



Improving Home-Based Stroke Rehabilitation in Saudi Arabia: A Cross-sectional E-Survey of Physical Therapist Perspectives

Faisal A. Alqahtani¹, Raee S. Alqhtani²

Mohamed S. Sirajudeen³, Yasser I. Seada⁴

Department of Rehabilitation Science-Physiotherapy Program-, College of Applied Medical Science, Najran University-Najran, KSA^{1,4}

Tathleeth General Hospital, Ministry of Health, KSA²

Department of Physical Therapy and Health Rehabilitation, College of Applied Medical Sciences, Majmaah University, Majmaah, KSA³

Abstract. In Saudi Arabia, stroke is a major public health concern. Home-based rehabilitation is a crucial element of post-stroke care. This study takes the perspectives of physical therapists regarding the provision of home-based exercise program (HBEP) education. The aim is to uncover opportunities for improving this critical aspect of stroke care. A cross-sectional E-survey, employing a validated questionnaire, was distributed to a diverse group of physical therapists across Saudi Arabia. The results from 216 respondents revealed that 93.01% provided HBEP education, with more than half educating 7 out of 10 stroke patients. Main barriers included a perceived lack of suitable programs (82.41%) and limited awareness of local HBEPs (47.22%). The percentage of physical therapists providing HBEP education varied significantly between inpatient and outpatient settings. This research offers insights to enhance home-based stroke rehabilitation in Saudi Arabia by addressing identified challenges, improving therapist training, and tailoring resources to patients' needs.

Index Terms- Stroke, rehabilitation, exercises, home-based exercise, Saudia Arabia

I. Introduction

A cerebrovascular accident (CVA), commonly referred to as a stroke, is an emergency medical condition that occurs due to a sudden disruption of blood flow to a part of the brain.^[1] This disruption can happen due to various reasons, including the blockage of a blood vessel (ischemic stroke) or the rupture of a blood vessel (hemorrhagic stroke).^[2] Strokes can result in a wide range of symptoms, depending on the area of the brain affected. Stroke patients often experience lifelong neurological impairment that limits their ability to perform their prior activities of daily living.^[3]



Stroke is a significant global health concern with substantial epidemiological implications. According to the World Health Organization (WHO), stroke is the second leading cause of death and disability worldwide.^[4] It is estimated that every year, approximately 13.7 million people worldwide suffer a stroke, and nearly 5.5 million die as a result.^[5] In Saudi Arabia, the reported incidence of acute strokes is 30 to 40 per 1,00,000 per year, and the prevalence is 186 per 1,00,000.^[6] This global epidemiology of stroke underscores the importance of public health initiatives aimed at effective management to reduce the substantial social and economic impact of this condition.

The process of stroke recovery is complex, encompassing various domains of physical, psychological, and social well-being.^[7] While rehabilitation centers offer essential care and support, the majority of stroke survivors eventually return home to continue their recovery journey. The home environment presents unique challenges and opportunities for rehabilitation, often requiring personalized interventions tailored to the individual's needs and circumstances. A home-based exercise program (HBEP) is one effective strategy to maintain or improve the functional capacities of stroke patients at the convenience of their homes.^[8] Such programs offer significant value for stroke patients by providing a flexible and patient-centred approach to rehabilitation.

HBEPs are typically developed by healthcare professionals, such as physical therapists, to be performed by stroke survivors in their homes.^[9] HBEP aims to improve mobility, strength, balance, and overall functional capacity while addressing specific post-stroke impairments and limitations. They are tailored to the unique needs and abilities of each stroke patient and often involve a combination of exercises and activities that target the affected areas of the body and support the individual's recovery goals.^[10,11] These programs play a crucial role in enhancing the quality of life and independence of stroke survivors by facilitating ongoing rehabilitation and promoting long-term recovery.^[12]

