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ORIGINAL ARTICLE **ÖZGÜN ARAŞTIRMA**

RELATIONSHIPS AMONG SOCIAL SUPPORT, EXERCISE CAPACITY AND QUALITY OF LIFE OF STROKE SURVIVORS: A CASE-CONTROL STUDY

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ABSTRACT

INTRODUCTION: This study investigated the relationships among social support (SS), exercise capacity (EC) and quality of life (QoL) of stroke survivors and healthy controls.
METHODS: This observational controlled study involved 50 stroke survivors from 4 Nigerian tertiary hospitals and 50 age-sex matched controls. Data on SS, EC and QoL were collected using physical activity social support scale, 6-minute walk test, stroke specific quality of life (SSQoL) and Short Form (SF-36) Health Status Questionnaire, respectively. Data were analysed using descriptive and inferential statistics.
RESULTS: The mean age of patients and controls were 60.98±9.6 and 60.56±9.4 years, respectively. There were significant differences between stroke survivors and control group in terms of perceived SS (35.17+26.72 vs. 17.54+22.07; t=3.596; p<0.001), EC (5.45+1.07 vs. 9.89+1.34; t=18.26; p<0.001), physical component summary (PCS) (47.01+16.47 vs. 72.69+22.77; t=-6.460; p<0.001) and mental component summary (MCS) (58.03+16.62 vs. 77.85+14.63; t=-6.329; p<0.001) of SF-36. There were significant associations between SS and each of SSQoL and PCS among stroke survivors. In addition, significant associations were observed between EC and each of SS, SSQoL, PCS and MCS of SF-36. However, no significant associations were observed among the controls except between EC and PCS of SF-36.
DISCUSSION AND CONCLUSION: There were significant relationships among social support, exercise capacity and quality of life of stroke survivors, which were significantly different from the apparently healthy individuals.
Keywords: Stroke, 6-minute walk test, health status, physical activity.

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İNME SONRASINDA SOSYAL DESTEK, EGZERSİZ KAPASİTESİ VE YAŞAM KALİTESİ ARASINDAKİ İLİŞKİ: BİR VAKA KONTROL ÇALIŞMASI

ÖZ

GİRİŞ ve AMAÇ: GİRİŞ: Bu çalışmada inme sonrası hastalarda sağlıklı kontrollere göre sosyal destek (SD), egzersiz kapasitesi (EK) ve yaşam kalitesi (YK) açısından farklılık olup olmadığı araştırılmıştır.
YÖNTEM ve GEREÇLER: Bu gözlemsel kontrollü çalışma, Nijerya'daki 4 üçüncü basamak hastaneden inmeden kurtulan 50 hasta ve yaş-cinsiyet olarak eşleştirilmiş 50 kontrol grubunu içermektedir. SD, EK ve YK ile ilgili veriler sırasıyla fiziksel aktivite sosyal destek ölçeği, 6 dakikalık yürüme testi, inmeye özgü yaşam kalitesi (İÖYK) ve Sağlık Durumu Anketi Kısa Form (SF - 36) kullanılarak toplandı. Veriler, tanımlayıcı ve çıkarımsal istatistikler kullanılarak analiz edildi.
BULGULAR: Hastaların ve kontrollerin yaş ortalaması sırasıyla 60,98 ± 9,6 ve 60,56 ± 9,4 idi. İnme hastaları ve kontrol grubu arasında, algılanan SD (35,17+26,72'ye 17,54+22,07; t=3,596; p<0,001), EK (5,45+1,07'ye 9,89+1,34; t=18,26; p<0.001) ve SF-36'nın fiziksel bileşen özeti (FBÖ) (47,01+16,47'ye 72,69+22,77; t=-6,460; p<0,001) ile mental bileşen özeti (MBÖ) (58,03+16,62 'ye 77,85+14,63; t=-6,329); p<0.001) açısından anlamlı fark olduğu saptandı. İnmeden kurtulanlar arasında SD ile İÖYK ve FBÖ'nin her biri arasında anlamlı ilişki tespit edildi. Ek olarak, EK ile SF-36'nın SD, İÖYK, FBÖ ve MBÖ arasında istatistiksel olarak önemli bağlantı bulunduğu gösterildi. Bununla birlikte, EK ve SF-36'nın FBÖ'i dışında kontroller arasında önemli bir ilişki dikkati çekmedi.
TARTIŞMA ve SONUÇ: İnmeden sağ kurtulan hastalarda sosyal destek, egzersiz kapasitesi ve yaşam kalitesi sağlıklı bireylerdekinden belirgin ve anlamlı ölçüde farklıdır.

