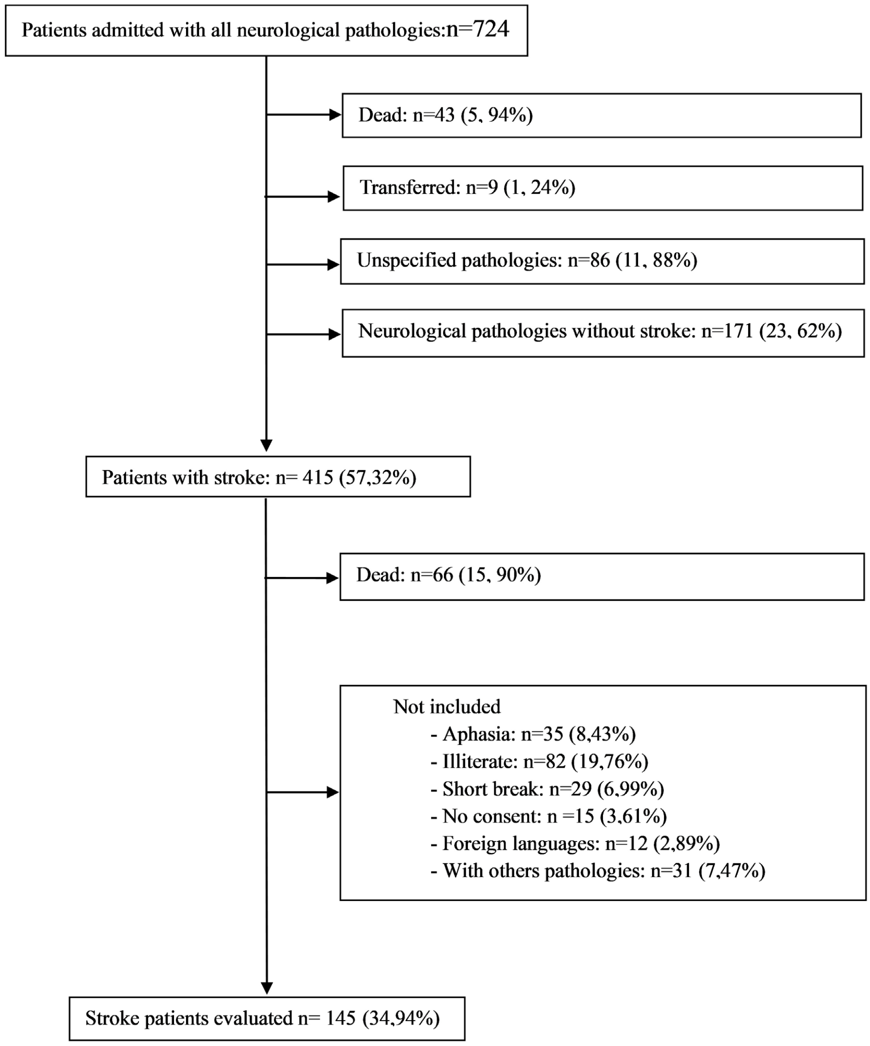

Figure 1. Flowchart of the studied population.

patients with executive function problems was 81.38% against 18.62% without the problem. Executive functions are highly impaired after stroke. The frequency of patients with impaired language was 54.48%. However, 45.52% of the stroke patients were not impaired. Language is moderately affected after a stroke. The frequency of short-term memory disorders was 34.48% and that of the working memory disorders was 24.83%. On the contrary, the frequency of patients without short-term memory disorders was 65.52% and the patients without working memory disorders were 75.17%. Our figures suggest that short-term memory disorders and working memory disorders are not frequent after a stroke.

3.2. Overall Cognitive Functioning Status of Patients According to Socio-Demographic Characteristics

3.2.1. Patients' Overall Cognitive Functioning by Age Group

As shown in Figure 2, the frequency of elderly patients with global cognitive functioning impairment was 95%, which was higher than the frequency of young patients, which was 82.86%.

