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Pain and Prescribed Exercise Parameters are Associated with Home-based Exercise Adherence Among Community-dwelling Stroke Survivors: A Multicenter Cross-sectional Study

Ağrı ve Reçete Edilen Egzersiz Parametreleri, Toplumda Yaşayan İnmeli Hastalarda Ev Temelli Egzersiz Uyumuyla İlişkilidir: Çok Merkezli Kesitsel Bir Çalışma

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Abstract

Objective: Adherence to a home-based exercise program (HEP) is important in the achievement of rehabilitation goals among stroke survivors. Earlier studies have measured adherence to HEPs among this population using non-specific outcome measures, which may not be suitable. In addition, the influence of prescribed exercise parameters on adherence remains unclear. This study assessed adherence to HEPs among stroke survivors using stroke-specific measures of adherence to HEP and determined its correlates.

Materials and Methods: This multicenter cross-sectional study involved 125 consenting Nigerian community-dwelling stroke survivors. Data on HEP adherence, prescribed exercise parameters, patients' attitudes, perceived/encountered barriers to exercise, stroke-related characteristics, and socio-demographics were assessed. Descriptive and inferential statistics were employed. A *P* value of <0.050 indicated statistical significance.

Results: The mean age of the participants was 60.26 ± 12.11 years. Findings showed that only approximately 35% of the participants were adherent to their HEP. Among the non-adherent group, 22% had no adherence and 43% had low adherence. The results indicated that stroke severity, pain during exercise, a number of prescribed exercises of ≥3, a number of weekly exercise sessions of ≥7, a duration of the exercise of ≥43 min, and exercise intensity of ≥5 on a 0–10 Borg's rate of perceived exertion scale were found to be related with non-adherence to the HEP ($P < 0.050$).

Conclusion: Adherence to HEPs among Nigerian community-dwelling stroke survivors is poor. HEP adherence is associated with stroke severity, pain, and the prescribed exercise parameters. This study highlights the need to consider exercise parameters in HEP prescription to enhance patient adherence.

Keywords: Adherence, home-based exercise, stroke, outcome measure, rehabilitation

Öz

Amaç: Ev tabanlı bir egzersiz programına (ETEP) uyum, inmeli hastalarda rehabilitasyon hedeflerine ulaşılmasında önemlidir. Daha önceki araştırmalar, uygun olmayabilecek spesifik olmayan sonuç ölçütleri kullanarak bu popülasyonda ETEP'lere uyumu ölçmüştür. Ek olarak, öngörülen egzersiz parametrelerinin uyum üzerindeki etkisi belirsizliğini korumaktadır. Bu çalışmada, inmeden sağ kalanlarda ETEP'lere uyum, inmeye özgü ETEP uyum ölçütlerini kullanarak değerlendirilmiştir ve ilişkiler belirlenmiştir.

Gereç ve Yöntem: Bu çok merkezli kesitsel çalışma, inme mağduru olan ve toplum içinde yaşayan Nijeryalı 125 kişiyi içermektedir. ETEP uyumu, önerilen egzersiz parametreleri, hastaların tutumları, egzersiz için algılanan/karşılaşılan engeller, inme ile ilgili özellikler ve sosyo-demografik veriler değerlendirildi. Tanımlayıcı ve çıkarımsal istatistikler kullanıldı. *P* değerinin 0,05'ten düşük olması istatistiksel anlamlılığı gösterdi.

Bulgular: Katılımcıların yaş ortalaması 60,26 ± 12,11 yıl idi. Bulgular, katılımcıların yalnızca yaklaşık %35'inin ETEP'lerine bağlı olduğunu gösterdi. Uyum sağlamayan grubun %22'sinde hiç uyum yoktu ve %43'ünde düşük uyum vardı. Sonuçlar inme şiddeti, egzersiz sırasında ağrı, reçete edilen egzersiz sayısının ≥3 olması, haftalık egzersiz seanslarının sayısının ≥7 olması, egzersiz süresinin ≥43 dakika olması ve 0-10 puan üzerinden değerlendirilen Borg'un algılanan efor ölçeği oranı skalasında egzersiz yoğunluğunun ≥5 olması ETEP'ye uyumsuzluk ile ilişkili bulundu ($P < 0,050$).