Anahtar Sözcükler: İnme, 6 dakikalık yürüme testi, sağlık durumu, fiziksel aktivite.

INTRODUCTION

Stroke is a main source of physical disability which is very prevalent in the developing nations (1,2). The physical disabilities that often accompany stroke episode place limitation on mobility and active lifestyle leading to social segregation with its attendant deleterious effects on health outcomes (3,4). Thus, the need for implementation of effective social support for stroke survivors. Similarly, the level of physical performance is grossly reduced among stroke survivors and may affect the degree of exercise capacity leading to slow rate of recovery from stroke. The prevalent co-occurrence of sedentary lifestyle, low levels of physical activity, and other medical co-morbidities in stroke are implicated in the inadequate exercise endurance and loss in aerobic capacity experience by stroke survivors (5). It has been shown that effective implementation of physical activity and exercise are potent enough to restore the physical function after stroke (5), which may be enhanced through support of family, friends and exercise partners.

Meanwhile, it has been shown that stroke survivors reported a reduced health related quality of life (HRQoL) when compared with apparently healthy individuals (6). Again, limitation in daily tasks, emotional distress and social segregation resulting from post-stroke physical impairments have been shown to be significantly associated with lower quality of life of stroke survivors (4). Furthermore, due to the negative influence of stroke on psycho-social functioning and HRQoL, stroke patients often rely on support from relatives and friends to improve stroke sequlae. As a result, effective stroke rehabilitation should incorporate strategies to promote HRQoL which necessitated the need to explore and identified all factors that may be associated with HRQoL. Although, several studies have investigated social support, exercise capacity and HRQoL in stroke, many of these studies did not compare the levels of these constructs with the apparently healthy age-sex matched individuals, and few investigated the possible interrelationships among the three constructs. Thus, this study was aimed to assess, compare and relate the social support, exercise capacity and health related quality of life of stroke survivors and their apparently healthy control.

METHODS

Participants: Participants in this study were stroke survivors attending physiotherapy outpatient clinics of selected Nigerian tertiary hospitals. The selected health facilities were Ife Hospital Unit and Wesley Guild Hospital Unit Ilesha of the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife,

Osun State University Teaching Hospital, Osogbo, and University of Medical Sciences Teaching Hospital Complex, Ondo, Nigeria. Eligible participants were stroke survivors whose ages were 18 years and older, those who have had stroke for at least six months, and who are ambulant with or without walking aids post-stroke. Stroke survivors with sight impairments and difficulty in comprehending verbal instructions, those with non stroke-related musculoskeletal conditions affecting balance and gait, and those with unstable medical conditions were excluded. Furthermore, apparently healthy hospital staff members and patient's relatives who are age and sex-matched were recruited for the control group.

With Eng sample size formula (7), N=4σ2(Zcrit+Zpwr)/D2, where N=the total sample size (for both comparison group), σ=assumed standard deviation of each group, Zcrit=Standard normal variate corresponding to the desired significance criterion (1.96 at α set at 0.05), Zpwr=Standard normal variate corresponding to the desired statistical power (0.84 for 80% power), and D=minimum expected difference between the two means. The overall mean score for social support in both stroke survivors and healthy adults from previous studies are 2.97±0.925 and 2.4±1.0 (8).