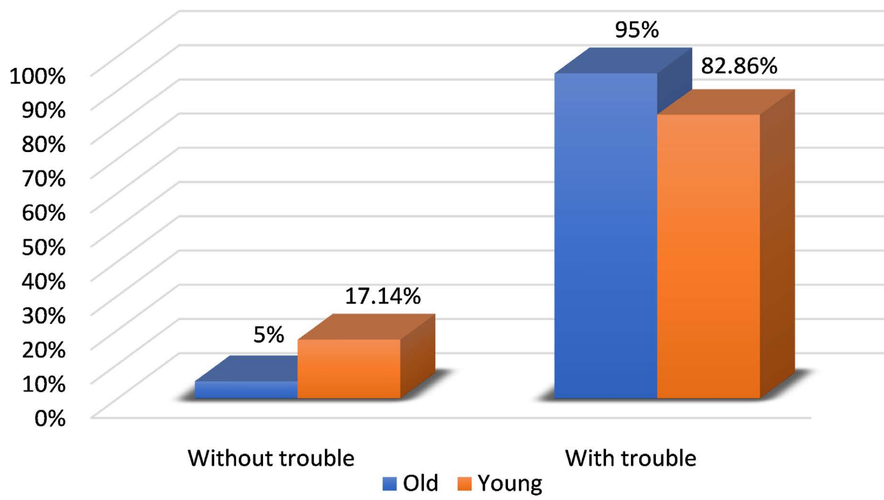

Figure 2. Distribution of patients' overall cognitive functioning by age group. The frequency of patients with global cognitive functioning impairment was higher in older patients (95%) than in younger patients (82.86%).

3.2.2. Overall Cognitive Functioning of Patients by Gender

Figure 3 shows that the frequency of male patients with impaired global cognitive functioning, 90.48%, is higher than the frequency of female patients, 82.93%.

3.2.3. Overall Cognitive Functioning of Patients by Level of Education

Figure 4 shows that after stroke, 93.65% of patients with a low level of education had problems with global cognitive functioning, compared with 85.48% of patients with a medium level of education and 65% of patients with a high level of education. The frequency of patients with a high level of education without global cognitive functioning impairment was higher (35%) than that of patients with a medium or low level of education (14.52% and 6.35% respectively).

3.2.4. Patients' Overall Cognitive Functioning According to Working Status

Figure 5 shows that the frequency of patients in free practice with global cognitive functioning impairment after stroke (89%) was significantly higher than that of patients in private and public practice (81.48% and 77.78%) respectively. The frequency of patients in public practice without global cognitive functioning impairment was significantly higher (22.22%) than that of patients in private and free practice (18.52% and 11%) respectively.

3.3. Overall Cognitive Functioning Status of Patients According to Clinical Characteristics

The frequency of patients with hypertension and GCFI was higher (88.63%) than those without hypertension (82.45%). The frequency of patients with diabetes and GCFI was higher (90%) than those without diabetes (85.6%). The frequency of patients with cardiopathy and GCFI was higher (90%) than those without cardiopathy (85.92%).

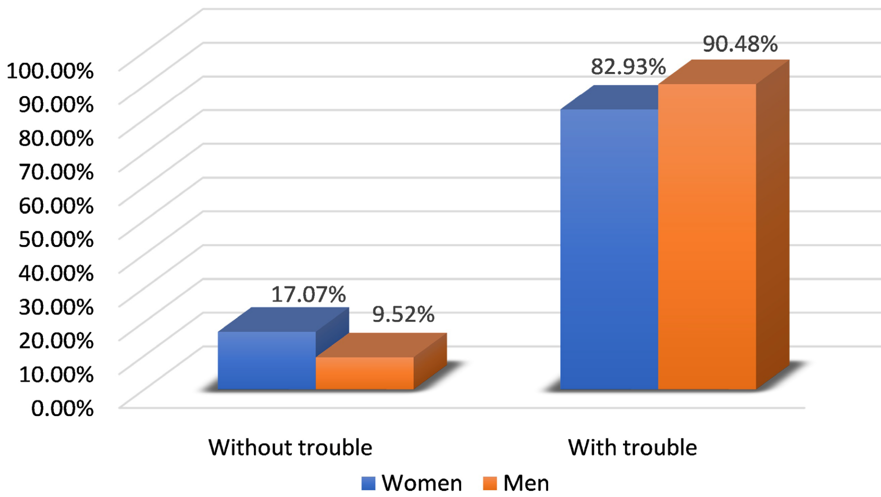

Figure 3. Distribution of patients' global cognitive functioning by gender. The frequency of patients with global cognitive functioning impairment was higher in men (90.48%) than in women (82.93%).

