



Adherence to Home Exercise Programmes and its Associated Factors among Patients Receiving Physiotherapy

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Abstract

Objective: Home exercise programmes (HEPs) ensure the enhancement of therapeutic gains and enable patients assume responsibility for managing their conditions. This study investigated patients' adherence to HEPs, determined its association with their personal characteristics and identified factors influencing their engagement.

Methods: A cross-sectional design was used to recruit 139 consenting patients who completed self-report questionnaires. Data were analysed via descriptive and inferential statistics.

Results: Most participants, 105 (75.5%) were non-adherent to HEPs whilst 34 (24.5%) were adherent. HEP adherence had significant associations with age ($p < 0.001$), sex ($p = 0.001$) and educational status ($p = 0.048$). There were significant negative relationships ($p < 0.05$) between HEP adherence and these influential factors; fatigue, forgetfulness, pain, deeming exercises as injurious, exercises perceived as less beneficial and need for physical assistance. A significant positive relationship ($p = 0.038$) between HEP adherence and family/ friend support was also established.

Conclusion: Adherence to HEPs was revealed to be poor in this study. Older, female and less/uneducated patients displayed a high tendency of non-adherence. Several factors which exhibited patients' challenges were revealed to have substantial negative influences on their HEP adherence. Social support from patients' family/friends was linked to facilitating HEP adherence.

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Introduction

Physiotherapy offers patients a range of treatment options, which include exercise as a core component of rehabilitation. Evidence exist on the effectiveness of exercises used by physiotherapists in the management of various conditions (1-5). Such exercises need to be properly designed and executed to ensure their provision of health benefits (6). These gains significantly depend on sustained participation, hence a home exercise programme (HEP) is prescribed as a fundamental part of physiotherapy management (7).

Home exercise programmes aid patients to assume responsibility for managing their conditions as this ensures the maintenance of functional gains and continual progress (8). Executing prescribed exercises is considered vital to attaining positive

rehabilitation outcomes (9). However, there must be a change in lifestyle to include regular exercise in order to reap its benefits and ensure adherence (7).

The extent to which patients adhere to HEPs is considered to be partly responsible for the success of many physiotherapy programmes (10;11). Adherence to prescribed exercises has been associated with improved treatment outcomes of physical performance and functional ability (12). In contrast, patients who do not adhere to HEPs have exhibited reduced positive outcomes (13). Furthermore, non-adherence has been reported as a reason for physiotherapists to unnecessarily alter treatment programmes by believing that they are ineffective (13;14). Research reveals that patients' HEP adherence rates are not as high as many physiotherapists would have preferred



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(15;16), and studies show that less than 40% of patients fully adhere to HEPs (17-19). This denotes a general poor adherence to HEPs, which has been emphasised by other authors (11;20;21). Fortunately, efforts are being made to address this issue as current reviews offer evidence of associated factors (7;16) and strategies to improve HEP adherence (22).

The problem of non-adherence to HEPs extends to Nigeria, as researchers have highlighted its significant rates and contributory factors (23;24). However, there is a dearth of relevant literature in the country and this prompts the need for more data. Such information would enhance a deeper understanding of this predicament as it pertains to the local environment in order to improve adherence and ultimately, recovery. Therefore, this study sought to investigate patients' adherence to HEPs, determine its association with their personal characteristics and identify factors influencing their engagement.

Methods

Research design

A cross-sectional design was utilised for this study. Participants were recruited via purposive sampling in 3 prominent hospitals in Enugu, Nigeria. These comprise University of Nigeria Teaching Hospital, Enugu State University Teaching Hospital and Nigeria Army Reference Hospital. Patients, receiving outpatient physiotherapy services, were identified from the departmental register in each hospital and screened to determine their eligibility to participate. Ethical approval was obtained from the research/ethics committee of the selected hospitals as well as permission from the head of each physiotherapy department before the start of the study.

Participants

A total of 139 patients undergoing physiotherapy management, aged between 16 and 75 years participated in the study. Participants receiving a minimal of one week treatment including a HEP prescription were selected. Patients who had deficits in their memory, understanding and communication were excluded alongside those with diagnosed psychological problems. The patients were educated about the study objectives and procedure for data collection: highlighting voluntary and anonymous involvement. Informed consent was duly obtained from all participants.