Patient education is central to stroke rehabilitation. It empowers stroke patients and their caregivers with the knowledge and skills necessary for effective self-management and recovery. So far, there have been no studies in Saudi Arabia that have explored the practice of physical therapists in educating individuals who have experienced a stroke about HBEP. This represents a critical area for research because it can help identify potential gaps between knowledge and actual practice in the Saudi healthcare system. Addressing this gap may involve updating clinical practice guidelines and healthcare policies and ensuring the availability of suitable resources and training. While some research has assessed physical therapists' perspective in implementing best practices for evaluating and treating stroke conditions,^[15-17] these studies were performed in Western countries whose healthcare systems differ from Saudi Arabia. Furthermore, there is limited literature about the nature, extent, and timing of education provided by physical therapists to individuals with stroke regarding HBEP in Saudi Arabia and the Middle East region; thus, examining this area of practice is of utmost importance.



Therefore, this study explores the realm of patient education regarding HBEP for stroke patients and seeks to shed light on the perspectives of physical therapists practicing in Saudi Arabia. Understanding the perspectives of physical therapists is essential for developing targeted interventions and improving the quality of stroke rehabilitation services in the country. The aims of this study are three-fold: 1) To determine the provision and nature of education provided to people with stroke regarding HBEP, 2) To identify barriers to educating stroke patients about HBEPs, and 3) To determine whether the provision of education about HBEPs by physical therapists varies across practice settings.

II. Methods

1. Study Design

This study employed a descriptive cross-sectional design to examine physical therapists' perspectives on HBEP for stroke patients. The study used a convenience sampling method to select participants for data collection. This sampling method was chosen for a practical reason: to access a specific population of physical therapists who work with stroke patients. This approach selected participants based on their availability and relevance to the research topic.

2. Study Participants

The participants were licensed physical therapists practicing in various healthcare settings across Saudi Arabia. Inclusion criteria required participants to hold an active license to practice physical therapy in Saudi Arabia and have experience providing rehabilitation services to stroke survivors in a home-based setting. The exclusion criteria include students, practitioners not registered with the Saudi Commission for Health Specialties, those who do not specialize in stroke rehabilitation, and those practicing outside the boundaries of Saudi Arabia. These criteria were applied to ensure the study focused on qualified, registered physical therapists actively engaged in stroke rehabilitation in Saudi healthcare. See supplementary File#1 for the detailed recruitment process of study participants.

3. Sample Size Calculation

The sample size was calculated using EPI Info 7.[18] The Saudi Commission for Health Specialties statistics have reported 6,028 physical therapists practicing in Saudi Arabia.[19] The sample size was calculated taking into account the following parameters: a population size of 6,028, an expected outcome frequency of 50%, a confidence interval of 90%, an accountable margin of error of 5%, a design effect of 0.1, and no clustering. By plugging in all these values into the software, the calculated sample size was estimated at 160 participants. To account for a 20% non-response rate, the minimum required sample size was revised to 192 participants. However, we were able to collect completed questionnaires from 216 participants.

4. The Questionnaire

Data were collected through a structured online questionnaire adapted from previous research.[17] It was cross-culturally validated in the Saudi context using a



rigorous approach to ensure content validity, relevance, and clarity. The questionnaire items were translated from English to Arabic using the forward-backward translation method suggested by Beaton et al.[20] The questionnaire included seven domains with a total of 69 items. These domains cover various aspects related to HBEPs for stroke patients. The questionnaire comprises sections on eligibility (2 items), provision of HBEPs (5 items), the nature of HBEPs (19 items), the timing of HBEPs (3 items), barriers to educating about HBEPs (18 items), preferences for resources related to HBEPs (5 items); and sociodemographic and practice characteristics (17 items). This questionnaire is designed to capture comprehensive information and perspectives from physical therapists regarding their practices and experiences in delivering HBEPs for stroke patients. After modifying some questions that were used in the original Canadian study,[17] the reliability of the questionnaire was evaluated by calculating Cronbach's alpha (α).[21]

After obtaining the ethical approval from the Majmaah University Institutional Review Board [Ethical certificate# 421103820], a group of rehabilitation experts performed cultural adaptation and face validity of the questionnaire to suit the Saudi practice and policies. After this, the pre-final version of the questionnaire was pretested on a small sample of physical therapists to examine comprehensibility, clarity, and applicability, and the final version of the questionnaire was produced.