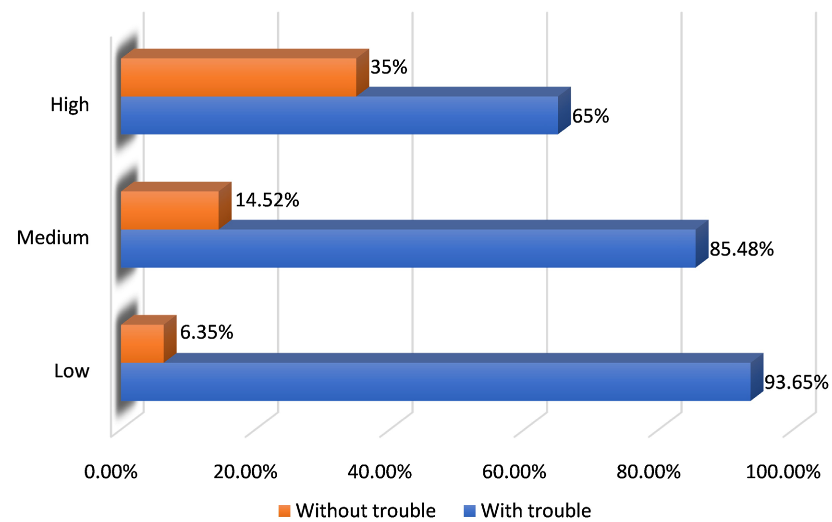

Figure 4. Distribution of patients' overall cognitive functioning by level of education. The frequency of patients with problems in overall cognitive functioning was higher in patients with a low level of education than in patients with a medium level of education and a high level of education.

3.4. Related Risk Factors

3.4.1. Sociodemographic Risk Factors

The p-values for age group, gender and employment status were not significant. Age, sex and employment status have no effect on the onset of global cognitive impairment. The p-value is significant for educational level. The level of education therefore had an effect on the onset of global cognitive impairment (Table 1).

3.4.2. Vascular Diseases Risk Factors

The p-values are not significant. Hypertension, diabetes and cardiopathy had no effect on the occurrence of cognitive functioning impairment (Table 2).

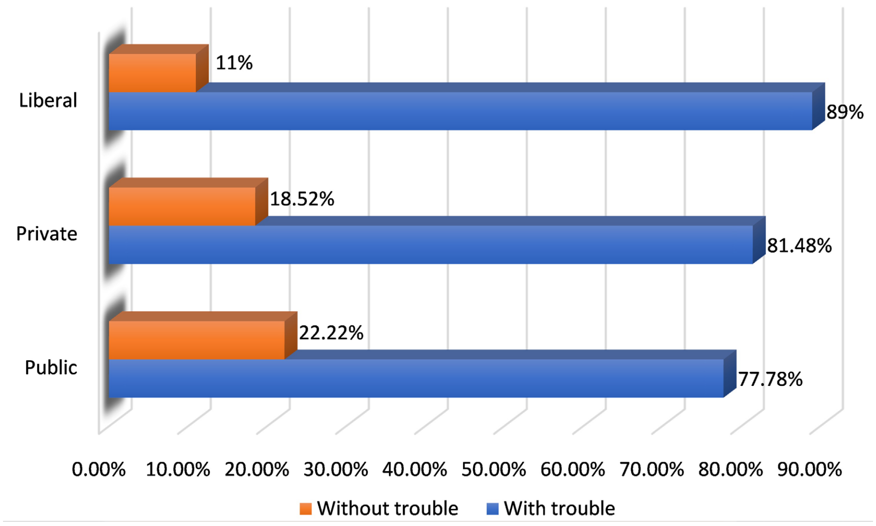

Figure 5. Distribution of global cognitive functioning according to working status. The frequency of patients with impaired global cognitive functioning was higher in patients with liberal status than in patients with private and public status.

Table 1. Sociodemographic risk factors.

Variables		GCFI Yes (n = 125)	GCFI No (n = 20)	OR	Chi 2	P value
Age group	Old	38	2	3.93 [0.86 - 17.79]	3.59186	0.058066
	Young	87	18			
Gender	Women	68	14	1.95 [0.71 - 5.42]	1.70767	0.191292
	Men	57	6			
Educational level	Low	59	4	-	10.5276	0.005177**
	Medium	53	9	-		
	High	13	7	-		
Employment status	Public	14	4	-	2.23869	0.326497
	Private	22	5	-		
	Liberal	89	11	-		

(5% significance level). *significant, **very significant. The p-values for age group, gender and employment status were not significant. Age, gender and employment status have no effect on the onset of global cognitive impairment. The p-value is significant for educational level. The level of education therefore has an effect on the onset of global cognitive functioning impairment. GCFI: global cognitive functioning impairment.