Sonuç: Nijeryalı toplulukta yaşayan inme mağdurları arasında ETEP'lere uyum zayıftır. ETEP uyumu inme şiddeti, ağrı ve öngörülen egzersiz parametreleri ile ilişkilidir. Bu çalışma, hasta uyumunu artırmak için ETEP reçetesinde egzersiz parametrelerini dikkate alma ihtiyacını vurgulamaktadır.

Anahtar Kelimeler: Uyum, ev temelli egzersiz, inme, sonuç ölçütü, rehabilitasyon

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Introduction

Stroke is one of the main causes of disability globally (1) and usually requires long-term rehabilitation (2). Stroke patients receive medical rehabilitation while admitted to the hospital; however, many stroke survivors do not attain full functional independence by discharge (3). Although some rehabilitation centers offer exercise programs for stroke survivors, these centers are minimal in developing countries (4). Access to these centers is also limited in developed countries (5). Moreover, in developing countries, particularly Nigeria, many stroke survivors depend primarily on the relatively inadequate outpatient appointments provided at public hospitals, which are usually insufficient to meet their health demands. Therefore, prescribed home-based exercise programs (HEPs) have grown in popularity (6). The effectiveness of HEPs has been described and proven in many studies (7,8,9,10,11). However, a patient's adherence to a prescribed HEP is considered vital to achieving successful rehabilitation outcomes (12).

Adherence has been described as a complex phenomenon, and its accurate assessment reportedly is difficult, especially for stroke survivors (12,13). In addition, the available measures of HEP adherence among stroke survivors are primarily designed for other disease populations–not stroke survivors (12). Evidence has shown that HEP adherence in stroke survivors is influenced by stroke-specific factors that may not be captured by an adherence scale meant for other disease populations (12). Moreover, the outcome measure often deployed in assessing adherence to HEPs among stroke survivors is self-report questionnaires (14), a one-time measurement where patients recall and fill in the details of their previous HEP without considering any exercise parameters. Adherence to an exercise program should include some measures of duration, frequency, intensity, and correct performance of movements (15). Recently, Mahmood et al. (12) developed a 13-item self-administered stroke-specific measure of adherence to home-based exercise (SS-MAHE) for measuring adherence to HEPs after a stroke and tested its reliability.

Knowledge of the rate and correlates of HEP adherence among stroke survivors may help health professionals develop effective strategies to improve HEP adherence in stroke survivors. Several studies have investigated HEP adherence among stroke survivors (16,17,18); unfortunately, the rate of HEP adherence among stroke survivors reported in the literature has been questioned due to the tools that were employed (12). This scenario may hamper effective HEP planning for stroke survivors. Thus, there is a need to have updated data on the rate of HEP adherence among stroke survivors using an adherence scale specific to stroke. To the authors' knowledge, only one study to date has employed stroke-specific measures of HEP adherence (12). In addition, evidence has shown that the number of prescribed exercises may influence HEP adherence (19,20,21). However, information about the influence of prescribed exercise parameters on HEP adherence in stroke patients is sparse.

This study aims to assess HEP adherence rates using the SS-MAHE, and it investigates the factors associated with HEP adherence, especially the prescribed exercise parameters (number of exercises, number of sessions, duration of exercise, intensity of exercise, and time of prescription), among Nigerian community-dwelling stroke survivors.

Materials and Methods

Participants

Participants in this multicenter cross-sectional study were community-dwelling stroke survivors recruited from the physiotherapy outpatient clinics of four Nigerian tertiary hospitals including Bowen University Teaching Hospital; Ladoke Akintola University of Technology Teaching Hospital, Ogbomoso; State Specialist Hospital; and Osun State University Teaching Hospital, Osogbo. Included in this study were stroke survivors who were discharged from the hospital stroke unit/ward at least one month before this study, must have been prescribed a protocol for a HEP, and were able to comprehend instructions. However, stroke survivors with other neurological, psychiatric, or disabling musculoskeletal conditions unrelated to stroke, who were aphasic, and those who had cognitive impairment with more than one or two errors on the short portable mental status questionnaire were excluded. Using the Kasiulevicius et al. (22) sample-size formula for a cross-sectional study with a 95% confidence level, 0.05 precision level, and estimated 10% pre-study estimate of stroke proportion, 125 patients were sampled. Thus, a total of 125 community-dwelling stroke survivors were consecutively recruited between February and October 2022. The Ethical Review Board of Bowen University Teaching Hospital, Ogbomoso approved this study (BUTH/REC-341). Furthermore, written informed consent was obtained from all participants.