The Minimum expected mean difference (D)=(2.97-2.4)=0.57, therefore, N=(4×⟦0.927⟧^2×(1.96+0.84)^2)/⟦0.57⟧^2=82.5 ~83. Accounting for 10% attrition=(10%×83)=8.3, total sample size for two comparison group=83+8.3=91.3, hence, the sample size per group=91.3/2=45.6≈50. For this study, two groups were recruited making a total sample size of 100.

Instruments:

Stroke Specific HRQoL Questionnaire (SSQoL): The SS-QoL, a disease-specific quality of life assessment instrument is made up of 49 items, encompassing 12 categories. This categories include; social role (five questions), mobility (six questions), energy (three questions), language (five questions), self-care (five questions), mood (five questions), personality (three questions), thinking (three questions), upper extremity function (five questions), family role (three questions), vision (three questions) and work/productivity (three questions). Each item is rated on a five-point Likert scale with one indicating complete agreement and five indicating complete disagreement. The scale's summary score is a weighted average of the 12 domains. The overall score ranges from 49 to 245, with higher score implying a higher quality of life. The psychometric properties of the Yoruba version of the SS-QoL has validity of r=0.711-0.920 while the reliability value was reported to have an intra class correlation coefficient (ICC)=0.47-0.81 (9).

The Short Form (SF-36) Health Status Questionnaire: This instrument was used to assess the stroke survivors' and healthy controls' general health-related quality of life. This questionnaire comprises of eight health dimensions referred to as subscales. This subscales include: Physical Functioning (PF: 10 items), Role Limitations due to Physical Problems (RP: 4 items), Bodily Pain (BP: 2 items), General Health (GH: 5 items), Vitality (VT: 4 items), Social Functioning (SF: 2 items), Role Limitations due to Emotional Problems (RE: 3 items), and Mental Health (MH: 5 items). Physical Health Component (PC) and Mental Health Component (MC) are formed from these subscales. The items on the SF-36 are recoded, totaled, and converted individually. The SF-36 assigns a number from 0 to 100 to many health concepts, higher scores indicating better performance or health. The SF-36 questionnaire has previously been used to compare the quality of life of people with various illnesses and populations (10). The scale has been reported to have good psychometric properties. The reliability, validity and internal consistency of this instrument in measuring the quality of life among the population has been reported to be satisfactory with Cronbach alpha exceeding 0.70 (11).

Support for Exercise Habits Scale (SEHS): This instrument was used to assess family and friend social support among the participants. SEHS is one of the specific social support scales developed by Sallis et al. (12) for health-related eating and exercise behaviours. SEHS has twelve different social support questions in the instruments. On a 5-point Likert scale each item was graded with one equaling much less than I would like and five equaling as much as I would like. A score of 60 (highest possible score), indicates a strong level of social support while a score of 12 (lowest possible score), indicates low social support. The instrument has been validated among sedentary adults, older women, spinal cord injured patients and was recently used to assess social support

among patients with chronic stroke (13).

Six-Minute Walk Test (6MWT): The 6MWT is a self-paced walking test performed on a 25m level corridor or walkway with minimum of external stimuli, as recommended by the American Thoracic Society (ATS). Participants were urged to walk at their own selected pace from the start to the finish line, without jogging or running in order to cover as much ground as feasible in six minutes. Resting was allowed if required, but participants resumed walking as soon as they were able. Standardized encouragement was provided every 30seconds or more by saying: "you are doing well" or "keep up the good work". The total distance walked in six minutes (6MWD) was recorded to the nearest metre. Computation for exercise capacity=VO2 max (mlO2kg/min)=Speed (m/min)×0.1 mL/O2/kg+3.5 ml/O2/kg/min.