5. Data Collection

The final questionnaire was then emailed to the selected physical therapists. A reminder was circulated to the same participants two weeks after the first email. After one month, a third reminder was sent to participants to accept or decline the invitation to participate. Participation in the questionnaire was entirely voluntary, and those who agreed to participate had to sign the consent form before accessing the questionnaire. The questionnaire link was made accessible for a period of three months.

6. Data Analysis

Collected data was imported to SPSS software version 28 for analysis. Cases with less than 80% of completed responses were excluded from the analysis. Descriptive statistics, including means, and standard deviation, were calculated to analyze continuous variables, while frequency and percentages were examined in the categorical variables. Finally, a chi-square test was performed to investigate the association between the education provision rate and the participants' specific practice setting.

III. Results

1. The validity and Reliability of the Questionnaire

In terms of validity, the questionnaire demonstrated good content validity, as it was evaluated based on experts' input, ensuring that it accurately measures the intended constructs in the Saudi context. Regarding reliability, the 69 questionnaire items exhibited excellent internal consistency, with Cronbach's $\alpha = 0.88$, indicating



that the items within the questionnaire are highly reliable and consistently measure the same underlying construct. These findings strongly support the questionnaire's robustness and suitability for collecting meaningful data in this study.

2. Socio-Demographic Characteristics of the Study Sample

As presented in Table 1, the included sample comprises a diverse group of physical therapists from various clinical backgrounds. Geographically, the sample encompasses participants from both urban (28.2%), suburban (48.1%), and rural (23.6%) areas, offering a comprehensive view of socio-demographic diversity. In terms of age, the participants span a wide range, with the majority falling within the 20-39 age group. Gender distribution is fairly balanced, with a slightly higher representation of males (57.4%). Education levels vary, with a significant portion holding bachelor's degrees (83.30%) and about (10.4%) holding either master's or doctoral degrees, reflecting a well-educated subset of the population. The most reported clinical settings were general hospital outpatient service (35.5%), followed by general hospital inpatient service (15.2%), and rehabilitation inpatient facilities (16.2%).

Table 1: Demographic and professional characteristics of respondents (n=216)

Characteristics	Entire Sample (n=216)		Providing Education (n=201)		Not Providing Education (n=15)	
	N	%	n	%	n	%
Age						
20-29 years	134	62%	125	62.20%	8	53.30%
30-39 years	71	32.90%	69	34.30%	3	20%
40-49 years	10	4.60%	7	3.50%	3	20%
>50 years	1	0.50%	0	0%	1	6.70%
Gender						
Male	124	57.40%	113	56.20%	11	73.30%
Female	92	42.60%	89	44.30%	3	20.00%
Highest degree obtained						
Diploma	4	1.90%	3	1.50%	1	6.70%
Bachelor's degree in physical therapy (PT)	180	83.30%	169	84%	11	73.30%
Professional doctorate degree in physical therapy (DPT)	9	4.20%	7	3.50%	2	13.30%
Professional master's degree in physical therapy (MPT)	16	7.40%	16	8%	0	0.00%
Academic Doctoral degree (Ph.D.)	7	3.20%	6	3%	1	6.70%
Years practice						
< 5	116	53.70%	110	54.70%	7	46.70%
5-10	63	29.20%	59	29.30%	3	20%