Assessment of Home-based Exercise Adherence

The SS-MAHE was used to assess adherence to HEPs among the participants. The SS-MAHE is a 13-item self-administered questionnaire for measuring adherence to home-based exercise after a stroke, with adequate reliability and internal consistency, having an inter-rater reliability score of 0.81 and a Cronbach's alpha of 0.89 (12). Among other measures of adherence to exercise, the SS-MAHE is specific to stroke, easy to use, requires less time to fill, and can be easily understood by the participants. The SS-MAHE considers exercise adherence the same as defined by the World Health Organization (WHO): comparing prescribed exercises as recalled by the participants to the actual exercises performed at home. The level of adherence is categorized as no adherence (participants did not adhere to any of the prescribed home-based exercises), low adherence (≤70% adherence to the prescribed dose of home-based exercises), and high adherence (>70% adherence to the prescribed dose of home-based exercises). Furthermore, participants with good adherence levels were categorized as the adherent group, while those with no and low adherence levels were categorized as the non-adherent group (12).

Assessment of Prescribed Home-based Exercise Parameters

The parameters of the prescribed home-based exercises, including the time since discharge, the type of exercises, the number of exercises, the number of weekly sessions, the duration of exercise, and the intensity of the exercises, were assessed. The participants were asked to rate the prescribed exercise intensity on a 0–10 scale of Borg's rate of perceived exertion (RPE) (23).

Assessment of stroke-related Characteristics

The stroke-related characteristics of the participants, including stroke laterality, stroke type, functional independence, stroke severity, and stroke duration, were assessed. The functional independence of the participants was evaluated by the modified Barthel index (mBI). The mBI has a maximum score of 100, with a higher score indicating higher functional abilities. In this study, participants with an mBI score of >60 were deemed independent in activities of daily living (24,25,26). The mBI is well-validated among stroke survivors in assessing functional abilities (25). The severity of the stroke was obtained using the National Institutes of Health Stroke Scale (NIHSS). The NIHSS measures neurological impairment following a stroke incident. The NIHSS has excellent psychometric properties in assessing stroke severity, and it is useful in predicting patient outcomes (27). The maximum NIHSS score is 42, and by using the total NIHSS score, the participants' stroke severity was categorized as minor (1–4), moderate (5–15), moderate severe (16–20), and severe (21–42) (28). Stroke duration was classified as early sub-acute (≤3 months), late sub-acute (>3 or ≤6 months), and chronic (>6 months) (29).

Assessment of Patients' Attitudes and Perceived/ Encountered Barriers to Exercise

The patients' attitudes and perceived/encountered barriers to exercise, an important component of the psychometric characteristics of adherence measure, were measured by a validated 12-item scale questionnaire (30). This instrument has four factors relating to patients' attitudes and barriers to exercise: discomfort, barriers, helplessness, and dependence (30). Some of the items in the questionnaire include "the exercises are difficult", "the exercises are painful", and "I can do little by myself'. The items are scored on a four-point scale: 1 ("agree"), 2 ("strongly agree"), 3 ("strongly disagree"), and 4 ("disagree"). The options were dichotomized for the purpose of analysis in this study. The options "agree" and "strongly agree" were collapsed and recoded as "yes," and "strongly disagree" and "disagree" were recorded as "no".

Socio-demographic Characteristics

The socio-demographic information of the participants, including age, gender, marital status, income level, employment, and education status, was obtained with a self-developed proforma. Income was categorized as low or high based on Nigerian minimum wage, while education up to the university level was considered high. Any education lower than that was considered low education.

Statistical Analysis

The descriptive statistics of frequency, percentage, mean, and standard deviation were used to summarize the data. The independent t-test and chi-square test of association were used to investigate the differences in the adherent and non-adherent groups. The alpha level was set at $P < 0.050$. Data analysis was conducted with SPSS software version 21.0 (SPSS Inc., Chicago, Illinois, USA).