Instrument

A three section, self-report questionnaire was developed for this study based on previous research on adherence

to HEPs (8;17;18;23-26). The first section collected the participants' personal characteristics: age, sex, marital and educational statuses. The second section assessed each patient's adherence to the HEP prescribed as part of physiotherapy treatment. Four questions based on each principle of exercise: frequency, intensity, time and type were utilised. Each question addressed the participant's performance of the exercise(s) that was prescribed and sought a single response on a four-point scale: 'Always', 'Often', 'Rarely' and 'Never' respectively. These responses were weighted in percentage; with 'Always' at 100%, 'Often' at 66%, 'Rarely' at 33% and 'Never' at 0%. The total score for the four responses was calculated for each participant and divided by 4 to get the average. Mean scores from 70 – 100% were regarded as adherence whilst those below this range indicated non-adherence. The last section addressed influential factors that determine their adherence to HEPs. To examine factors with a potential influence on adherence, an instrument used in Sluijs et al. (17) was adapted to the study. 12 questions indicating these factors were used and participants identified the relevance of each to their HEP engagement rated on a four-point scale, from strongly agree to strongly disagree. An internal consistency test for these 12 questions on all participants, yielded a high Cronbach's alpha value of 0.76; indicating an acceptable reliability of their assessment of relevant influential factors in this study.

Procedure

The developed questionnaire was vetted and corrected by six physiotherapists (engaged in both HEP prescription and exercise research) to improve the relevance of its content. A pilot study involving 8 eligible patients was conducted and in their feedback, they stated that using common words in clear and understandable sentences would improve the questionnaire. The 8 patients were interviewed within 3 days and their verbal responses supported their initial feedback, which confirmed its reliability. Subsequently, the above mentioned physiotherapists agreed that the improved questionnaire was in line with the study objectives. Duplicates were given to the participants who immediately completed and returned them to the researchers. Information were meticulously extracted and kept confidential.

Data analysis

The data obtained were analysed with the SPSS Software version 23 for Windows (IBM, Chicago, IL, USA). Adherence to HEPs and personal characteristics of the participants were presented descriptively in tabular form by using percentage frequencies. Association



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between personal characteristics and adherence to HEPs was examined using Chi-square test. Binary logistic regression (BLR) analysis was used to ascertain the relationship between adherence to HEPs and influential factors. This analysis was adjusted for the influential factors, as they were all entered together. The BLR model was appropriately evaluated for its effectiveness. The level of significance was set at $p < 0.05$ for all tests and BLR analysis.

Results

Participants' characteristics and their adherence to HEPs

139 patients who were receiving outpatient physiotherapy services in hospitals in Enugu metropolis participated in this study. Table 1 shows the demographic profile of the participants; 77 men (55.4%) and 62 women (44.6%); most within the age group 36–55 years (54%). 117 participants (84.2%) were married and 76 (54.7%) had up to a secondary school education. It further reveals 34 (24.5%) participants were adherent to HEPs.

Association between personal characteristics and adherence to HEPs

The association between the participants' characteristics and their adherence to HEPs is presented in Table 2. A significant association existed between decreased adherence and advancing age ($p < 0.001$). Adherence to HEPs was highest (61.5%) in those aged 16–35 years and lowest (10.5%) in those aged 56–75 years. A significant association was also observed between gender and adherence to HEPs ($p = 0.001$). Notably, 27 (35.1%)

Table 1. Demographic characteristics and adherence of participants

| Participants' characteristics and their adherence to HEPs | |
|---|------------------|
| Age (years) | |
| 16–35 | 26 (18.7) |
| 36–55 | 75 (54.0) |
| 56–75 | 38 (27.3) |
| Sex | |
| Female | 62 (44.6) |
| Male | 77 (55.4) |
| Marital status | |
| Single | 15 (10.8) |
| Married | 117 (84.2) |
| Widowed or Separated | 7 (05.0) |
| Educational status | |
| No formal education | 3 (02.1) |
| Primary | 8 (05.8) |
| Secondary | 76 (54.7) |
| Tertiary | 52 (37.4) |
| Adherence to HEPs | |
| Adherent | 34 (24.5) |
| Non adherent | 105 (75.5) |
| Total | 139 (100) |

Data are presented as n (%)

men were adherent while 7 (11.3%) women adhered to HEPs. In contrast, there was no significant association between the participants' marital status and adherence to HEPs ($p = 0.120$). A significant association was observed between adherence to HEPs and improved educational status ($p = 0.048$). For patients with no formal education or only primary education, no adherence (0%) were reported, while 25 (32.9%) of secondary school graduates were adherent.