11-15	25	11.60%	23	11.40%	2	13.30%
> 15	12	5.60%	9	4.50%	3	20%
Years practiced in stroke care						
< 5	125	57.90%	116	57.70%	9	60%
5-10	63	29.20%	63	31.30%	1	6.70%
11-15	18	8.30%	16	8%	1	6.70%
> 15	10	4.60%	6	3%	4	26.70%
Hours of work/week						
<20	15	6.90%	128	63.70%	3	20%
20 – 30	24	11.10%	40	19.90%	7	46.70%
31 – 40	46	21.30%	20	10%	3	20%
>40	131	60.60%	13	6.50%	2	13.30%
Job title						
Physical therapy technician	8	3.70%	7	3.50%	1	6.70%
Physical therapist	176	81.50%	166	82.60%	0	66.70%
Senior Physical therapist	24	11.10%	22	10.90%	2	13.30%
Physical therapy Consultant	8	3.70%	6	3%	2	13.30%
Daily caseload						
< 5 patients	37	17.10%	34	17%	3	20%
5 - 10 patients	81	37.50%	72	35.80%	9	6%
11 - 15 patients	85	39.40%	83	41.30%	2	13.30%
> 15 patients	13	6%	12	6%	1	6.70%
Stroke caseload						
< 2 patients/wk.	44	20.40%	39	19.40%	5	33.30%
2 -5 patients/wk.	104	48.10%	98	48.60%	6	40%
6 - 10 patients/wk.	58	26.90%	55	27.40%	3	20%
> 10 patients/wk.	10	4.60%	9	4.50%	1	6.70%
Typical duration of active treatment						
< 1 month	13	6%	12	6.00%	1	6.70%
2-4 months	58	26.90%	52	25.90%	6	40%
4-6 months	123	56.90%	116	57.10%	7	46.70%
> 6 months	22	10.20%	21	10%	1	6.70%
Practice Location						
Rural	51	23.60%	45	22.40%	6	40.00%
Suburban	104	48.10%	100	50%	4	26.70%
Urban	61	28.20%	56	28%	5	33.30%
Type of facility						
General Hospital: inpatient service	33	15.2 %	30	14.9 %	3	20 %
General Hospital: outpatient service	77	35.5 %	72	35.8 %	5	33.3 %



Rehabilitation facility: inpatient service	35	16.2 %	33	16.4 %	2	13.3 %
Rehabilitation facility: outpatient service	20	9.3 %	19	9.5 %	1	6.66 %
Recovery and Mental Health Hospital.	1	1.90%	0	0.00%	1	6.66 %
Home visiting care	27	12.5 %	25	12.4 %	2	13.3 %
Private practice or clinic	23	10.6 %	22	10.9 %	1	6.66 %
Primary health care	0	0.00%	0	0.00%	0	0.00%

3. Provision, Nature, and Timing of HBEP Education

As shown in Table 2, out of 201 respondents who reported providing HBEP education, 77.6 % mentioned assessing patient readiness most or all of the time. During education sessions, respondents discussed preventative benefits (85.6%), physical benefits (83.6%), mental benefits (51.3%), and social benefits (41.3%) most or all of the time. The most mentioned programs to which stroke patients were referred most or all of the time were home activity (90.55%), aerobic exercise (78.11%), walking programs (77.11%), task-orientated training programs (58.71%), and private fitness trainer sessions (28.8%). The mode of education with the highest reported use most or all the time was verbal education (84.58%). Regarding the timing of education, respondents reported introducing HBEP for patients at discharge (70.65%), between initial evaluation and discharge (23.38%), and at initial evaluation (18.91%) most or all of the time.

Table 2: Provision, Nature, and Timing of Education (n=201)

Variable	None of the Time		some of the Time		Most of the Time		All the Time	
	n	%	n	%	n	%	n	%
Provision: assessments before providing education								
Patient readiness	5	2.50%	40	20%	87	43.30%	69	34.30%
Patient exercise preference	20	10.00 %	91	45%	49	24.40%	27	13.40%
Nature: contents of education								
Physical benefits	2	1%	31	15.40%	85	42.30%	83	41.30%
mental benefits	7	3.50%	92	45.80%	71	35.30%	32	16%
Social benefits	19	9.50%	100	49.80%	59	29.40%	23	11.40%
Preventative benefits	1	0.50%	28	13.90%	54	26.90%	118	58.70%
Nature: type of program to which referred								
Task-orientated training	5	2.49%	78	38.81%	80	39.80%	38	18.91%
Aerobic exercise	4	1.99%	40	19.90%	72	35.82%	85	42.29%