Results

The mean age of the participants was 60.26 ± 12.11 years, and 88 patients (66.4%) were male. Findings showed that only about 35% of the participants were adherent to their HEPs. Among the non-adherent group, 22% did not adhere at all to the prescribed HEP, and 43% had low adherence (Figures 1, 2). The results of the Chi-square test of association of the adherent status of the participants with the categorical variables including socio-demographics, stroke-related characteristics, and the patients' attitudes and perceived/ encountered barriers to exercise are presented in Tables 1 and 2. The results indicated that there was a significant association between the adherent status of the participants and stroke severity (χ^2: 11.622; $P = 0.003$) and pain during exercise (χ^2: 9.259; $P = 0.002$). Table 3 shows the results of the independent t-test showing the difference in adherence status with respect to the prescribed exercise parameters. The results demonstrate that each of the prescribed number of exercises (t = 2.853; $P = 0.005$), number of weekly sessions (t = 5.261; $P < 0.001$), duration of exercise (t = 2.035; $P = 0.044$), and exercise intensity (t = 4.141; $P < 0.001$) was significantly higher for the non-adherent group.

Discussion

This study assessed adherence to HEPs among Nigerian stroke survivors using the SS-MAHE. It also investigated the correlates

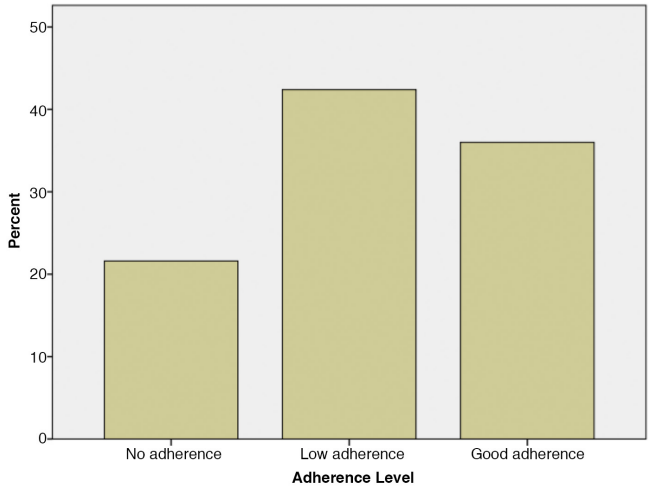

Figure 1. Bar chart showing the adherence level of the participants

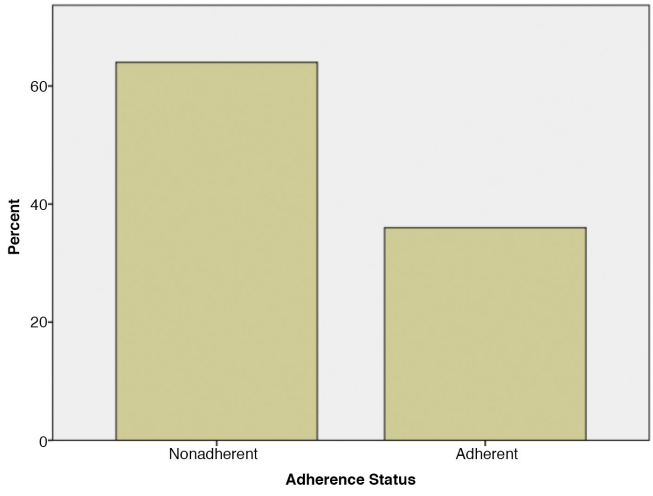

Figure 2. Bar chart showing the adherence status of the participants

of HEPs among stroke survivors, especially the influence of the prescribed HEP parameters on adherence. The results showed that there was a high rate of non-adherence to HEPs among Nigerian stroke survivors. Poor adherence to HEPs among stroke survivors was associated with stroke severity, pain, and the parameters of the prescribed HEP including the number, session, duration, and intensity of the prescribed exercises.