3.4.3. Risk Factors of Indexed Stroke

1) Hemorrhagic stroke

❖ Injured hemisphere

The odds ratio shows that patients injured on the left hemisphere are likely to present GCFI 4 times in comparison to patients injured on the right hemisphere. But the p-value is not significant. Either left or right hemisphere injury had no effect on the occurrence of global cognitive functioning impairment (Table 3).

❖ Affected area

The odds ratio shows that patients injured on the left hemisphere are 4.16 times

Table 2. Vascular diseases risk factors.

Variables		GCFI Yes (n = 125)	GCFI No (n = 20)	OR	Chi 2	P value
Hypertension	Without hypertension	47	10	-	-	-
	With hypertension	78	10	1.92 [0.70 - 5.30]		0.20039
Diabetes	Without diabetes	107	18	-	-	-
	With diabetes	18	2	1.52 [0.35 - 10.64]		0.61108
Cardiopathy	Without cardiopathy	116	19	-	-	-
	With cardiopathy	9	1	1.61 [0.26 - 31.20]		0.66021

(5% significance level). The p-values are not significant. Hypertension, diabetes and heart disease had no effect on the occurrence of global cognitive functioning impairment.

Table 3. Risk factors of indexed stroke (hemorrhagic stroke).

Variables		GCFI Yes (n = 55)	GCFI No (n = 10)	OR	Chi2	P value
Injured Hemisphere	Right	34	4	-	-	-
	Left	21	6	0.24 [0.04 - 1.14]		0.088937
Affected area	Lobar	10	6	-		-
	Deep	45	4	9.61 [2.07 - 56.45]		0.005731**

(5% significance level). *significant, **very significant. The p-value is very significant for the deep area. The deep area lesion is associated with the occurrence of global cognitive functioning impairment.

less likely to have global cognitive functioning impairment than patients injured on the right hemisphere. Moreover, the p-value is very significant (0.005731). The deep area lesion is associated with the occurrence of post-stroke cognitive functioning impairment. Patients with a deep lesion are 9.61 times more likely to have global cognitive functioning impairment than those with a lobar lesion (Table 3).

2) Ischemic stroke

❖ Injured hemisphere

The odds ratio shows that patients injured on the left hemisphere are 1.34 times more likely to have global cognitive functioning impairment than patients injured on the right hemisphere. However, the p-value is not significant. Either left or right hemisphere injury had no effect on the occurrence of global cognitive functioning impairment (Table 4).

❖ Affected area

The odds ratio value shows that patients with a deep lesion are 1.87 times more likely to have impaired global cognitive functioning than patients with a lesion in the MCA area. Patients with a lesion in the PCA area are 57.1 times less likely to have impaired global cognitive functioning than patients with a lesion in the MCA area. In addition, the p-value is significant (0.0480493). The lesion located in the posterior cerebral artery area is associated to the occurrence of global cognitive functioning impairment (Table 4).

Table 4. Risk factors of indexed stroke (ischemic stroke).

Variables		GCFI		OR	Chi2	P value
		Yes (n = 70)	No (n = 10)			
Injured Hemisphere	Right	37	6	-	-	-
	Left	33	4	1.34 [0.32 - 6]		0.6850554
Affected area	MCA	46	6	-	-	-
	ACA	6	0	5.51×10^{6} [1.46×10^{-51}]		0.9923178
	PCA	4	3	1.75×10^{-1} [3×10^{-1} - 1.06]		0.0480493*
	Deep	14	1	1.87 [2.8×10^{-1} - 37]		0.5776079

(5% significance level). *significant, **very significant. MCA: middle cerebral artery, ACA: anterior cerebral artery, PCA: posterior cerebral artery. The p-value is significant for the PCA. The lesion located in posterior cerebral artery area is associated to the occurrence of global cognitive functioning impairment.

