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Psychosocial Parameters as Determinants of Return to Driving among Stroke Survivors

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ABSTRACT

Background: Stroke is a leading cause of disability worldwide, significantly impairing physical, cognitive, and psychosocial functions. Returning to driving, a complex activity requiring motor coordination, cognition, and psychosocial stability, is an important marker of functional recovery for stroke survivors. Limited research exists on the determinants of return to driving in Africa, prompting this study in Enugu, Nigeria.

Materials and Methods: This correlational survey involved 49 stroke survivors receiving physiotherapy at two major hospitals in Enugu. Participants were selected via disproportionate stratified random sampling. Data were collected using the Beck's Index for depression, the Hospital Anxiety and Depression Scale (HADS), the Stroke-Specific Quality of Life Scale (SS-QOL), Fugl-Meyer Assessment. Inferential statistics of independent t-test and chi-square were used to analyze the relationship between variables, with significance set at $p<0.05$.

Results: Only 10.2% of participants returned to driving post-stroke. Key determinants included significantly lower depression ($p = 0.001$) and anxiety scores ($p = 0.006$) among returners. While balance and motor function scores were higher in returners, compared to non-returners, the differences were not statistically significant. Gender and occupation had no significant association with return to driving.

Conclusion: This study revealed a low return-to-driving rate among stroke survivors in Enugu, with depression and anxiety emerging as significant barriers. Integrating psychosocial interventions in stroke rehabilitation programs could enhance functional outcomes like driving.

Key words: Stroke, Driving, Psychosocial, Functional ability, Anxiety, Depression, Quality of life

INTRODUCTION

Stroke is a leading neurological condition responsible for significant global mortality and disability (1). According to the American Heart Foundation (2010), over 33 million people live with stroke, with 16.9 million experiencing their first episode. It ranks as the third leading cause of death globally, accounting for about 10% of all deaths (2). The prevalence of stroke in Nigeria is about 1.14 per 1000 while the 30-day case fatality rate is as high as 40% (3). Among the survivors 20% will require intensive and vocational care after 3 months and 15-30% would be permanently disabled (4).

Fluctuations in economic growth have resulted in a shift in its health burden, ranging from infectious disease to lifestyle disorders, of which stroke is at the forefront (5). This fluctuating factor that has contributed to the shift includes both modifiable and non-modifiable factors. Age, sex and ethnicity contribute to the non-modifiable factors while the modifiable factors are smoking, hypertension and hypocholesteremia. The population has adapted to sedentary lifestyle with a decrease in physical activities and with less beneficial food choice. Thus, as a result stroke prevalence has continued to rise. In many countries, including the US and India, the prevalence and burden of stroke continue to rise, reflecting global trends (6,7).

Stroke places a heavy economic burden due to high treatment costs, loss of productivity, and the need for long-term care (8). As the population ages and life expectancy grows, the impact of stroke is likely to only increase. Studies carried out by Kollen *et al*. (9) revealed that although nearly two-third of persons with stroke regain enough function to work short distances, decreased physical function and endurance combined with fatigue can make mobility a challenge, especially as it relates to driving a motor vehicle. Driving is a multi-task that involves visual perception, cognition and physical function, all of which are affected by stroke (9) patients are eager to return to driving and work following post stroke conditions and life situations, thus the need to study the factors that prevent their regain of functionality to work and driving. The information is very crucial to health care professionals and patients who steadily struggle for survival in fluctuating economies.

Several studies (1, 2, 8, 9, 10, 11, 12, 13) have been conducted to describe the determinants of return to work and driving among stroke survivor. Studies by Kollen *et al.* (9) and Wang *et al.* (14) highlight depression, anxiety, and neurological

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E impairments such as speech and cognitive deficits as key predictors of return to work and driving among stroke survivors.. Much of the studies done on this work has not been done in Africa, thus this study was therefore conceived to assess the determinants of return to work and driving among stroke survivors in Enugu metropolis.

Post-stroke patients usually come down with muscle weakness, joint stiffness and contracture, pain, visual inaccuity, depression and anxiety which could affect their ways of life in which their return to work and driving are some of the major areas affected. These patients thus have restrictions and barriers to return to work and driving. Using the bio-psychological model of health, the researcher seeks to investigate the psychosocial determinants of return to driving among stroke survivors.