This study's findings showed that only 35% of stroke survivors were adherent to their HEP. This is like the findings from Mahmood et al. (12) (28%) who investigated the prevalence of HEP adherence among 92 Indian community-dwelling stroke survivors. In contrast, some studies, including Ogwumike et al. (16) (55.8%), Miller et al. (17) (63.5%), and Babbar et al. (18) (63.5%), reported a higher rate of adherence to HEPs among stroke survivors. This disparity may be because these studies employed a non-specific MAHE among stroke survivors. This discrepancy in adherence rates seems apparent as only this current study and that of Mahmood et al. (12) presented similar rates of HEP adherence among stroke survivors. This may be because these two studies employed stroke-specific measures of HEP adherence. Literature has described the rate of HEP adherence by stroke survivors as poor; however, data from the present study and from Mahmood et al. (12) indicated that the rate of HEP adherence in stroke patients may be even poorer than what was previously reported. These findings suggest an apparent overestimation of HEP adherence among this cohort in the literature, possibly due to the use of a non-specific adherence scale and/or non-consideration of exercise adherence based on the WHO's definition.

In this study, the results showed that poor HEP adherence in stroke survivors was associated with the prescribed exercise parameters. Specifically, the following parameters were associated with non-adherence: a prescribed number of exercises of ≥3, a number of weekly exercise sessions of ≥7, a duration of exercise ≥43 min, and an exercise intensity RPE of ≥5 (0–10 scale). Exercise prescriptions for stroke survivors are said to be similar to medication prescriptions in that dose is imperative (31). This describes the importance of exercise parameters such as type of exercise, number of sessions, duration of exercise, and exercise intensity. Some researchers have recommended intensive task-specific exercises for more than 45 min a day and two to five days a week for motor recovery after stroke (2,32). However, the American Heart Association/American Stroke Association (AHA/ASA) recommends 20–60 min per session, for 3–5 days per week, and an intensity of RPE 11–14 (6–20 scale) (31). Meanwhile, previous studies of service members (19), elderly patients (20), and patients with back and neck pain (21) have

Table 1. Association between the adherent status of the participants with socio-demographic and stroke-related characteristics (n = 125)

Variable		Adherent n (%)	Non-adherent n (%)	χ^2	*P* value
Gender	M F	37 (82.2) 8 (17.8)	69 (86.3) 11 (13.7)	0.362	0.547
Age group (years)	≤64 ≥65	32 (71.1) 13 (28.9)	46 (57.5) 34 (42.5)	2.274	0.132
Employment	Employed Unemployed	28 (62.2) 17 (37.8)	58 (72.5) 22 (27.5)	1.417	0.234
Education	Low High	30 (66.7) 15 (33.3)	54 (67.5) 26 (32.5)	0.009	0.924
Marital status	Married Single†	37 (82.2) 8 (17.8)	69 (86.3) 11 (13.7)	0.362	0.547
Income level	Low High	14 (31.1) 31 (68.9)	24 (30.0) 56 (70.0)	0.017	0.897
Type of stroke	Ischemic Hemorrhagic	34 (75.6) 11 (24.4)	59 (73.8) 21 (26.2)	0.049	0.824
Laterality	Right Left	22 (48.9) 23 (51.1)	44 (55.0) 36 (45.0)	0.432	0.511
Stroke duration	Early sub-acute Late sub-acute Chronic	13 (28.9) 11 (24.4) 21 (46.7)	18 (22.5) 18 (22.5) 44 (55.0)	0.906	0.636
Stroke severity	Minor Moderate Moderate severe Severe	22 (48.9) 23 (51.1) 0 (0.0) 0 (0.0)	59 (73.8) 18 (22.5) 3 (3.8) 0 (0.0)	11.622	0.003*
Activities of daily living	Dependent Independent	7 (15.6) 38 (84.4)	11 (13.8) 69 (86.2)	0.076	0.783

*Indicates significant association at $P < 0.050$, †Included the unmarried, divorced, separated, and widowed participants. n: frequency; %: percentage; χ^2: Chi-square, M: Male, F: Female

Table 2. Association between the patients' attitudes and perceived/encountered barriers to exercise with adherent status (n = 125)