4. Discussion

In our study, 81.38% of patients had problems with executive function and 54.48% had problems with language. Vidović *et al.* found that language deficits after stroke are common, affecting up to 80% of patients, and may regress with appropriate rehabilitation [14]. Our results showed a frequency of 34.48% and 24.83% for disorders of short-term memory and working memory, respectively. According to [15], about 30% develop memory problems in the year after stroke. Our study found 86.21% cognitive impairment. Other studies have also found around 80% impairment after stroke [6]. Burton and al., estimated that 80% would be impaired in the acute phase [16]. In foreign developed countries, a cross-sectional Chinese study conducted by [17] in Changsha (China) had a frequency of 41, 8%. A cross-sectional study conducted in India by [18] revealed a frequency of 66, 66%. Another Chinese study on post-stroke cognitive impairment (PSCI), revealed an overall prevalence of 80.97% [19]. A study conducted in Indonesia by Pinzon et al revealed a frequency of 68.2% [20]. According to Jokinen and collaborators, 83% of patients showed impairment in at least one cognitive domain [21]. In comparison, the frequencies of PSCI in reported studies in various countries move away from each other's. The frequency observed in our study remains higher, but it is not so far from those of studies conducted in African developing countries. Studies similar to ours have been conducted in Ghana by [22], in Nigeria by [23], Uganda by [24]. These authors found frequencies of 72.8%, 67.4%, and 66.4%. The higher frequency in our study may be due to when the patients were assessed. In our study, patients were assessed in the subacute stage (at least 5 days after stroke), while in the studies mentioned, patients were assessed in the post-acute phase (at least 3 months after stroke). Timing of cognitive assessment is crucial for accurate diagnosis, as retested scores often show improvements [25] [26]. Some studies reported that cognitive problems continue to stabilise and even improve beyond the first 3 months after stroke [27]. Moreover, we performed assessment with the MoCA test, while authors of studies named above used the MMSE. Incidentally, Zhao and colleagues have shown that the MoCA is more sensitive to mild cognitive impairment than the MMSE [28].

Although our study did not find a significant effect of age on the risk of cognitive impairment after stroke (**Table 1**), other studies show that age influences cognitive decline after stroke. Age is a risk factor for both stroke and cognitive decline. There is evidence that cognitive decline after stroke increases with age after 65 [29]. Our study did not find that gender had a significant effect on the onset of cognitive impairment (**Table 1**). Others researchers showed that gender was not identified as a factor associated with the onset of post-stroke cognitive impairment [30] [31]. In some studies, gender is linked to post-stroke cognitive issues [32]. Our research reveals education impacts cognitive function. High education levels protect against cognitive decline after a stroke [22] [33]. Indeed, a higher level of education increases the brain's cognitive reserve, which may lead to better compensation for ageing and brain damage [34]. Some authors found education level doesn't impact cognitive decline. Singh-Manoux, Zahodne & colleagues studied education's effect on cognition in 7454 Whitehall II & 1023 Victoria Longitudinal Study participants [35] [36]. Both studies suggested that there was no significant difference of the rate of decline in cognitive function between each group of the education level. The education level is a conflictive risk factor. It could influence the expression of the cognitive impairment in patients. The cohort study conducted by Elbaz and collaborators, on 4010 participants suggested the higher education was associated with better cognitive performances [37]. Our study did not show that employment status was related to cognitive impairment (**Table 1**). Yet, there is evidence suggesting that the occupation have effects on the prevalence of the cognitive impairment. Singh-Manoux and collaborators also suggested that the individuals with high occupations that were defined as the administrative positions had a more obvious cognitive decline than other occupations [35]. Another study conducted by Douiri and collaborators, proposed a higher prevalence of cognitive impairment after ischemic stroke in the manual workers [38]. Our study did not show that vascular diseases risk factors *i.e.* hypertension, diabetes, cardiopathy were related to post-stroke cognitive functioning impairment (**Table 2**). On the contrary, a study has shown the effect of those factors on post-stroke cognitive impairment [39]. **Table 3** showed that deep affected area is related to post-stroke cognitive impairment in hemorrhagic stroke ($p = 0.005$). **Table 4** showed that affected area of posterior cerebral artery is related to post-stroke cognitive functioning impairment in ischemic stroke ($p = 0.048$). About it, Munsch and collaborators suggested that the onset of post-stroke cognitive impairment could be related to the location of cerebral infarction [40].

5. Limitations of the Study

Cross-sectional studies cannot establish causality. Timing of patient assessment (subacute phase) may overestimate cognitive problems (86.21% of survivors). Restricting the study to public health facilities may introduce bias due to the social status of the population. The study may be biased by the exclusion of a significant number of participants from the study consortium, particularly for illiteracy (n = 82, 19.76%) and aphasia (n = 35, 8.43%). In addition, the use of the MoCA test, which has not been validated in sub-Saharan African populations, could lead to misinterpretation of cognitive impairment in participants from these countries, potentially overestimating the impact. Despite these limitations, the study provides valuable data on cognitive impairment after stroke in sub-Saharan Africa. This can inform public awareness, policy recommendations and future research into effective interventions.

