

CLINICAL STUDIES / ETUDE CLINIQUES

CLINICAL AND DEMOGRAPHIC CORRELATES OF UNILATERAL SPATIAL NEGLECT AMONG COMMUNITY-DWELLING NIGERIAN STROKE SURVIVORS

CORRÉLATIONS CLINIQUES ET DÉMOGRAPHIQUES DE LA NÉGLIGENCE SPATIALE UNILATÉRALE PARMIS LES SURVIVANTS D'UNE COMMUNAUTE NIGÉRIANE POST-ACCIDENT VASCULAIRE CEREBRAL

HAMZAT Tal-hatu Kolapo ¹OYEDELE Sarah Y. ¹PETERS Grace Oluwatitofunmi ¹

1. Department of Physiotherapy, College of Medicine, University of Ibadan, Nigeria

E-Mail Contact - HAMZAT Tal-hatu Kolapo : tkhamzat (at) comui (dot) edu.ng

Keywords: Perceptual Disorder, Rehabilitation, Stroke, Unilateral Spatial Neglect

ABSTRACT

Background

Unilateral Spatial Neglect (USN) is important sequelae of stroke which has been linked with poor clinical recovery. Its prevalence among post hospital discharge stroke survivors and clinical and demographic correlates of the USN have not been well documented. This study explored the occurrence of USN and its associated factors among Nigerian community-dwelling stroke survivors.

Method

A descriptive research approach was employed in this study carried out at a Physiotherapy outpatient facility. Forty post-stroke individuals receiving physiotherapy on out-patient basis were screened for the existence of USN using the bells and star cancellation tests. Information on age, gender, stroke laterality, time after stroke and motor function assessed using modified motor assessment scale were also documented. Prevalence of USN was determined while differences in prevalence by demographic and clinical variables were analyzed using Chi-square and Mann Whitney U tests at P=0.05.

Results

Neglect was observed in 15 (37.0%) stroke patients, with an almost equal proportion in both right and left hemispheric stroke. Among the demographic and clinical variables investigated, only gender and motor function were found to have significant association with USN. Conclusions: A considerable proportion of community-dwelling stroke survivors receiving physiotherapy as part of their rehabilitation program were observed to experience neglect, a disorder identified with prolonged rehabilitation efforts and poor outcome. Routine screening for existence or persistence of USN should be carried out for individuals who have suffered a stroke considering that its presence is associated with poor motor performance.

INTRODUCTION

Unilateral Spatial Neglect (USN) is a common disorder after stroke (10). It is a failure to report, respond, or orient to stimuli in the space contralateral to a brain lesion, and the failure is not attributable to a primary sensory or motor deficit (6). Stroke patients with USN could experience impaired ability to detect sensory stimuli (sensory neglect), visualize or process mental representation of objects (memory or representational neglect), and move (motor neglect) in the space opposite the hemisphere affected by stroke (2, 4). These clinical features may account for the negative impact of USN on different functional activities of people who have suffered a stroke (4).

Attempts have been made to provide a reliable estimate of the incidence and prevalence of USN after stroke (3). A wide variation in the reported figures however makes conclusive deduction and generalization difficult. While the reported prevalence ranges from 12% to 100% in patients with right hemispheric stroke, figures among those with left hemispheric stroke vary from 0% to 76% (3). Although differences in the frequency of occurrence of USN has been linked to the side of brain damage, factors such as differences in research

methodology and attributes of study population are also major contributors to the variations in the available data (3).

The influence of gender, age, stroke severity, marital status, handedness and post-stroke duration on the prevalence of USN (1, 3, 11) has been explored. Whereas there appears to be no consensus on the impact of these factors, nevertheless availability of information on factors associated with the frequency of USN may have implications for the successful post-stroke rehabilitation. This is especially more so that post-stroke patients with USN have been reported to require longer periods of rehabilitation and often end up with lesser functional recovery than those without the disorder (1), a situation affirming that USN often hinders response to therapy (3). Furthermore, negative consequences such as postural imbalance, frequent falls, poor autonomy, impaired mobility (2) and directional hypokinesia(4) which often accompany USN are known to result in poor functional outcome. Obtaining information about the correlates of USN among post-stroke individuals should then be considered as an important factor when designing rehabilitation programmes for this group of patients. The aim of this study was to investigate influence of age, gender, duration and motor function as correlates of USN among community-dwelling stroke survivors in Nigeria.

MATERIALS AND METHODS

Participants were 40 post-stroke patients receiving physiotherapy on out-patient basis at tertiary health facilities in south west Nigeria. Inclusion criteria for the participants were stroke onset within 12 months preceding this study, being community-dwelling, ability to hold a pencil to complete the USN screening tests and willingness to participate in the study by giving written informed consent. The protocol for this study was approved by the Health Research Ethics Committee of the University of Ibadan/University College Hospital, Nigeria.