Procedure: The Ethics and Research Committees of Obafemi Awolowo University Teaching Hospitals Complex granted ethical permission for this study (Approval number: ERC/2021/07/02, Date: 02/07/2021). Written informed consent was obtained from all participants. A health checklist was used to screen the controls and proforma was used to record participants' socio-demographic and clinical information. Standard procedures were used to measure participant's blood pressure, pulse rate, weight and height. Participants performed the six-minute walk test before other assessments. Participants were allowed to rest for 10- 20mins and the copies of the questionnaires were given to the participants to complete.

Data Analysis: Descriptive statistics of frequency, percentages, mean and standard deviation were used to summarized the data. The Shapiro-Wilk test was used to analyse normal distribution assumption of the quantitative data. Exercise capacity, social support and health-related quality of life among stroke survivors and apparently healthy controls were compared using Independent t–test for normal data. The relationship among exercise capacity, social support and health-related quality of life in stroke survivors and apparently healthy controls were determined using Pearson's Moment Correlation Co-efficient. The statistical analysis was carried out using the International Business Machine of Statistical Package Social Sciences (version 21). A p value less than 0.05 was considered as statistically significant.

RESULTS

Table 1 shows the socio-demographic characteristics of stroke survivors and apparently healthy control. The mean age of the stroke survivors group was 60.98±9.6 years and about 58% were 60 years and above while the mean age of the control group were 60.56±9.4years. The results showed significant differences between stroke survivors and control group in physical functioning (t=-6409; p=0.001), role performance (t=-5.725; p=0.001), physical component score (t=-6.460; p=0.001) and mental component score (t=-6.329; p=0.001). There was no significant difference between stroke survivors and control group in bodily pain (t=-1.643; p=0.104) (Table 2). Furthermore, Table 3 shows comparison of social support, exercise capacity and health related quality of life between stroke survivors and control group. There were significant differences between stroke survivors and control group in social support (t=3.596; p=0.001), exercise capacity (t=18.26; p=0.001), physical component score (t=-6.460; p=0.001) and mental component score (t=-6.329; p=0.001) of SF-36. The results of correlation analysis showed that there was weak significant association of social support with stroke specific quality of life summary score (r=0.337; p=0.017) and physical component summary score of short form (SF-36) health status questionnaire (r=0.341; p=0.015) among stroke survivors. However, there was no significant association between social support and mental component summary of short form (SF-36) health status questionnaire among the stroke survivors (r=0.25; p>0.05). There was no significant association between social support and physical health (r=-0.157; p>0.05) and mental health (r=-0.092; p>0.05) component summary of health-related quality of life among the healthy controls (Table 4). Furthermore, the exercise capacity of stroke survivors was moderately associated with each of social support (r=0.497; p<0.001), stroke specific quality of life (r=0.409; p<0.001), physical (r=0.586; p<0.001), and weakly associated with mental (r=0.292; p=0.040) components summary of short form (SF-36) health status questionnaire. However, among the healthy controls, exercise capacity was moderately associated with only physical component summary of short form (SF-36) health status questionnaire (r=0.503; p<0.001) (Table 4).

Table 1. Socio-demographic characteristics of participants (N=100)

Variable	Stroke Survivors		Control	
	n	%	n	%
Age (years)				
45-49	8	16	9	18
50-54	5	10	4	8
55-59	8	16	9	18
60	29	58	28	56
Sex				
Male	29	58	29	58
Female	21	42	21	42
Education				
Tertiary (NCE, OND)	14	28	23	46
Tertiary (HND, University)	11	22	17	34
Secondary (JSS – SSS)	10	20	9	18
Primary	15	30	1	2
Marital Status				
Single	5	10	-	-
Married	42	84	47	94
Widowed	3	6	3	6
Occupation				
Professional/Manager/Top	4	8	5	10
Middle Level Bureaucratic	14	28	16	32
Semiskilled Workers	15	30	9	18
Unskilled workers/Small Scale	6	12	2	4
Unemployed/Full time	4	8	5	10
Retired	7	14	13	26

NCE: National council of education; OND: Ordinary national diploma; HND: Higher national diploma; JSS: Junior secondary school; SSS: Senior secondary school.