Table 2. Association between personal characteristics and adherence to HEPs

| Personal characteristics | Adherent | Non adherent | χ^2 | p-value |
|---------------------------|-----------|--------------|----------|---------|
| Age (years) | | | | |
| 16–35 | 16 (61.5) | 10 (38.5) | 24.701 | 0.000* |
| 36–55 | 14 (18.7) | 61 (81.3) | | |
| 56–75 | 4 (10.5) | 34 (89.5) | | |
| Sex | | | | |
| Female | 7 (11.3) | 55 (88.7) | 10.506 | 0.001* |
| Male | 27 (35.1) | 50 (64.9) | | |
| Marital status | | | | |
| Single | 6 (40.0) | 9 (60.0) | 4.245 | 0.120 |
| Married | 28 (23.9) | 89 (76.1) | | |
| Widowed or Separated | 0 (00.0) | 7 (100.0) | | |
| Educational status | | | | |
| No formal education | 0 (00.0) | 3 (100.0) | 7.928 | 0.048* |
| Primary | 0 (00.0) | 8 (100.0) | | |
| Secondary | 25 (32.9) | 51 (67.1) | | |
| Tertiary | 9 (17.3) | 43 (82.7) | | |

Data are presented as n (%)

* Indicates statistical significance ($p < 0.05$)



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Evaluation of the BLR model

Table 3 shows that the model correctly classified most of the cases, which demonstrates its high prediction accuracy (sensitivity=70.6%, specificity=99%, positive prediction=96.0% and negative prediction=91.2%). This model also provided a good fit to the data, as it showed statistical significance ($p < 0.001$). The complementary Hosmer & Lemeshow test was insignificant ($p = 0.339$).

Table 3. Evaluation of the Binary Logistic Regression Model

| Adherence status classification ^a | | | |
|--|-----------------|--------------|-----------|
| Observed cases | Predicted cases | | Correct % |
| | Adherent | Non adherent | |
| Adherent | 24 | 10 | 70.6 |
| Non adherent | 1 | 104 | 99.0 |
| Positive prediction value | | 96.0 | |
| Negative prediction value | | 91.2 | |
| Test for significance | | | |
| Omnibus (Model) | 62.873 | 0.000* | |
| Hosmer & Lemeshow | 9.036 | 0.339 | |

^a The cut value is 0.5

* Indicates statistical significance ($p < 0.05$)

Relationship between influential factors and adherence to HEPs

Presented in Table 4, BLR analysis showed that there were significant negative relationships ($p < 0.05$) between adherence to HEPs and the influential factors; 'fatigue', 'forgetfulness', 'exercise is painful', 'exercise can cause injury', 'exercise is not very beneficial' and 'need for

physical assistance'. It also showed that there was a significant positive relationship ($p = 0.038$) between adherence to HEPs and the influential factor; 'family/friend support'. Notably, patients were 4.75 times more likely to adhere to HEPs when they receive this support to perform home exercises. Conversely, there were no significant relationships ($p > 0.05$) between adherence to HEPs and other influential factors like 'limited time', 'exercise is hard', 'exercise is boring', 'exercise does not fit daily routine' and 'need for physiotherapist's presence'.

Discussion

Adherence to HEPs

Approximately a quarter of the patients in our study were adherent to HEPs (34/139), which corresponds to a study by Adeniyi and Zandam where 25.9% of physiotherapy patients adhered to HEPs (24). This original study supports our finding by revealing that poor adherence to HEPs prevails in our communities. However, another study reported a higher adherence rate of 55.8% amongst similar patients (23). This difference might be due to a variation in study methods; as patients had to rate their level of adherence each week. This process might have influenced some patients' engagement, for it has been mentioned that certain procedures can boost adherence as they remind patients to perform their HEPs (27).

An adherence rate of 24.5% in this study contradicts the results of previous studies which showed different adherence rates. Sluijs et al. noted that 35% of physiotherapy patients fully adhered to HEPs (17) whilst Chan and Can reported this fully adherent rate in

Table 4. Relationship between influential factors and adherence to HEPs

| Factor | B | Wald | p | Exp (B) ^a |
|--------------------------------------|--------|--------|--------|----------------------|
| Fatigue | -5.156 | 9.946 | 0.002* | 0.006 |
| Limited time | -2.062 | 3.249 | 0.071 | 0.127 |
| Forgetfulness | -3.735 | 13.304 | 0.000* | 0.024 |
| Family/friend support | 1.558 | 4.005 | 0.038* | 4.751 |
| Exercise is hard | -0.366 | 0.299 | 0.584 | 0.694 |
| Exercise is boring | -0.494 | 0.974 | 0.324 | 0.610 |
| Exercise is painful | -2.853 | 15.038 | 0.000* | 0.058 |
| Exercise can cause injury | -3.292 | 4.988 | 0.026* | 0.037 |
| Exercise is not very beneficial | -1.614 | 4.685 | 0.030* | 0.199 |
| Exercise does not fit daily routine | -1.084 | 0.829 | 0.362 | 0.338 |
| Need for physical assistance | -3.009 | 15.204 | 0.000* | 0.049 |
| Need for physiotherapist's presence. | -0.492 | 1.193 | 0.275 | 0.611 |