MATERIALS AND METHODS

Ethical Approval

Ethical approval was sought and obtained from the Medical Research and Ethics Committee of the University of Nigeria Teaching hospital, Ituku-Ozalla (NHREC/05/01/200B-FWA00002458- 1RB00002323). Also, informed consent was obtained from each participant prior to data collection. The subjects' demographic details were recorded in a data sheet. The instruments were administered face to face by the researcher to the subjects, and there was a 100% rate of retrieval.

Study Design

This study was a correlational survey study that involved 49 stroke survivors who were receiving physiotherapy treatment at the University of Nigeria Teaching Hospital and 82 Division Military Hospital, Enugu State, Nigeria. The participants were selected via disproportionate stratified random sampling technique from a population of 98 stroke survivors from both hospitals. The population was initially stratified based on the aforementioned hospitals. A disproportionate balloting method without replacement was then used to select half of the population for the study. The names of the patients were written on individual pieces of paper, which were placed into a bowl. One piece of paper was drawn at a time, and the name on it was recorded. This process was repeated until the required sample size was achieved. Patients with other neurological deficits or disabilities were excluded from the study.

Inclusion and exclusion criteria

Participants were included in this study if they:

- were diagnosed stroke survivors receiving physiotherapy at the university of nigeria teaching hospital or 82 division military hospital, enugu.
- aged 45 years and above.
- had first stroke occurrence at least one month prior to recruitment.
- and were cognitively aware and able to give informed consent.

Participants who met the inclusion criteria but – (i) had other neurological disorder (such as Parkinson's disease, multiple sclerosis), (ii) had severe cognitive impairment or severe aphasia hindering comprehension and/or communication, (iii) or had active psychiatric conditions diagnosed independently of stroke (such as schizophrenia, bipolar disorder) – were excluded from this study.

Materials

Beck's index questionnaire was used to assess depression of respondents. It has 21 items corresponding to a symptom of depression and a four-point scale for each item ranging from 0 to 3. This provides information of one's feeling and how well respondents were able to complete their activities which are both physically and emotionally based. Scoring was done using a scale ranging from 0 to 13 which is considered minimal range, 14 to 19 mild, 20 to 28 moderate and 29 to 63 is severe.

The Hospital Anxiety and Depression Scale (HADS) was used to determine the levels of anxiety experienced by the participants. The HADS is a fourteen-item scale from which seven of the items relate to anxiety while the other seven relate to depression. Each item on the questionnaire is scored from 0-3 and with total score ranging between 0 and 21 for either anxiety or depression.

Health related quality of life among the participants was assessed using the Stroke Specific Quality of Life Scale (SS-QOL). The SS-QOL is a self-reported scale comprising of 49 items. Items are rated on a 5-point Likert scale (ranging from 1 to 5). Total score obtainable range from 49 to 245.

Berg's scale was used to objectively assess balance of the respondents, during a series of predetermined tasks. The pre-determined tasks take 15-20 minutes to complete and comprise of a set of 14 item list with each item consisting of a five-point ordinal scale ranging from 0 to 4, with 0 indicating the lowest level of function and 4 the highest level of function. Total score ranged from 0 to 56.

The Fugl-Meyer Assessment (FMA) was used to measure the upper and lower limb motor functions among the respondents. The FMA is a stroke specific, performance-based impairment index. It is designed to assess motor functioning, balance, sensation and joint functioning in patients with post-stroke hemiplegia. The upper extremity has a total score of 66 while the lower extremity has a score of 34. Increasing scores show recovery in this assessment tool.

Data Analysis

Demographic data of the participants were summarized using descriptive statistics of frequency, percentage, mean and standard deviation. Inferential statistics of independent t-test

and chi-square were used to analyze the relationship between psychosocial parameters and return to driving among the participants.

RESULTS

Summary of Respondents' demographic and Health Related Variables

A total number of 49 stroke survivors who met the selection criteria participated in this study. Majority of the respondents (63.3%) were males. Most of the respondents were traders (34.7%), civil servants (30.6%) and military (12.2%). Most of the respondents had ischaemic stroke (73.5%) and more of their left side affected (53.1%). Some of the respondents were driving before stroke (30.6%) and only few returned to driving after stoke (10.2%). This is presented in Table 1.

Table 2 shows the mean and standard deviation of the respondents' variables of age (55.90 ± 6.17 years), duration of stroke (2.55 ± 1.12 years), duration of physiotherapy (2.27 ± 1.13 years), depression (23.33 ± 15.77), fall efficacy (6.46 ± 1.89), balance (40.76 ± 11.82), quality of life (151.10 ± 39.20), anxiety (10.92 ± 9.30), motor function upper limb (43.37 ± 9.97), motor function lower limb (24.27 ± 4.58) and motor function total (67.63 ± 14.22).