Table 2. Comparison of the eight domains, Physical Component Score and Mental Component Score of general health-related quality of life between stroke survivors and control group.

Variables	Stroke Survivors Mean ± *SD*	Control Mean ± *SD*	t-value	p-value
Physical Functioning	50.6±13.95	76±24.31	-6.409	0.001**
Role Performance	18±38.81	66±44.82	-5.725	0.001**
Role Emotional	63.33±47.74	84.67±31.73	-2.631	0.010**
Energy and Fatigue	50.2±8.86	58.7±13.88	-3.650	0.001**
Emotional Wellbeing	63.84±9.69	81.28±16.9	-6.302	0.001**
Social Functioning	54.75±13.34	86.75±16.25	-10.763	0.001**
Bodily Pain	68.25±15.93	74.75±22.99	-1.643	0.104
General Health	51.2±9.67	74±20.43	-7.134	0.001**
PCS	47.01±16.47	72.69±22.77	-6.460	0.001**
MCS	58.03±16.62	77.85±14.63	-6.329	0.001**

SD: Standard deviation; PCS: Physical component score; MCS: Mental component score.

Table 3. Comparison of social support, exercise capacity, and general health-related quality of life between stroke survivors and control group.

Variable	Stroke survivors Mean ± S.D	Healthy control Mean ± S.D	t-value	p-value
Social support	35.17 ± 26.72	17.54 ± 22.07	3.596	0.001**
Exercise Capacity (ml/O_2kg/min)	5.45 ± 1.07	9.89 ± 1.34	18.26	0.001**
PCS	47.01± 16.47	72.69 ± 22.77	-6.460	0.001**
MCS	58.03± 16.62	77.85 ± 14.63	-6.329	0.001**

SD: Standard deviation; PCS: Physical component score; MCS: Mental component score.

Table 4. Relationships among social support, exercise capacity and health-related quality of life of stroke survivors and healthy controls.

Variable	Social support		Exercise capacity	
	Stroke survivors r	Healthy controls r	Stroke survivors r	Healthy controls r
PCS	0.341*	-0.157	0.586**	0.503**
MCS	0.250	-0.092	0.292*	0.131
SSQoL	0.337*	_____	0.409**	_____
Social support	_____	_____	0.497**	-0.129

MCS: Mental component summary of Short Form (SF-36) Health Status Questionnaire; PCS: Physical component summary of Short Form (SF-36) Health Status Questionnaire; SSQoL: Stroke specific quality of life; r: Correlation coefficient; *significant correlation at p<0.05; **significant correlation at p<0.001.

DISCUSSION AND CONCLUSION

This study assessed social support, exercise capacity and health-related quality of life of stroke survivors attending some Nigerian tertiary hospitals, as well as comparing with apparently healthy controls. The result from this study demonstrated that the mean score of social support of stroke survivors was higher than that of the healthy controls. This is similar to finding of previous studies that individuals with chronic diseases are faced with high demand for support for performing certain activities (14-18). Since social support involves means by which necessary assistance is provided for an individual undergoing certain physical or emotional challenges (19); therefore, the difficulty faced by stroke survivors in performing daily activities optimally due to physical and psychological sequelae of stroke may be responsible for higher need for social support whereas the healthy population may have the ability to carry out daily activities without depending on families, friends or spouses.

The exercise capacity of stroke survivors, according to the findings of this study, was significantly lower than that of the healthy controls. This is consistent with findings of previous studies that reported lower exercise capacity among patients with stroke (20). The impact of stroke on musculoskeletal system, coordination and muscle functions make optimum walking to be difficult and compromised. Besides, the impact of stroke may encourage sedentary lifestyle and reduced participation in physical activity. Walking is a function of exercise capacity and is the extent to which body can utilize oxygen when performing activity. Therefore, it is expected that the apparently healthy individuals had higher level of exercise capacity because the rate of oxygen consumption is usually greater compared to individuals with stroke.