Demographic and clinical data of age, gender, side of stroke and time since stroke were obtained from the patients and medical records as appropriate; motor function was assessed using the Modified Motor Assessment Scale (MMAS). The MMAS is a widely used 8-item scale that assesses motor function in stroke. Assessment entails patients carrying out functional movements rather than isolated patterns of movements. Supine to side lying; supine to sitting over the side of the bed; balanced sitting; sitting to standing; walking; upper-arm function; hand movements and advanced hand activities were assessed and performance of each movement was graded on a 1 to 6 scale. The total obtainable score on the scale ranges from 8 to 48 with higher score indicative of better motor function (9).

Participants were assessed for existence of USN using 2 paper and pencil cancellation tests namely the star and bell tests. The use of more than one cancellation tests to detect USN is in line with documented recommendations (13). In the star test, the stimuli are 52 large stars, 13 letters, and 10 short words interspersed with 56 smaller stars (2 stars are for demonstration) on an 8.5" x 11" piece of paper. Patient was required to cross out with a pencil all the small stars on the paper which was placed at the patient's midline on a table (13). The star cancellation test has a diagnostic sensitivity of 80% and has been described as the best single test for diagnosing USN (7). The test is scored based on the number of stars canceled by the patient. Maximum score is 54 and neglect is diagnosed when less than 44 stars are canceled.

The second test was the bells cancellation test. The bells test consists of 35 bells surrounded by 280 distractors such as houses, keys, guitars arranged in 7 columns on an 11 x 8.5 inch paper [11]. Patients circled the bells with a pencil. Maximum obtainable score is 35 and an omission of 6 bells or more indicates USN. A patient was diagnosed to have USN if he failed both cancellation tests. This is because no single test can effectively test for this dysfunction.

DATA ANALYSES

Descriptive statistics of frequency, mean and standard deviation were used to summarize the demographic and clinical data. Mann Whitney U test was used to determine difference in prevalence of USN by stroke severity while Chi square statistics was used to analyze difference by demographic and other categorical clinical variables at 0.05 alpha.

RESULTS

Majority (55.0%) of the 40 stroke patients who took part in the study were males, and had suffered left hemispheric stroke with 42.5% aged 60 years and above. Presence of unilateral spatial neglect was observed in 15 (37.5%) of the participants. Table 1 shows their demographic and clinical characteristics.

Among the categorical variables, only gender was significantly associated with neglect, with a greater proportion of females experiencing USN. The other variable with significant association with USN was motor

function assessed using the Modified Motor Assessment scale (MMAS). The MMAS score was significantly better among stroke patients without neglect than those with neglect. Results obtained for test of association are presented in table 2.

DISCUSSION

Unilateral spatial neglect was observed in about a third of the participants in this study. Prevalence of USN across previous studies shows wide variations, ranging from 0% to as high as 100% (5). Reasons for the wide variability have been identified to include differences in methodology in the existing studies (3). The proportion of patients with USN observed in this study is within the range reported by the earlier cited studies.

As a result of some assumptions, many authors who had investigated USN involved only patients with right hemispheric stroke. These authors opine that the right hemisphere of the brain plays the primary role in spatial processing and therefore would be more affected by USN. Others exclude patients with left hemispheric stroke because of their higher likelihood to experience dysphasia and consequent difficulty in understanding and utilizing tools and instructions for assessment of USN (5). In spite of this trend among studies on USN, there are a number of studies that compared the occurrence of USN between stroke patients with right and left brain damage. Our present study included stroke patients with right and left brain damage and results showed that neglect was equal in proportions between right and left hemispheric stroke patients. Our finding contrasts submissions from majority of similar studies as shown in the outcome of a systematic review of 17 stroke studies in which 16 out of the studies reported a higher rate of neglect after right brain damage than occurs following left brain damage (3). The other study in the review reported findings of almost equal incidence of USN following left and right brain damage (3), and this is similar to our findings in this study.

Our findings showed no significant influence of age and time since occurrence of stroke on USN. A previous study however reported a significantly positive relationship between age and frequency of USN (11). The documented influence of increasing age on increased frequency of neglect contrasts our findings in which a higher proportion of those aged 50 years and below presented with neglect. Spatial neglect was also not statistically associated with time after stroke. Our results however showed a trend that more people with longer duration had the disorder. Differences between the genders in performance of cognitive tasks have generated a lot of interest in research over the years. Gender differences have been reported in about 80% of studies that investigated performance of spatial tasks among apparently healthy individuals, with males performing better than females (12). Available studies on the influence of gender on the occurrence of USN after stroke however revealed no gender differences (8,11). In this present study however, a significantly higher proportion of females experienced USN. This observation could result from differences in stroke severity between the genders since the degree of severity has a relationship with occurrence of neglect.

Increased stroke severity in terms of high levels of motor impairment was associated with increased frequency of neglect among the stroke patients in this study. Previous studies have also observed association between the presence of USN with the severity of stroke (1,4). The relationship between stroke severity and neglect can be described as reciprocal since neglect may be seen to contribute to severity while on the other hand, occurrence of neglect depends on, and indicates the severity of stroke. Inclusion of assessment of neglect among other variables in determining the severity of stroke is therefore justified.