Variable	Adherent n (%)	Non-adherent n (%)	χ^2	*P* value
I get tired from exercising				
Yes	25 (55.6)	36 (45.0)	1.284	0.257
No	20 (44.4)	44 (55.0)		
The exercises are difficult				
Yes	19 (42.2)	22 (27.5)	2.832	0.092
No	26 (57.8)	58 (72.5)		
The exercises are painful				
Yes	19 (42.2)	56 (70.0)	9.259	0.002*
No	26 (57.8)	24 (40.0)		
I have too little time				
Yes	9 (20.0)	8 (10.0)	2.451	0.117
No	36 (80.0)	72 (90.0)		
Exercises do not fit daily routine				
Yes	9 (20.0)	15 (18.8)	0.029	0.865
No	36 (80.0)	65 (81.2)		
I often forget to exercise				
Yes	10 (22.2)	16 (20.0)	0.086	0.769
No	35 (77.8)	64 (80.0)		
I cannot afford to exercise				
Yes	2 (4.4)	2 (2.5)	0.352	0.553
No	43 (95.6)	78 (97.5)		
Exercising will not help much				
Yes	6 (13.3)	6 (7.5)	1.129	0.288
No	39 (86.7)	74 (92.5)		
I can do little by myself				
Yes	17 (37.8)	23 (28.8)	1.079	0.299
No	28 (62.2)	57 (71.3)		
Recovery depends on the therapist				
Yes	25 (55.6)	56 (70.0)	2.634	0.105
No	20 (44.4)	24 (30.0)		
The therapist is more important				
Yes	34 (75.6)	66 (82.6)	1.375	0.503
No	11 (24.4)	14 (17.4)		
My complaints will disappear without exercising				
Yes	3 (6.7)	5 (6.3)	0.008	0.927
No	42 (93.3)	75 (93.7)		

*Indicates significant association at $P < 0.050$. n: frequency, %: percentage, χ^2: Chi-square

Table 3. Differences in exercise parameters between the adherent and non-adherent groups

Variable	Adherent $\overline{X}$ ± SD	Non-adherent $\overline{X}$ + SD	t-test	*P* value
Time of exercise prescription (weeks)	1.47 ± 2.02	1.97 ± 2.63	1.101	0.273
Number of exercises	2.36 ± 1.44	3.04 ± 0.92	2.853	0.005*
Number of sessions	4.01 ± 3.49	7.07 ± 2.29	5.261	$P < 0.001$*
Duration of exercise (min)	30.47 ± 34.68	43.82 ± 36.08	2.035	0.044*
Exercise intensity (RPE)†	3.72 ± 3.31	5.84 ± 2.02	4.141	$P < 0.001$*

*Indicates significant difference, †0–10 category of Borg's rate of perceived exertion scale. $\overline{X}$: Mean, SD: Standard deviation, RPE: Rate of perceived exertion

shown that the number of exercises is associated with adherence to home-based exercise. Henry et al. (20) showed that elderly patients adhere better to two exercises rather than five, while patients with back and neck pain have better adherence to three to six exercises (21). Eckard et al. (19) reported that service members have a higher adherence rate to their HEPs when two or fewer exercises are prescribed, compared with four or more, suggesting that the higher the number of exercises prescribed, the lesser the HEP adherence rate of adherence. This is similar to the findings of this study. The number of prescribed weekly exercise sessions among the non-adherent stroke survivors was higher than the recommendations for weekly exercise sessions. This study's authors opined that the prescription of a higher number of exercises was responsible for the higher number of weekly exercise sessions patients are required to complete at home. Similarly, in this study, patients whose prescribed exercise intensity exceeded a moderate level were non-adherent to their HEP. The exercise intensity recommended for stroke survivors is RPE 11–14 on a 6–20 Borg's scale (31), which is comparable to the RPE 3–4 (moderate intensity) on a 0–10 Borg's scale found for the adherent group in this study. The prescribed high number of exercises, sessions, and intensity may have overwhelmed the stroke survivors, and coupled with easy fatigability often seen in stroke patients (33), might have contributed to poor HEP adherence. Mahmood et al. (12) reported deficiencies in the parameters of the prescribed HEPs for stroke survivors among physiotherapists in India. They suggested that health professionals may be contributing to the high rate of non-adherence to HEPs among stroke survivors through their exercise prescriptions (12). Therefore, clinicians may improve HEP adherence in this cohort through the correct application of recommended exercise prescriptions in stroke patients.

