ORIGINAL ARTICLE

Evaluation of e-Physical Activity Coaching Programme on Stroke Knowledge and Anxiety Level Among Stroke Survivors

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ABSTRACT

Background and Objective: Education and training on self-management are important components of post-stroke care. For the past few years, education and training for stroke survivors have been delivered through an online platform due to various reasons. However, the effectiveness of this type of patient education and training delivery is still unknown. Therefore, this study was intended to evaluate an online education program for stroke survivors living at home post-stroke. **Methods**: A total of 52 stroke survivors were recruited as participants in this study. Subjects were respondents to a previous local survey on knowledge, attitude, and practice of physical activity conducted in the Klang Valley of Malaysia. Selected subjects were those who scored low in the knowledge part of the survey. The stroke education focused on stroke in general and the benefits of physical activity for stroke survivors, and was delivered online via an e-Physical Activity Coaching program (e-PAc). The effect of the e-PAc was assessed in terms of changes in knowledge and anxiety levels using the Stroke Knowledge Test: Malay version (SKT-Malay) and the Hamilton Anxiety Rating Scale (HAM-A) after 6 weeks of enrolment. **Results**: All 52 participants completed the e-PAc without any adverse effects. A statistically significant improvement in SKT ($p<0.001$) and a positive change in HAM-A after the intervention ($p<0.001$) were found. **Conclusion**: Our study shows that an online education program is effective in improving stroke-related knowledge and lowering anxiety levels among stroke survivors. The e-PAc may be recommended to physiotherapists who manage post-stroke patients as an alternative to a face-to-face program**.**

Keywords: online education, stroke, knowledge, anxiety

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INTRODUCTION

Stroke, a neurology manifestation due to a disruption of the vascular system, is the second leading cause of mortality and burden among older adults globally (Feigin et al. 2021). Stroke is also a significant health problem in Asia, with a higher stroke mortality rate than in Western countries (Venketasubramanian et al., 2017). In Malaysia, stroke is one of the top causes of death and disability since the last decade, with stroke-related deaths documented as 8.43 per 100,000 population in the past few years (Sowtali et al., 2016). Among the stroke victims who survived, there is a high risk of stroke recurrence (Boehme et al., 2017). As such, secondary prevention is important to minimise the risk of a recurrent onset and minimise complications. Clinical conditions such as hypertension, hyperlipidemia, atrial fibrillation, diabetes, and obesity, and poor lifestyle, namely smoking, physical inactivity, unhealthy diet, and excessive alcohol consumption, are identified in national and international stroke guidelines identify stroke as a significant modifiable risk factor that should be targeted for secondary stroke prevention (Boehme et al., 2017).

After an episode of stroke, it was assumed that knowledge about stroke, such as stroke risk factors and symptoms, is better among the stroke survivors and their families. However, past studies demonstrated that the stroke onset had no influence on knowledge of stroke among the survivors and their family members (Saengsuwan et al., 2017). A local study conducted in the state of Kelantan reported that more than half of the stroke survivors in the study demonstrated a low level of knowledge about stroke (Sowtali et al., 2016). Another Malaysian study by Ching and colleagues (2019) reported that although stroke survivors were good at recognizing stroke symptoms, the wider aspect of stroke knowledge was, in general, lacking among the survivors. Consequently, the lack of stroke-related knowledge causes most stroke survivors to maintain an

unhealthy pre-stroke lifestyle increases the risk for stroke recurrence (Saengsuwan et al., 2017).

Poor knowledge may also be a reason for post-stroke anxiety (PSA) among stroke survivors, as it is related to confidence and coping strategy, two established factors associated with PSA (Wright et al., 2017; Wei et al., 2019). It was documented that up to 38% of stroke survivors experienced PSA in the first few years post-stroke, which has negatively impacted their quality of life, affected the rehabilitation process, and increased the risk of another stroke (Wei et al., 2019; Golding et al., 2015). Targeting knowledge improvement among the stroke survivors is therefore crucial in post-stroke care.