Walking	5	2.49%	41	20.40%	56	27.86%	99	49.25%
Private fitness trainer sessions	55	27.36%	88	43.78%	42	20.90%	16	7.96%
Home activity	2	1.00%	17	8.46%	64	31.84%	118	58.71%
Nature: mode of education								
Verbal	6	2.99%	25	12.44%	46	22.89%	124	61.69%
Written material	10	4.98%	29	14.43%	56	27.86%	105	52.24%
Online resource	30	14.93%	94	46.77%	45	22.39%	32	15.92%
Presentation	58	28.86%	83	41.29%	39	19.40%	21	10.45%
Timing of Education								
At initial evaluation	54	26.87%	75	37.31%	34	16.92%	38	18.91%
Between initial evaluation and discharge	9	4.48%	39	19.40%	106	52.74%	47	23.38%
At discharge	6	2.99%	17	8.46%	36	17.91%	142	70.65%

4. Factors Influencing the Provision of HBEP Education

The results revealed that 92.6 % of respondents agreed or strongly agreed that physical therapists have the primary responsibility of providing education on HBEP to stroke patients. Respondents also mentioned that other healthcare professionals may provide education on HBEPs, such as occupational therapists (56.5%), social workers (28.2%), physicians (33.3%), and nurses (25.9%).

Table 3 presents physical therapists' opinions on how patient characteristics may impact their decision to provide HBEP education. It seems that the patient's cognitive status (43.98%), communication abilities (34.72%), readiness for exercise (18.52%), and ambulation level (17.13%) were the most frequently reported considerations before HBEP education.

Table 3. Degree of Influence of Patient Characteristics on the Decision to Provide HBEP Education (n=216)

Characteristic	Degree of Influence							
	Not at all		A Little		Sometime		A lot	
	n	%	n	%	n	%	n	%
Cognitive status	10	4.63%	32	14.81%	79	36.57%	95	43.98%
Communication abilities	8	3.70%	27	12.50%	105	48.61%	75	34.72%
Readiness for exercise	8	3.70%	78	36.11%	90	41.67%	40	18.52%
Ambulation level	18	8.33%	84	38.89%	77	35.65%	37	17.13%



Physical therapists' attitudes and beliefs concerning the impact of personal and external factors on HBEP education are presented in Supplementary file# 2. The data reveals that a substantial majority of respondents, approximately 40.74% and 73.15%, respectively, expressed agreement or strong agreement on the importance of HBEP education, considering it a representation of best practice. Additionally, about 46.76% of physical therapists noted a shortage of suitable HBEP in their localities, while 24.07% acknowledged a personal lack of awareness regarding HBEP within their clinics.

5. Preferences for Educational Resources

Within the complete dataset comprising 216 participants, it was observed that the majority of respondents expressed either agreement or strong agreement towards the usefulness of various resources, including a comprehensive list of HBEPs (82.41%), informative pamphlets or brochures on HBEPs (79.63%), the availability of a knowledgeable resource person (40.7%), guidance on evaluating patient readiness for exercise (58.8%), and training in delivering HBEPs education (61.1 %). (See Supplementary file# 2).

6. Rate of Education Across Practice Settings

Out of the 201 respondents who indicated their engagement in HBEPs education, the distribution of high education rates differed across various practice settings. Specifically, 16.4 % of respondents reported high education rates in inpatient settings, and a notably higher proportion of 42.4% in public outpatient settings. This variation was statistically significant, as evidenced by the Chi-squared test results ($\chi^2 = 6.536$, and $p\text{-value} = 0.011$), indicating a significant association between the rate of education provision and the specific practice setting.