A closer look at the duration of exercise prescribed showed that it was within the recommended parameters, and yet, most of the stroke survivors did not adhere to their HEPs. In this study, an exercise duration of ≥43 min, which is within the recommended ≥45 min (2, 32) and 20–60 min (31), was associated with non-adherence, indicating that the parameters of the exercise prescription recommended for stroke survivors in the literature may not totally apply to HEPs. There may be a need to consider many associated factors with home exercise, including the patient's clinical conditions, caregivers, environments, socio-demographics, self-efficacy, and psychosocial issues, before prescribing HEP parameters for stroke survivors. Thus, there may be a need for the formulation of separate exercise prescription guidelines for HEPs following stroke. Furthermore, clinicians may need to perform graded or submaximal exercise testing prior to prescription and should endeavor to individualize the prescription of the HEP to the stroke survivors based on clinical and non-clinical factors. The AHA/ASA guidelines recognize the importance of variation in exercise prescriptions for stroke survivors (31). Reports have also shown that factors associated with HEP adherence among stroke survivors are multifaceted and include many intrinsic and extrinsic factors, including caregiver-related issues (3,26).

This study identified a strong association between stroke severity and adherence to home-based exercise, suggesting that the higher the severity of the stroke, the lesser the rate of adherence. Participation in exercise and physical activity is said to be influenced by a wide range of clinical factors, including stroke severity (31); therefore, more attention should be placed on the severity of the stroke in prescribing HEPs to improve adherence. Stroke severity is linked to the level of functional independence of stroke survivors. Previously, researchers have pointed out that stroke survivors with a high level of functional dependence often depend on their caregivers to perform their HEP; this has been found to influence adherence rates (3,26). Furthermore, in this study, pain during exercise was associated with poor adherence to HEPs. Pain has been identified as the most common physical symptom reported by caregivers of stroke survivors as a barrier to HEP adherence (26). This is consistent with previous studies that have identified pain as a barrier to HEPs in stroke patients (17,18,34). Pain after a stroke episode is common, debilitating, compromises rehabilitation outcomes, and can persist up to five years after a stroke (35,36). Despite its negative effect on stroke clinical outcomes, post-stroke pain (PSP) is often under-reported, under-diagnosed, and under-treated in rehabilitation (35,36).

It can be inferred from the results of this study that pain interfered with HEP adherence because patients with PSP had low HEP adherence. This is not unexpected as pain has been reported to hinder the rehabilitation process and outcomes. Pain during exercise is said to arise mainly from the presence of spasticity, sensory disturbance, and joint stiffness in patients with stroke (16,37), not necessarily the exercise itself. In fact, recent reviews and expert opinions have provided evidence that exercise helps in reducing PSP (38,39). However, despite the benefits of exercise for PSP, clinicians may need to streamline home-based exercise prescriptions for stroke survivors with PSP to enhance HEP adherence. Ademoyegun et al. (26) recommended incorporating cognitive behavior model strategies and ensuring graded exercise that increases over time when prescribing HEPs for stroke survivors with PSP.

Although this study employed well-validated tools, their self-reporting nature may introduce reporting bias, memory lapses, and social desirability, which may serve as limitations. In addition, this study did not investigate the impact of the type of exercise prescribed on the rate of adherence. However, a previous study reported no significant association between the type of exercise and HEP adherence (19). Finally, the associations found in this study cannot be taken as cause and effect because this is a cross-sectional study. Prospective studies may be needed to consolidate this study's findings.

Conclusion

The rate of adherence to HEPs among Nigerian community-dwelling stroke survivors is poor. Poor HEP adherence is associated with stroke severity, pain, and prescribed exercise parameters. This study highlights the importance of streamlining exercise dosage when prescribing HEPs to stroke survivors to facilitate adherence.

Ethics

Ethics Committee Approval: The Ethical Review Board of Bowen University Teaching Hospital, Ogbomoso approved this study (BUTH/REC-341).

Informed Consent: Written informed consent was obtained from all participants.

Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: A.B.A., A.G.I., Concept: A.B.A., A.G.I., Data Collection or Processing: A.B.A., A.G.I., Analysis or Interpretation: A.B.A., A.G.I., Literature Search: A.B.A., A.G.I., Writing: A.B.A., A.G.I.

Conflict of Interest: No conflict of interest was declared by the authors.

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