^a Represents the adjusted odds ratio

* Indicates statistical significance ($p < 0.05$)



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similar patients to be 39% (18). These rates would rise above 70% in both studies, when the patients' good/ rather regular performances of HEPs are included. However, the increase in adherence to HEP for their participants remains unsatisfactory, as this denotes partial adherence, which reflects an aspect of non-adherence. Overall, our finding reveals significant poor adherence to HEPs amongst physiotherapy patients, which has also been identified by other authors (11;19-21).

Association with age

The results of this study revealed a decline in the adherence of older adults, as they were nearly six times less likely to adhere to HEPs when compared to the youngest population. This concurs with the finding of Pickering et al. who reported that adherence reduced with increasing age amongst patients. The rate of performance of prescribed home exercises by the above patients decreased by 10% per 10-year increase in age (28). Though Pickering et al. did not entail teenagers or younger adults, this similar finding suggests that routine physical activity/exercise progressively reduces with age (29). Findorff et al. also showed that HEP adherence reduces overtime when growing old. It should be noted that the study participants were sedentary and the use of telephone counseling as well as goal-oriented nurse visits could not optimally boost adherence (30). Contrastingly, some authors have found no association between age and HEP adherence (31;32), while other researchers have reported that age is a consistent predictor of decreased physical activity (33;34). Older patients might not necessarily deviate from executing HEPs; however, our study indicate that non-adherence needs to be actively addressed with regards to age.

Association with gender

Our findings demonstrate that men were three times more likely to adhere to HEPs than women. This conforms with other studies showing that men display higher levels of physical activity than women (33;34). Several studies though, have found no significant link between sex and HEP adherence (10;23;24;35). In support of our findings, another HEP study found that men performed 15% more repetitions than women; although this difference was not reported as statistically significant (28). Mannion et al. (36) have also reported that women were significantly less adherent than men in completing their home exercises and further revealed that female gender predicts non-adherence. Though no direct explanation can be made, higher adherence shown by men in this present study may be attributed

to the peculiarity of our social environment. Culturally, men in Nigeria are expected to be more physically active and hence, might enjoy more support from our local communities. Such backing might boost their HEP execution whilst Nigerian women would not typically receive this extra incentive. This postulation has to be verified by appropriate and prospective research.

Association with educational status

In this study, we observed that all 11 patients with little or no formal education were non-adherent, whilst HEP adherence was displayed only in groups with better educational backgrounds. As this finding relates to a rather small population in groups with little or no formal education, it is difficult to make a conclusion on this basis. A systematic review seemed to support this finding as it provided evidence that people with better education were more likely to adhere to exercise programmes (7), though it solely involved the elderly and did not exclusively address HEPs. Conversely, other studies did not report a significant association between adherence to HEPs and educational status (18;23;24;31).

Better adherence linked to an improved educational status might be attributed to the patients' health literacy levels. Other researchers have shown that improved educational status leads to better health literacy (37-39), which enables individuals to acquire, process and comprehend basic health information or services needed to make appropriate health decisions. Some authors have bemoaned the poor health literacy status prevalent in the present study environment (40;41). Hence, patients who had little or no formal education in our study might have been unable to make positive health decisions that would improve their adherence to HEPs. This stance calls for a better and suitable exploration.

Relationship with influential factors

Pain, forgetfulness, perceiving exercise as less beneficial and fatigue had significant negative relationships with patients' adherence to HEPs in this study. This is confirmed by other authors who have reported a similar negative influence of pain on HEP adherence (8;23). They evaluated stroke patients and found fatigue as a possible cause (23). Other authors did not find a significant influence of pain on adherence to HEPs (17,35). A systematic review supports the results of the present study on pain as a barrier to physiotherapy treatment adherence (42). Forgetfulness has also been found to negatively influence HEP adherence in other studies (17,23), where authors state that even though



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forgetfulness is an unintentional process, it may have been influenced by the patients perception of barriers or inadequate importance attached to the HEP. This negative influence of attributing little importance to HEPs was highlighted by our study finding of the tendency of being non-adherent, if home exercises were perceived as not being beneficial. Some researchers have shown that patients were less adherent to HEP, if they thought it would not help considerably (17), while others reported increased adherence among patients who understood the importance of home exercises (18). Fatigue was similarly shown to have a significant adverse relationship with HEP adherence (23). Contrastingly, another study did not show a significant relationship between HEP adherence and fatigue (18). As patients would engage in other daily activities, forgetfulness and fatigue might inadvertently lead to non-adherence if these factors are not properly addressed.