6. Conclusion

This study provides data on frequencies and related risk factors of cognitive status among patients in subacute stage of stroke in Abidjan. Global cognitive functioning and executive functions were highly impaired, language was moderately impaired while memory was less impaired. The level of education and the affected brain area were risk factors associated with the occurrence of cognitive functioning disorders. The interest of this study is the importance of early screening of cognitive disorders after a stroke for many cognitive functions have been found to be impaired. The cognitive care of stroke patients should benefit from these findings. We plan to integrate further aspects such as the patient's lifestyle in the research of post-stroke cognitive disorders in order to find more associated factors.

Acknowledgements

We especially and attentively thank the family members of the Biology and Health Laboratory, Felix Houphouët-Boigny University and the medical staff of the University Hospital who contributed significantly to the completion of this project.

Consent to Participate

Informed consent was obtained from the patient.

Authors' Contribution

NNA and ON contributed to writing this manuscript; ON and KKL contributed to revising the manuscript. TNA and KKL contributed to the study design. NNA performed all the data analyses.

Conflicts of Interest

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

References

[1] Albakaye, M. (2010) Les accidents vasculaires cérébraux au mali: Étude des filières

de prise en charge. Thèse Méd., FMOS, Bamako, No. 232, 113 p.

[2] Esiri, M., Matthews, F., Brayne, C., Ince, P., Matthews, F. and Xuereb, J. (2001) Pathological Correlates of Late-Onset Dementia in a Multicentre, Community-Based Population in England and Wales. *The Lancet*, **357**, 169-175.

[3] Rockwood, K., Wentzel, C., Hachinski, V., Hogan, D.B., MacKnight, C. and McDowell, I. (2000) Prevalence and Outcomes of Vascular Cognitive Impairment. Vascular Cognitive Impairment Investigators of the Canadian Study of Health and Aging. *Neurology*, **54**, 447-451. https://doi.org/10.1212/WNL.54.2.447

[4] Saposnik, G., Cote, R., Rochon, P.A., Mamdani, M., Liu, Y. and Raptis, S. (2011) Care and Outcomes in Patients with Ischemic Stroke with and without Preexisting Dementia. *Neurology*, **77**, 1664-1673. https://doi.org/10.1212/WNL.0b013e31823648f1

[5] Patel, M., Coshall, C., Rudd, A.G. and Wolfe, C.D. (2003) Natural History of Cognitive Impairment after Stroke and Factors Associated with Its Recovery. *Clinical Rehabilitation*, **17**, 158-166. https://doi.org/10.1191/0269215503cr596oa

[6] Lesniak, M., Bak, T., Czepiel, W., Seniów, J. and Członkowska, A. (2008) Frequency and Prognostic Value of Cognitive Disorders in Stroke Patients. *Dementia and Geriatric Cognitive Disorders*, **26**, 356-363. https://doi.org/10.1159/000162262

[7] Jacova, C., Pearce, L.A., Costello, R., McClure, L.A., Holliday, S.L. and Hart, R.G. (2012) Cognitive Impairment in Lacunar Strokes: The SPS3 Trial. *Annals of Neurology*, **72**, 351-362. https://doi.org/10.1002/ana.23733

[8] Whiting, D.R., Hayes, L. and Unwin N.C. (2003) Diabetes in Africa. Challenges to Health Care for Diabetes in Africa. *Journal of Cardiovascular Risk*, **10**, 103-110. https://doi.org/10.1177/174182670301000205

[9] Jorm, A. and Jacomb, P. (1989) The Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE): Socio-Demographic Correlates, Reliability, Validity and Some Norms. *Psychological Medicine*, **19**, 1015-1022. https://doi.org/10.1017/S0033291700005742

[10] Nasreddine, Z.S., Phillips, N.A., BÉDirian, V., Charbonneau, S., Whitehead, V. and Collin, I. (2005) The Montreal Cognitive Assessment, MoCA: A Brief Screening Tool for Mild Cognitive Impairment. *Journal of the American Geriatrics Society*, **53**, 695-699. https://doi.org/10.1111/j.1532-5415.2005.53221.x

[11] Dubois, B., Slachevsky, A., Litvan, I. and Pillon, B. (2000) The FAB: A Frontal Assessment Battery at Bedside. *Neurology*, **55**, 1621-1626. https://doi.org/10.1212/WNL.55.11.1621

[12] Flamand-Roze, C., Falissard, B., Roze, E., Maintigneux, L., Beziz, J., Chacon, A., JoinLambert, C., Adams, D. and Denier, C. (2011) Validation of a New Language-Screening Tool for Patients with Acute Stroke: The Language Screening Test (LAST). *Stroke*, **42**, 1224-1229. https://doi.org/10.1161/STROKEAHA.110.609503

[13] Blackburn, H.L. and Benton, A.L. (1957) Revised Administration and Scoring of the Digit Span Test. *Journal of Consulting Psychology*, **21**, 139-143. https://doi.org/10.1037/h0047235

[14] Vidović, M., Sinanović, O., Sabaskić, L., Haticić, A. and Brkić, E. (2011) Incidence and Types of Speech Disorders in Stroke Patients. *Acta Clinica Croatica*, **50**, 491-494.