CONCLUSION

Increased frequency of USN was associated with female gender and lower motor function in this study. The proportion of participants with USN indicates that neglect is a fairly frequent disorder among stroke patients receiving physiotherapy hence the need for screening all stroke patients for the disorder especially as it adversely affects outcome of rehabilitation.

Table 1: Demographic and Clinical Characteristics of Participants (N=40)

| Variable | n | % |
|---------------------------------|-----------|------|
| Age (years) | | |
| Below 50 | 10 | 25.0 |
| 50-60 | 13 | 32.5 |
| Above 60 | 17 | 42.5 |
| Mean (SD) | 56.6 (10) | |
| Gender | | |
| Male | 22 | 55.0 |
| Female | 18 | 45.0 |
| Side of Stroke | | |
| Right | 19 | 47.5 |
| Left | 21 | 52.5 |
| Stroke Duration (months) | | |
| 1-6 | 33 | 82.5 |
| 7-11 | 7 | 17.5 |
| Presence of Neglect | | |
| Neglect | 15 | 37.5 |
| Non Neglect | 25 | 62.5 |

Table 2: Distribution of neglect by demographic and clinical variables (N=40)

| Variable | %Neglect | %Non-Neglect | X ² | p-value |
|---------------------------------|---------------------|------------------------|----------------|----------------|
| Gender | | | | |
| Male | 13.6 | 86.4 | 11.87 | 0.00* |
| Female | 66.7 | 33.3 | | |
| Side of Stroke | | | | |
| Right | 36.8 | 63.2 | 0.01 | 0.93 |
| Left | 38.1 | 61.9 | | |
| Age Group (years) | | | | |
| Below 50 | 50 | 50 | 4.04 | 0.13 |
| 50-60 | 15.4 | 84.6 | | |
| Above 60 | 47.1 | 52.9 | | |
| Stroke Duration (months) | | | | |
| 1-6 | 36.4 | 63.6 | 0.10 | 0.74 |
| 7-11 | 42.9 | 57.1 | | |
| Motor Function | With Neglect | Without Neglect | U | p-value |
| Mean (SD) | 21.1 (7.6) | 32.6 (9.9) | 58.5 | 0.00* |

*= significant at $p < 0.05$ X²=Chi-Square U=Mann Whitney U

REFERENCES

1. APPELROS P, KARLSSON GM, SEIGER A, NYDEVIK I. Neglect and anosognosia after first-ever stroke: incidence and relationship to disability. *J Rehabil Med* 2002; 34:215-20.
2. BARTOLOMEO P, THIEBAUT DE SCHOTTEN M, DORICCHI F. Left unilateral neglect as a disconnection syndrome. *Cereb Cortex* 2007; 17:2479-90.
3. BOWEN A, KATE MCKENNA K, TALLIS RC. Reasons for variability in the reported rate of occurrence of unilateral spatial neglect after stroke. *Stroke* 1999; 30:1196-202
4. BUXBAUM LJ, FERRARO MK, VERAMONTI T, FARNE A, WHYTE J, LADAVAS E, FRASSINETTI F, COSLETT HB. Hemispatial neglect: Subtypes, neuroanatomy, and disability. *Neurology* 2004; 62:749-56.
5. GAUTHIER L, DEHAUT F, JOANETTE Y. The bells' test: a quantitative and qualitative test for visual neglect. *International Clinical Neuropsychology* 1989; 11:49-54
6. HEILMAN KM, WATSON RT, VALENSTEIN E. Localization of lesions in neglect and related disorders. In: Kertesz A, editor. *Localization and neuroimaging in neuropsychology*. San Diego: Academic Press; 1994. p 495-524
7. JEKONEN M, AHONEN, JP, DASTIDAR P, KOIVISTO AM, LAIPPALA P, VILKKI J. How to detect visual neglect in acute stroke. *The Lancet* 1998; 351:727.
8. Kleinman JT, Gottesman RF, Davis C, Newhart M, Heidler-Gary J, Hillis AE. Gender differences in unilateral spatial neglect within 24 hours of ischemic stroke. *Brain Cogn* 2008; 68:49-52
9. LOEWEN SC, ANDERSON BA. Reliability of the Modified Motor Assessment Scale and the Barthel index. *Physical Therapy* 1988; 68:1077-81
10. RENGACHARY J, HE BJ, SHULMAN GL, CORBETTA M. A behavioral analysis of spatial neglect and its recovery after stroke. *Front Hum Neurosci* 2011; 5:29.
11. RINGMAN JM, SAVER JL, WOOLSON RF, CLARKE WR, ADAMS HP. Frequency, risk factors, anatomy, and course of unilateral neglect in and acute stroke cohort. *Neurology* 2004; 63(3):468-74.
12. SANDERS G, SJODIN M, DE CHASTELAINE M. On the elusive nature of sex differences in cognition: hormonal influences contributing to within sex variation. *Archives of Sexual Behavior* 2002; 31:145-52
13. WILSON B, COCKBURN J, HALLIGAN P. Development of a behavioral test of visuospatial neglect. *Arch Phys Med Rehabil* 1987; 68:98-101