To ensure its effectiveness, education to enhance stroke-related knowledge should include information on physical activity, an important strategy for reducing post-stroke anxiety (Lee et al., 2023). While physical activity and education have been shown to benefit stroke survivors much in secondary prevention plans, studies have shown that many survivors demonstrated low knowledge, awareness, and practice about physical activity. More efforts are needed to ensure stroke survivors are optimally equipped in knowledge about physical activity following a stroke. Various delivery methods are recommended to ensure optimal knowledge gain among post-stroke individuals, including online platforms.

An online approach of knowledge delivery can be realised by creating a virtual platform and providing the audience with knowledge about stroke and physical activity promotion. Past studies have shown that stroke education programs positively affect stroke knowledge and improvement in anxiety level (Golding et al., 2015), but there is no study that looks into online education or coaching programs for stroke survivors. Therefore, this study was intended to design an e-physical activity coaching program (e-PAc) and to determine its outcome on the level of knowledge about stroke and anxiety level among stroke survivors.

MATERIALS & METHODS

Study design and location

This was a one-group pre-post experimental study conducted at the Faculty of Health Sciences, Universiti Kebangsaan Malaysia (UKM) between April and August 2021. The study is a part of a larger study on post-stroke care approved by the Research Ethics Committee of Universiti Kebangsaan Malaysia (study code NN2019-149).

Study participants

Participants for this study were recruited from among respondents to a local survey on knowledge, attitude, and practice of physical activity conducted in the Klang Valley area of Malaysia (Ong et al. 2021, unpublished research report). Selected participants were those who scored low in the knowledge part of the survey and fulfilled specified criteria, namely(1) clinically diagnosed as stroke by a medical officer, 2) age >18 to 80 years old, (3) community-dwellers with Modified Rankin Scale (MRS) score 0-3, and (4) live with family. Stroke survivors with severe cognitive impairment and aphasia, as reported by their family members, were excluded from the study. This study used a simple random sampling method to recruit participants, with the required sample size estimated using G*Power version 3.1.9.2. Based on a moderate effect size of 0.4, a study power of 80%, and an alpha level of 0.05, a total of 52 participants were required and enrolled in this study.

INTERVENTION

All participants received online education via the e-PAc program, delivered through the Facebook application by two final-year physiotherapy students at UKM. The e-PAc comprises two training components: education on stroke-related matters and coaching on physical activity practice. The education component covered knowledge on stroke risk factors, signs and symptoms, medical management, physiotherapy, and physical activity. While the physical activity coaching component used uploaded exercise modules and videos. The two physiotherapy students conducted two coaching sessions in the first week of the intervention, and participants then performed the physical activity on their own with minimal supervision from their carer twice weekly for six weeks. All participants were monitored weekly by the researchers via Facebook and WhatsApp. Participants were also given opportunities to contact the researchers directly by phone or via Facebook or WhatsApp if they had any questions or concerns regarding the physical activity, or if they wished to report any problems that arose during the 6-week program.

Assessment of e-PAc outcomes

Baseline information for the 52 participants was collected via phone calls and a Google Form uploaded to WhatsApp. Two outcomes were targeted, namely stroke knowledge and anxiety level. An independent researcher conducted all assessments at baseline and at the end of week 6 of the intervention.

Stroke knowledge level was assessed using the Malay version of the Stroke Knowledge Test (SKT-Malay), which has been validated in previous local research (Sowtali et al., 2017). This questionnaire contains 20 items covering potential stroke risk factors, signs and symptoms, prevention, rehabilitation prevalence, and stroke treatment. The test format is a multiple-choice question with five answer options. The maximum total score is 20, with 1 point per correct answer. Accumulated score from each item can be classified into either ‘insufficient knowledge (less than 10 points or <50%)’ and ‘satisfactory knowledge’ (10 or more points or 50% and more).

Anxiety level among the participants was documented using the Hamilton Anxiety Rating Scale (HAM-A), a validated tool used to evaluate the symptoms of PSA among stroke survivors (Maier et al., 1988). The scale consists of 14 items, each defined as a series of symptoms, measuring psychic (mental agitation and psychological distress) and somatic anxiety (physical complaint to anxiety). HAM-A only assesses anxiety symptoms and is not used for diagnosing anxiety.