[15] Cullen, B., O'Neill, B., Evans, J.J., Coen, R.F. and Lawlor, B.A.A. (2007) Review of Screening Tests for Cognitive Impairment. *Journal of Neurology*, *Neurosurgery*, *and Psychiatry*, **78**, 790-799. https://doi.org/10.1136/jnnp.2006.095414

[16] Burton, L. and Tyson, S.F. (2015) Screening for Cognitive Impairment after Stroke: A Systematic Review of Psychometric Properties and Clinical Utility. *Journal of Rehabilitation Medicine*, **47**, 193-203. https://doi.org/10.2340/16501977-1930

[17] Tu, Q.Y., Yang, X., Ding, B.R., Jin, H., Lei, Z.H. and Bai, S. (2011) Epidemiological Investigation of Vascular Cognitive Impairment Post Ischemic Stroke. *Chinese Journal of Gerontology*, **31**, 3576-3579.

[18] Mukhopadhyay, A., Sundar, U., Adwani, S. and Pandit, D. (2012) Prevalence of Stroke and Post-Stroke Cognitive Impairment in the Elderly in Dharavi, Mumbai. *Journal of the Association of Physicians of India*, **60**, 29-32.

[19] Qu, Y., Zhuo, L., Li, N., Hu, Y., Chen, W. and Zhou, Y. (2015) Prevalence of Post-Stroke Cognitive Impairment in China: A Community-Based, Cross-Sectional Study. *PLOS ONE*, **10**, e0122864. https://doi.org/10.1371/journal.pone.0122864

[20] Pinzon, R.T., Rosa, D.S. and Satrianti, T. (2018) The Prevalence and Determinant Factors of Post-Stroke Cognitive Impairment. *Asian Pacific Journal of Health Sciences*, **5**, 78-83. https://doi.org/10.21276/apjhs.2018.5.1.17

[21] Jokinen, H., Melkas, S., Ylikoski, R., Pohjasvaara, T., Kaste, M., Erkinjuntti, T. and Hietanen, M. (2015) Post-Stroke Cognitive Impairment Is Common Even after Successful Clinical Recovery. *Journal Européen de Neurologie*, **22**, 1288-1294. https://doi.org/10.1111/ene.12743

[22] Sarfo, F.S., Akassi, J., Adamu, S., Obese, V. and Ovbiagele, B. (2017) Fardeau et prédicteurs des troubles cognitifs post-avc chez un échantillon de survivants ghanéens d'un avc. *Journal des accidents vasculaires cérébraux et des maladies cérébrovasculaires: Le journal officiel de la national stroke association*, **26**, 2553-2562.

[23] Akinyemi, R.O., Allan, L., Owolabi, M.O., Akinyemi, J.O., Ogbole, G., Ajani, A., Firbank, M., Ogunniyi, A. and Kalaria, R.N. (2014) Profil et déterminants de la déficience cognitive vasculaire chez les survivants africains d'un avc: L'étude cogfast nigeria. *Journal of the Neurological Sciences*, **346**, 241-249. https://doi.org/10.1016/j.jns.2014.08.042

[24] Kaddumukasa, M.N., Kaddumukasa, M.K.E., Sewankambo, N.L., Namujju, D. and Goldstein, L.B. (2023) Prévalence et prédicteurs des troubles cognitifs post-avc chez les survivants d'un avc en ouganda. *BMC Neurology*, **23**, Article No. 166. https://doi.org/10.1186/s12883-023-03212-8

[25] Wagle, J., Farner, L. and Flekkøy, K. (2011) Early Post-Stroke Cognition in Stroke Rehabilitation Patients Predicts Functional Outcome at 13 Months. *Dementia and Geriatric Cognitive Disorders*, **31**, 379-387. https://doi.org/10.1159/000328970