IV. Discussion

This study aimed to provide a comprehensive description of the educational practices employed by physical therapists in Saudi Arabia when it comes to educating people who have experienced a stroke about HBEPs. This goal aimed to shed light on the existing landscape of HBEPs education and the perceived barriers to applying them within the context of stroke rehabilitation in Saudi Arabia. The findings reveal that a substantial majority of physical therapists recognize the significance of HBEPs education. Most respondents agreed or strongly agreed that physical therapists have the primary responsibility of providing education on HBEP to their patients. Over half of respondents agreed or strongly agreed that educational tools such as pamphlets or brochures could significantly facilitate the educational process. These findings suggest a shared understanding among physical therapists about the importance of providing stroke patients with information and resources to aid their recovery, specifically through HBEP. Our results are comparable to the previous studies conducted in Canada and the USA, in which physical therapists were recognized as the primary providers of HBEPs to stroke survivors.^[17,22]

Furthermore, the study explored the perceived barriers to providing HBEP education. It was found that a significant portion of respondents identified a lack of



suitable HBEP in their respective areas as a substantial impediment. Additionally, nearly a quarter of respondents acknowledged their lack of awareness regarding HBEP in their practice area. The findings also show that physical therapists face several challenges in delivering HBEP to their patients. These challenges include the patient's cognitive functioning, communication skills, and physical abilities, which may slow or hinder HBEP programs. These challenges have been discussed in the literature as major obstacles faced physical therapists in providing HBEPs to stroke survivors.^[11,17,23] Although HBEPs are known to improve bio-psycho-social aspects of individuals after stroke,^[24-26] the results of this study showed the worrisome of physical therapists in dealing with these challenges altogether. These findings also highlight critical challenges in the accessibility and awareness of HBEPs, suggesting potential areas for improvement in the healthcare system's support for stroke patients.

The study also investigated the preferences of physical therapists regarding resources that would facilitate HBEPs. This aspect of the research is vital as the choices of healthcare providers play a significant role in determining the quality and effectiveness of rehabilitation interventions.^[27] Interestingly, nearly half of the respondents expressed the need for a knowledgeable resource person within their practice setting, underlining the importance of having access to experts who can guide them in their educational efforts. The preferences of physical therapists for specific educational resources have implications for the development of tailored and effective HBEPs. It is noteworthy that therapists' preferences align with the evolving healthcare trends, emphasizing patient-centred care and the integration of digital technologies. Recent studies, such as the work by Lau et al.,^[17] have highlighted the value of integrating technology and multimedia resources in rehabilitation programs to enhance patient engagement in HBEPs. Understanding physical therapists' preferences for such resources can inform the development of more patient-centred and HBEPs, ultimately contributing to more successful stroke rehabilitation outcomes.

The last objective of this study was a comparison between the provision of education regarding HBEPs by physical therapists in various practice settings. Our findings reveal a significant disparity in the frequency of education sessions offered across different rehabilitation settings. Notably, only 16.4% of respondents reported a high rate of education sessions in inpatient settings, reflecting potential limitations in providing comprehensive HBEP education within the constraints of inpatient care. In stark contrast, our research illuminated a substantially higher proportion of 42.4% in public outpatient settings, signifying a more robust commitment to patient education about HBEPs in these environments. Although the results found in this study are similar to the findings of previous studies in which inpatient settings have the least rates of patient education provided in inpatient settings,^[17] the significant difference compared to the public outpatient clinics is questionable. These disparities may stem from variations in resources, patient populations, or organizational priorities, underscoring the need for further investigation to understand and address these differences in HBEP education provision. These findings have important implications for standardizing and enhancing patient education practices within the physical therapy profession, ultimately contributing to improved patient outcomes and a more equitable care provision.



V. Conclusion

This study has provided valuable insights into the current state of HBEP education practices among physical therapists working with stroke patients in Saudi Arabia. Many physical therapists who treat stroke patients agree on the importance of providing HBEP education for their patients. The findings suggest that patient education can be facilitated by increasing the availability of physical therapists' preferred resources, which include a list of available HBEPs, brochures and online resources. Notably, significant disparities were found in providing educational sessions between inpatient and outpatient settings, underscoring the need for further investigation to understand and address these differences. These findings highlight the importance of improving access to HBEP resources, raising awareness among therapists, and enhancing their knowledge and skills to better serve individuals recovering from stroke. These insights can inform future interventions and policies aimed at optimizing stroke rehabilitation practices and improving patient outcomes in Saudi Arabia.

Conflicts of Interest

None.

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