This study employed stroke specific quality of life (SSQoL) scale and the generic health-related quality of life (SF-36 health status) questionnaire. However, the generic SF-36 health status questionnaire was employed in the comparison of the health-related quality of life between the stroke survivors and controls. Findings from this study showed that the quality of life of stroke survivors is grossly affected in many domains of human life when compared with the healthy controls. This result is in line with the reports of previous studies that quality of life of stroke survivors is generally poor (21-24). The significant reduction of quality of life of stroke survivors may be due to the negative impact of stroke occurrence which is usually sudden incidence with consequent severe disability and confusion. Stroke is known to reduce an active person to becoming dependant because of severe loss of function and gross disabilities which may lead to reduction in quality of life.

Stroke incidence seems to affect quality of life of the survivors in more ways other than through loss or reduction in physical or social participation due to stroke-related disabilities (physical, psychological and social problems) as evidence has shown that stroke survivors with little or no post-stroke disability have reduced health-related quality of life (25). This calls for further research to deepen the understanding of the mechanisms by which stroke incidence affect the health-related quality of life of the survivors. It should be stated however, that reports have shown that quality of life is not restricted to functioning but also human experiences and subjective reactions to illness (26,27), which may vary from one stroke patient to another. In general, the findings of this study revealed significant lower physical and mental component summary scores of SF-36 health status questionnaire; and significant reduction in all the

eight domains of SF-36 health status questionnaire among the stroke survivors except in bodily pain domain.

In addition, this study explored the relationships among social support, exercise capacity and HRQoL. Findings from this study showed that significant relationships exist among social support, exercise capacity and HRQoL in patients with stroke. This finding corroborates finding of a previous study that patients with chronic diseases demonstrated significant relationships between social support and exercise capacity (28,29). Specifically, studies have shown significant relationships among social support, exercise/physical activity and HRQoL in individuals with neurological impairments including patients with multiple sclerosis (30-32), Parkinson's disease (33-35), and spinal cord injury (36-38). Similarly, another study showed that there were significant relationships between social support and the HRQoL of stroke survivors (39). One of the reasons that may be attributed to this finding could be as a result of psychological feelings of receiving support from family members or friends or spouse during this period. It is also possible that the psychological feeling encourages active lifestyle which in turn improves the exercise capacity. This is more compelling as this study showed that the significant relationships among these constructs seen in stroke survivors were not exactly replicated among the apparently healthy controls.

The findings of this study may have few potential limitations. Social support and HRQoL are said to be perceived differently based on many intrinsic and extrinsic factors, therefore the findings of this study may not be applicable to non-ambulatory stroke survivors and other non-similar socio-ecological contexts to the study settings. In addition, the relationships among social support, HRQoL and exercise capacity cannot be taken as absolute due to the cross-sectional design of this research. Therefore, a prospective study may be needed to consolidate our findings. Despite these potential limitations, this study showed significant differences in social support, HRQoL and exercise capacity between ambulant stroke survivors and healthy controls. Our findings also showed the possible intricate relationships among these constructs in patients with stroke.

As conclusion, Nigerian stroke survivors demonstrated higher social support, reduced exercise capacity and poor health-related quality of life compared with apparently healthy controls. Furthermore, there were significant relationships among social support, exercise capacity and health-related quality of life in patients with stroke, and not in apparently healthy controls except between exercise capacity and physical component of health-related quality of life.

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Ethics

Ethics Committee Approval: The study was approved by The Ethics and Research Committees of Obafemi Awolowo University Teaching Hospitals Complex (Number: ERC/2021/07/02, Date: 02.07.2021).

Informed Consent: The authors declared that informed consent was signed by the patients.

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