Statistical Analysis

Data analyses were conducted using IBM SPSS Statistics version 25. Demographic data were analysed descriptively and presented as frequencies, percentages, means, and standard deviations. The change in SKT scores following the e-PAc program was analysed using a paired t-test, and further analysis using descriptive cross-tabulation was performed to identify the percentage for each knowledge level. The class is determined by the test score; any score below 50% indicates a low knowledge level, and any score of 50% or higher indicates a satisfactory knowledge level. The anxiety score was analysed using the Wilcoxon signed-rank test to determine whether the change in score was statistically significant. Similar to SKT, further analysis was conducted to determine the percentages for three categories: mild (score of 14-17), moderate (score of 18-24), and severe (score of 25-30) anxiety states.

RESULTS

Participants' Demography

Table 1 presents the demographics of the study participants (n = 52). The participants' age range between 34 to 89 years, with a mean age of 60.25 (SD 12.6) years. The majority of the participants are males (n=33, 63.5%). Regarding education level, most participants are diploma holders (n=22, 42.3%). The most frequent type of stroke among the participants was ischemic stroke (n=44, 84.6%).

Table 1: Demography of the participants (n=52)

Variable	Category	N (%) or mean (SD)
Gender	Male	33(63.5)
	Female	19 (36.5)
Mean age, years	-	60.25 (12.6)
Education status	Primary school	6 (11.5)
	Secondary school	12 (23.1)
	Diploma/Foundation	22 (42.3)
	Degree	10 (19.2)
	PhD	2 (3.8)
Type of Stroke	Ischemic	44 (84.6)
	Haemorrhagic	7 (13.5)
	TIA	1 (1.9)

Stroke knowledge

All 52 participants completed the pre-assessment of SKT; with 57.7% of the participants scored below 50% points at baseline. This percentage decreased to 23.1% following enrolment into e-PAc. A significant difference was found in the SKT score between pre- and post-e-PAc, $t(51) = -8.689$, $p < 0.001$, with a large effect size, $d = 1.00$. In this study, SKT was sorted into 5 domains: stroke risk factors, signs and symptoms, basic knowledge and prevalence, treatment, rehabilitation, and prevention. For each domain, the percentage of participants who obtained the correct answer increased following e-PAc, except in the risk factor domain, which showed no change. (Table 2).

Table 2: Percentage for low and good knowledge level

Timeline	Knowledge level category	
	Low knowledge; n (%)	Good knowledge;n (%)
Pre e-PAc	30(57.7)	22(42.3)
Post e-PAc	12 (23.1)	40 (76.9)

Anxiety Level

A significant difference in HAM-A ($Z=-5.985$, $p=0.01$) score was found, with a median (IRQ) score of 13(13.75) at baseline reduced to 9(10) after 6 weeks of e-PAc. As much as 48.1% of the participants presented with anxiety ranging from mild (15.4%), moderate (17.3%), and severe (15.4%) at baseline, and the percentages reduced to 34.6% after e-PAc, with no participants scoring in the severe category (Figure 1).

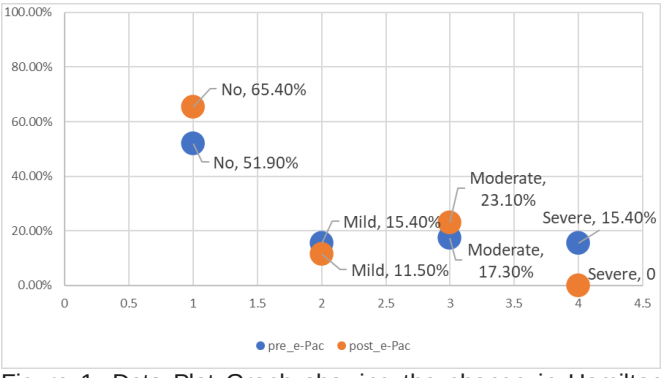

Figure 1: Dots Plot Graph showing the change in Hamilton Anxiety Rating Scale score