The depression score for the respondents that returned to driving (6.20 ± 1.48) was significantly lower (t = -7.87, p = 0.0001) than those that did not return to driving (25.27 ± 15.47). Also, the respondents that returned to driving have higher fall efficacy scores (8.12 ± 0.78) with (t=4.11, p = 0.30) than those that did not return to driving. Although there is no significant difference in balance and return to driving (t = 2.47, p =0.57), the respondents that returned to driving have higher balance scores (49.20 ± 7.53) that those that did not return to driving (39.80±11.90). The anxiety score for the respondents that returned to driving (1.20 ± 1.10) was significantly lower (t = -7.38, p = 0.006) than those that did not return to driving (12.02 ± 9.17). The total motor function of the respondents that returned to driving (85.80 ± 8.70) was higher (t = 4.62, p = 0.42) than those that did not return to driving (65.57 ± 13.27), though there was no significant difference between total motor function and return to driving. While 10.2% of the male respondents returned to driving, none of the female respondents returned to driving. However, the association between sex and return to driving status was not significant (X^2 = 3.23, p = 0.07).

Majority of the respondents that returned to driving were civil servants (4.1%) and Military personnel (4.1%). However, there was no significant association between occupation and return to driving status (X^2 = 7.04, p = 0.22). Also, majority of the respondents that returned to driving were males (10.2%). However, there was significant association between sex and return to driving status (X^2 = 3.23, p = 0.07) as shown in table 3.

Table 1: Summary Categorical Variables the Respondents (N=49)

Variables	Categories	Frequency	Percent
Gender	Male	31	63.3
	Female	18	36.7
Occupation	Retired	6	12.2
	Trader	17	34.7
	Civil Servant	15	30.6
	Driver	2	4.1
	Military	6	12.2
	Farming	3	6.1
Type of Stroke	Haemorrhagic	13	26.5
	Ischaemic	36	73.5
Side Affected	Left	26	53.1
	Right	23	46.9
Driving Before Stroke	Yes	15	30.6
	No	34	69.4
Returned To Driving	Yes	5	10.2
	No	44	89.8

Table 2: Summary of the Continuous Variable of the respondents (N=49).

Variables	Mean+SD	Range
Age (years)	55.90+6.17	46.00-71.00
Duration of stroke (years)	2.55+1.12	0.08-6.00
Duration of physiotherapy (years)	2.27+1.13	0.08-5.45
Depression (x/66)	23.33+15.77	4.00-51.00
Fall efficacy (x/10)	6.46+1.89	0.00-9.71
Balance (x/56)	40.76+11.82	0.00-55.00
Quality of life (x/245)	151.10+39.20	58.00-23.00
Anxiety (x/42)	10.92+9.30	0.00-36.00
MF-UL (x/66)	43.37+9.97	18.00-64.00
MF-LL (x/34)	24.27+4.58	12.00-33.00
MF-Total(x/100)	67.63+14.22	30.00-97.00

MF (UL) = Motor Function Upper Limb MF (LL) = Motor Function Lower Limb MF = Motor Function

DISCUSSION

A total number of 49 stroke survivors in Enugu metropolis participated in this study. Most of them were males with mean age 55.9 ± 6.17years. This may imply that more males within this age range tend to have stroke. Literature appears unsettled on the prevalence of stroke based on gender. While some studies (1, 3) had similar reports of more males than female stroke respondents, other studied (7, 12) reported more female stroke survivors than male stroke survivors. Baker et al (11) opined that stroke appears to be generally more prevalent among males but the trend reverses at older age. This may be due to the higher life expectancy of females than males (15) and the accumulated effects of menopause (5). This therefore may be hinged upon to attempt an explanation on the higher prevalence of stroke among males in this present study especially given the fact that the mean age of the respondents was 55.9 years.