Our study also demonstrated that patients tend not to adhere to HEPs if exercises were perceived as injurious or if they had a need for physical assistance. Fear of injury has been reported as a perceived barrier to physical activity in a general adult population (43), which seems to support our finding. Some authors have also stated that patients reported the fear of falling and their concern about getting hurt while exercising, as reasons for non-adherence to HEPs (8). Ogwumike et al. support our finding of a significant negative relationship between HEP adherence and patients' need for physical assistance (23). However, another study did not find this relationship with adherence (17). The need for physical assistance was suggested to emanate from challenges to function posed by diseases (23). Our finding could also mean that patients doubt their own ability to successfully perform HEPs without manual assistance from others; indicating a low self-efficacy. Hence, it would be interesting to investigate for links between this particular need and self-efficacy, which has been strongly reported to predict adherence to home-based physiotherapy (44).

Lastly, our study revealed a remarkable positive relationship between adherence to HEPs and support from one's family or friends. Several authors have supported this finding with reports of high levels of social support facilitating adherence to physiotherapy treatment (11;42;44;45). This denotes the encouraging effect of social support from loved ones. Based on this finding, it could be postulated that a wider support network in the local community might further motivate patients to adhere to their HEPs.

Clinical implications

This study's findings emphasize the importance of careful patient screening in routine clinical assessments, so as to identify relevant data, which could determine adherence. Specific attention should be given to older, female and less/uneducated patients; as non-adherence might be likely in these populations. Constant re-evaluation of patient's HEP performance is key to facilitating adherence, not depending on the exercise's efficacy or tailored programme design; as negative influences can be detected, addressed and curbed. Education given to patients by physiotherapists may not be sufficient to address this issue, hence this study's authors suggest the implementation of specific strategies targeted at improving adherence as they may help patients overcome any challenge(s). Seeking the active involvement of a patient's family and friends towards ensuring strict HEP execution could boost their provision of social support, potentially inhibiting non-adherence.

Limitations

The use of a self-report questionnaire is in line with recommendations in literature, however it's predisposition to response bias provides a probability of influencing this study's outcomes. Causal inferences cannot be made due to this study's design. Furthermore, it was not possible to carry out a longitudinal study which would account for long term adherence to HEPs.

Conclusion

Adherence to home exercise programmes was low in this study as most patients did not stick to their prescribed regimens. Older, female and less/uneducated patients displayed a high tendency of non-adherence and should be given specific attention. Several factors which exhibited patients' challenges were revealed to have substantial negative influences on their adherence to HEPs; emphasizing the need for effective detection and curtailment. Social support from loved ones was linked to facilitating adherence to HEPs, hence it should be encouraged to extend to a larger network in the community.

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Research and Best Practice

Appendix 1. Developed questions used to assess the participants' adherence status

| Principle | Question |
|-----------|---|
| Frequency | Did you perform the Exercise(s) as many times per day/week as was prescribed? |
| Intensity | Did you perform the Exercise(s) with the amount of effort that was prescribed? |
| Time | Did you perform the Exercise(s) for the length of time that was prescribed? |
| Type | Did you perform the kind of Exercise(s) that was prescribed? |

Appendix 2. Developed questions used to assess possible factors influencing HEP adherence

| Factor | Statement seeking a response from participants |
|--------------------------------------|--|
| Fatigue | I get too tired to perform the Exercise(s) that was prescribed. |
| Limited time | I have little time to perform the Exercise(s) that was prescribed. |
| Forgetfulness | I do not remember to perform the Exercise(s) that was prescribed. |
| Family/friend support | I get encouraged by my family or friends to perform the Exercise(s) that was prescribed. |
| Exercise is hard | It is difficult to perform the Exercise(s) that was prescribed. |
| Exercise is boring | It is not interesting to perform the Exercise(s) that was prescribed. |
| Exercise is painful | It is painful to perform the Exercise(s) that was prescribed. |
| Exercise can cause injury | It can harm the body to perform the Exercise(s) that was prescribed. |
| Exercise is not very beneficial | It is not very useful to perform the Exercise(s) that was prescribed. |
| Exercise does not fit daily routine | It does not match my daily plan to perform the Exercise(s) that was prescribed. |
| Need for physical assistance | I need a helping hand in order to perform the Exercise(s) that was prescribed. |
| Need for physiotherapist's presence. | I need the physiotherapist there in order to perform the Exercise(s) that was prescribed. |