DISCUSSION

Our study aimed to evaluate the effectiveness of an online version of an education and physical activity coaching program (e-PAc) on stroke knowledge and anxiety level among stroke survivors. To our knowledge, this is the first study that used an online platform to deliver a post-stroke education program locally. Our study shows that a substantial percentage of stroke survivors demonstrate an insufficient knowledge level at baseline (SKT score <50%). This result is consistent with a previous study's report of low

knowledge levels among post-stroke patients and supports the claim that prior episodes of stroke had little positive impact on stroke knowledge (Saengsuwan et al., 2017). This result illustrates that education and public health campaigns focusing on knowledge, attitude, and practice related to stroke may be inadequate in the country. Locally, only a

few hospitals have established specialized stroke units, where stroke care, including education, could be better implemented (Sowtali et al., 2017).

Our study shows that implementing e-PAc resulted in a significant improvement in participants' knowledge of stroke and physical activity. This finding is consistent with the results of a previous study by Krawcyk et al. (2019) on the effects of a motivation and education program. The researchers found a significant increase in knowledge and understanding of stroke following the intervention. In this past study, the education program was implemented face-to-face, and only one study (Marx et al., 2009) used multimedia such as billboards, local newspapers, and television as a medium for its education program. Positive results were obtained, but the study assessed only knowledge of stroke risk factors, unlike our recent study, which focused on a broader aspect of stroke knowledge, including physical activity.

Almost half of the participants in our study showed the symptom of anxiety prior to e-PAc implementation. Anxiety was categorized as mild, moderate, and severe. Our finding shows that the percentage was slightly higher than in past studies, which shows that 29% of the population among stroke survivors and TIA participants had anxiety (Broomfield et al., 2014). This was probably due to our small sample size, which was 52 compared to the study assessing 4079 participants. A stroke or neurological deficit has been documented to cause mood disorders (Broomfield et al., 2014; Wei et al.,2019), although this was not assessed in our study.

After 6 weeks of e-PAc, there was a significant improvement in anxiety level, with an increase in the percentage of participants categorized as having no symptoms of anxiety. This finding supports a previous study that implemented a self-management plan through the provision of a self-help autogenic relaxation video, following which participants showed significant improvement in anxiety levels (Golding et al., 2016). On the other hand, a study that only monitors the level of anxiety at the acute stage and after 3 months of stroke without any intervention for PSA shows no improvement in anxiety level (Wei et al., 2019). The e-PAc provides information on PSA and how to manage the anxiety following the onset. In addition, the e-PAc provides physical activity prescription, including strength training. A study by Aidar et al. (2012) shows that physical activity and strength exercise are beneficial in improving the state of anxiety among stroke participants after 12 weeks of intervention. Although not specifically tested, we hypothesize that the physical activity prescription and physical activity performance during 6 weeks of e-PAc implementation have resulted in improved anxiety levels among our participants.

Study Limitation

The first limitation of this study is that no control or comparison group is used during the 6-week intervention. By including a control group that receives usual care, a more accurate assessment of the e-PAc outcomes could be conducted. Secondly, there is no blinding for the assessor. The pre- and post-intervention questionnaires were distributed via WhatsApp and completed in a Google Form by the same researchers. The bias

This is, however, mitigated by asking the participant to complete their response in Google Forms without the researchers' influence.

Despite its limitations, this study showed that education and coaching techniques through an online platform effectively increased knowledge and lowered anxiety levels among stroke survivors. This study also provides a module for a virtual or online learning education program for stroke survivors. Physiotherapists can use this intervention module as a template or general idea to create an online learning program as a secondary intervention for the stroke survivor.

CONCLUSION

In conclusion, e-PAc induced a positive impact and statistically significant improvement in stroke knowledge and anxiety level among stroke survivors. This online learning program has been shown to provide adequate education for stroke survivors and is a suitable platform for survivors with difficulty physically accessing health care settings. Further studies with larger samples are recommended to establish these findings.

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