[26] Lees, R., Stott, D.J., Quinn, T.J. and Broomfield, N.M. (2014) Feasibility and Diagnostic Accuracy of Early Mood Screening to Diagnose Persisting Clinical Depression/Anxiety Disorder after Stroke. *Cerebrovascular Diseases*, **37**, 323-329. https://doi.org/10.1159/000360755

[27] Hachinski, V.C., Iliff, L.D., Zilhka, E., Du Boulay, G.H., McAllister, V.L. and Marshall, J. (1975) Cerebral Blood Flow in Dementia. *Archives of Neurology*, **32**, 632-637. https://doi.org/10.1001/archneur.1975.00490510088009

[28] Zhao, S., Guo, C., Wang, M., Chen, W., Wu, Y. and Tang, W. (2011) A Clinical Memory Battery for Screening for Amnestic Mild Cognitive Impairment in an Elderly Chinese Population. *The American Journal of Geriatric Pharmacotherapy*, **18**, 774-779. https://doi.org/10.1016/j.jocn.2010.07.149

[29] Gorelick, P.B., Scuteri, A. and Black, S.E. (2011) Vascular Contributions to Cognitive Impairment and Dementia: A Statement for Healthcare Professionals from the

American Heart Association/American Stroke Association. *Stroke*, **42**, 2672-2713. https://doi.org/10.1161/STR.0b013e3182299496

[30] Wang, J., Xiao, L.D., Wang, K., Luo, Y. and Li, X. (2020) Déficience cognitive et facteurs associés chez les personnes âgées rurales du nord de la chine. *Journal of Alzheimer's Disease*, **77**, 1241-1253. https://doi.org/10.3233/JAD-200404

[31] El-Sheik, W.M., El-Emam, A.I., El-Rahman, A. and Salim, G.M. (2021) Prédicteurs de démence après un premier accident vasculaire cérébral ischémique. *Dementia & Neuropsychologia*, **15**, 216-222. https://doi.org/10.1590/1980-57642021dn15-020009

[32] Tang, W.K. and Chan, H.F.K. (2006) Frequency and Clinical Determinants of Poststroke Cognitive Impairment in Nondemented Stroke Patients. *Journal of Geriatric Psychiatry and Neurology*, **19**, 65-71. https://doi.org/10.1177/0891988706286230

[33] Stern, Y. (2009) Réserve Cognitive. *Neuropsychologie*, **47**, 2015-2028. https://doi.org/10.1016/j.neuropsychologia.2009.03.004

[34] Chen, X.D., Han, L., Tian, Y., Dai, L. and Wang, Q. (2016) Prédicteurs de déficience cognitive vasculaire chez les patients victimes d'un AVC. *Neurologie BMC*, **16**, Article No. 115. https://doi.org/10.1186/s12883-016-0638-8

[35] Singh-Manoux, A., Marmot, M.G. and Glymour, M. (2011) Does Cognitive Reserve Shape Cognitive Decline? *Annals of Neurology*, **70**, 296-304. https://doi.org/10.1002/ana.22391

[36] Zahodne, L.B., Glymour, M.M. and Sparks, C. (2011) Education Does Not Slow Cognitive Decline with Aging: 12-Year Evidence from the Victoria Longitudinal Study. *Journal of the International Neuropsychological Society*, **17**, 1039-1046. https://doi.org/10.1017/S1355617711001044

[37] Elbaz, A., Vicente-Vytopilova, P. and Tavernier, B. (2013) Motor Function in the Elderly: Evidence for the Reserve Hypothesis. *Neurology*, **81**, 417-426. https://doi.org/10.1212/WNL.0b013e31829d8761

[38] Douiri, A., Rudd, A.G. and Wolfe, C.D. (2013) Prevalence of Poststroke Cognitive Impairment: South London Stroke Register 1995-2010. *Stroke*, **44**, 138-145. https://doi.org/10.1161/STROKEAHA.112.670844

[39] Khedr, E.M., Hamed, H.K. and El-Shereef (2009) Cognitive Impairment after Cerebrovascular Stroke: Relationship to Vascular Risk Factors. *Neuropsychiatric Disease and Treatment*, **5**, 103-116. https://doi.org/10.2147/NDT.S4184

[40] Munsch, F., Sagnier, S., Asselineau, J., Bigourdan, A., Guttmann, C.R. and Debruxelles, S. (2016) Stroke Location Is an Independent Predictor of Cognitive Outcome. *Stroke*, **47**, 66-73. https://doi.org/10.1161/STROKEAHA.115.011242