Table 3: Comparison of Respondents Variables between Respondents that Returned to Driving and Those that did not Return to Driving (N =49)

Variables	RTD	XRTD	*P value*
Depression	6.20±1.48	25.27±15.47	0.001*
Fall Efficacy	8.12±0.78	6.26±1.88	0.30
Balance	49.20±7.53	39.80±11.90	0.57
Quality of Life	197.00±12.73	145.89±37.78	0.30
Anxiety	1.20±1.10	12.02±9.17	0.006*
MF (UL)	56.20±5.93	41.91±9.29	0.43
MF (LL)	29.60±3.29	23.65±4.32	0.50
Total MF	85.80±8.70	65.57±13.27	0.48
D.O.S	3.33±0.62	2.46±1.13	0.31
D.O.P	3.08±0.75	2.18±1.13	0.32
Age	55.80±3.03	55.91±6.45	0.07
	F (%)	**F (%)**	
Gender			
Male	5(10.2%)	26(53.1%)	0.07
Female	0(0%)	18(36.7%)	
Occupation			
Retired	0(0%)	6(12.2%)	0.22
Trader	1(0.2%)	16(32.7%)	
Civil Servant	2(4.1%)	13(26.5%)	
Driver	0(0%)	2(4.1%)	
Military	2(4.1%)	4(8.1%)	
Farming	0(0%)	3(6.1%)	

*= significant; XRTD = Non-returners to Driving; RTD = Returners to Driving; MF (UL) = Motor Function Upper Limb MF (LL) = Motor Function Lower Limb; MF = Motor Function; D.O.S = Duration of Stroke D.O.P = Duration of Physiotherapy; F (%) = Frequency (percentage)

Also, three-quarters of the respondents had ischaemic type of stroke that affected the right hemisphere more and majority of them were traders by occupation. The distribution by type of stroke is in line with generally reported studies of Petrea et al (10) and also the greater prevalence of ischaemic stroke than the haemorrhagic type. About 75 to 80 percent of stroke worldwide are ischaemic (1). Possible explanation for this trend may be adduced to the greater mortality and morbidity rates of haemorrhagic stroke (16) especially for cases of subarachnoid haemorrhage which may have resulted in fewer survivors of post-stroke patients with haemorrhagic subtypes albeit the preponderance of the risk factors of haemorrhagic stroke such as atherosclerosis, ischaemic heart disease, obesity commonly called diseases of modern civilization that is assuming an alarming trend in developing countries especially Nigeria (4).

Only about a tenth of the respondents in this study returned to driving after stroke. This is consistent with some similar studies on return to driving after stroke (12), (14), (17). In the study by Ferrarello et al (17) among Canadian stroke survivors, only about one-quarter of the respondents returned to driving. Several factors have been adduced to influence return to driving among stroke survivors such as the side affected (14), severity of stroke (8) and other psychosocial factors (3, 17). In the same vein, only about two-tenth of the respondents returned to work after stroke. This is also in similar footings with earlier reports in literature (9, 18).

Stroke survivors that returned to driving in this present study had a significantly lower depressive symptom as well as anxiety score than those that did not return to driving. This may imply that there is an association between the ability to return to driving after stroke and the presentation of depressive and anxiety symptoms i.e., returning to driving ameliorates stroke associated depression and anxiety. This may be due the increase in activity and participation that is fostered by the ability to return to driving as the post-stroke individual is able to as much as possible reintegrate into his/her pre-stroke activities. Studies have shown linear relationship between activity limitation/participation restriction and each of anxiety and depression among stroke survivors (3, 19, 20). This finding is in congruence with some previous studies (21, 22, 23) that found some measures of relationship between return to driving and some measures of psychological functioning. The study by Perrier et al (21) found mental status and fatigue to be direct predictors of return to driving among Canadian stroke survivors. Depressive symptoms significantly and excellently correlated with mental status and fatigue (24). It may therefore be extrapolated that depression was an indirect predictor (through mental status and fatigue) of return to driving among the stroke survivors.

The factors in the result above should not be considered in isolation as the only factors that contributed to some stroke survivors returning to work and driving while their counterpart did not because cognitive abilities had significant indirect effect in RTW and RTD. This is in agreement with the findings reported by Aufman et al (25). Jones et al (26) also showed that when a person has cognitive impairments, they experience the lowest employment rates as they are less likely to be employed in the competitive labour market. If a less cognitively demanding job is not available for stroke survivors with cognitive impairments at their workplace, the employer might not be able to accommodate them. This implies an increase in depression and anxiety, thus the lower rate of returning to work.

Conclusion: This study observed a low level of return to driving among stroke survivors in Enugu, with psychosocial parameters of depression and anxiety having a significant association with return to driving

The authors recommend that physiotherapists and other health professionals involved in the rehabilitation of stroke survivors should seek to asses and improve psychosocial attributes of stroke survivors such as depression, anxiety and quality of life with the view to reintegrating them back to driving, and to work. Future studies should investigate this prevalence of return to driving, as well as other functional activities, among respondents with other disabling conditions such as spinal cord injury and amputees.

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