

## ORIGINAL ARTICLE

# Effectiveness of Home-based Rehabilitation Program Services on Improving the QoL of Post-stroke Patients Post the Covid-19 Pandemic in Malang City

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## ABSTRACT

**Introduction:** Patients suffering from a stroke undergo emotional and personality changes, which might affect their cognitive impairment, while home-based rehabilitation is an alternative rehabilitation service that provides remote rehabilitation supervision and removes access constraints, particularly during the Covid-19 (coronavirus disease-2019) epidemic. Thus, the purpose of this study is to assess the impact of home-based rehabilitation program services on post-stroke patients' quality of life (QoL) following the Covid-19 pandemic. **Materials and methods:** Using a prospective longitudinal study design, this research tracked the patient's post-stroke status over three months (June–September 2022). Purposive sampling was used to choose participants, and 84 recruited participants who satisfied the inclusion criteria were included. During three months, the participants received home-based rehabilitation program intervention five times a week for thirty minutes per session. Evaluation assessments were made during baseline (T0), 1st follow-up (T1), and 2nd follow-up (T2). These assessments are used to ascertain the patient's progress. The SF-36 (36-item Short Form Survey) questionnaire and a sociodemographic questionnaire (age, gender, BMI, and education level) were used as research instruments. Data analysis used were the One-Way ANOVA test and Post-Hoc test to find out significant differences between 2 treatments ( $p < 0.05$ ). **Results:** Based on One-Way ANOVA resulted that respondents experienced significant improvements ( $p < 0.05$ ) regarding the assessment of 8 domains of QoL during observations at T0, T1, and T2. **Conclusion:** The results of this research are highly recommended for the management of the elderly and post-stroke health management to integrate home-based rehabilitation services for post-stroke patients.

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## INTRODUCTION

Stroke is one of the main causes of death and inability worldwide(1). Stroke is also characterized as a focal neurological deficit caused by impaired blood supply to the brain(2). Stroke significantly reduced levels of physical activity, aerobic exercise and muscle strengthening which might leads to physical activity barriers (3,4). The most frequently reported barriers were challenges with ambulation, and transportation to training facilities in the community. While there were also personal barriers namely lack of motivation and knowledge about starting, and maintaining an exercise program (5,6). Disability associated with stroke were significantly interferes with limitations on

doing activities of daily living, and thus, it influenced on their quality of life (QoL) (1). Living with disability presents a new difficulty for stroke patients, and studies undertaken with stroke patients have demonstrated that stroke affects various domains of QoL, compromising functionality (7–9). However, in Indonesia, few studies on QoL after stroke have been developed(10). Therefore, it needs to develop future care models for stroke patients by improving their QoL.

The coronavirus (SARS-CoV-2) pandemic has created many consequences on delivering health care services for patients, including stroke survivors. As Covid-19 is transmitted via aerosols from person to person or contact physically, individuals undergoing post-stroke physiotherapy services during the pandemic are at increased risk of infection, since contact with other people is often unavoidable on the way to and from the hospital. While, the first 6 months after a stroke is an important period for recovering functional results, thus

sub-acute stroke patients and people with disabilities need to regularly undergo physiotherapy sessions in the hospital. This situation results in patients having a higher risk of contracting the virus. Physiotherapy and rehabilitation are resources that are difficult to access during the pandemic, and stroke rehabilitation services often cannot be offered to patients with stroke on the same scale as during pandemic-free conditions (11). As a result, patients are hampered from reaching the optimal recovery phase. Studies have shown that prolonged immobility in stroke patients can result in significant functional decline(12).

Many post-severe stroke patients experience emotional and personality changes as well as some degree of cognitive impairment. This problem also brings great concern to relatives and is a source of stress-related illnesses. There is a real concern that this could create stress resulting in more physical activity among stroke survivors. Therefore, home-based rehabilitation is an alternative to centralized rehabilitation services that allow remote rehabilitation supervision and eliminate access barriers, especially during the Covid-19 pandemic.

Remote physiotherapy services that are well monitored (supervised physiotherapy) are an important component in helping to speed up functional recovery after stroke in patients. Patients who received supervised physiotherapy recovered 25% faster compared to patients who received therapy after 6 months' post-stroke(13). Supervised home-based rehabilitation means developing a remote monitoring system to facilitate patients' independent therapy within their own homes(12). Thus, physiotherapy sessions can be carried out remotely without a therapist and meeting the patient directly. Home-based rehabilitation involves a physiotherapist assessing the patient's condition, showing examples of rehabilitation movements to the patient or their guardian, and using photos or videos to demonstrate how therapeutic exercises should be performed. Motor, language, and cognitive function can be accessed via video or by using specially designed programs. Previous studies have focused on the use of home-based technology to provide support and guidance by rehabilitation therapists remotely, representing a potential new approach to address access to post-acute rehabilitation care issues for stroke survivors (3,14). Assistive technology provides greater convenience to patients and families and promotes rehabilitation within the patient's home.

Nevertheless, physiotherapy sessions alone are not enough to improve exercise self-efficacy and physical activity levels among stroke patients after discharge from a rehabilitation program. Behavioral interventions are also effective in encouraging engagement and habitual compliance with exercise and physical activity after discharge from a rehabilitation program (15). Educational

programs are designed to motivate and change behavior from a sedentary to an active lifestyle(16). Physical exercise is very important because it has been established as one of the most important principles in physical activity and health promotion(17,18). By increasing the level of exercise efficacy, practitioners will be more effective at increasing levels of physical activity and exercise. Behavioral and psychological approaches through education and counseling are successful in achieving higher levels of physical activity and exercise among individuals, especially in the chronic phase.

Self-care management can offer post-stroke patients to speed up the recovery of their body's condition. Self-care management programs for post-stroke patients not only include health education about stroke and its possible effects but also focus on skills training to encourage patients to be active in managing their health independently and it might have positive impact on their QoL (4,11). Knowledge translation procedures, which include the e-learning process, greatly influence clinical self-efficacy and the practice that has been carried out, although the benefits are not yet significant(5,6,9).

Thus, the influence of e-learning on patient healthcare practices still needs further research. There are several barriers to the practice of cultural change needed to incorporate evidence-based knowledge. Such skills training may include problem-solving, goal-setting, decision-making, and coping skills. Therefore, in carrying out this research, we want to analyze the effectiveness of home-based rehabilitation program services on the QoL among post-stroke patients following the Covid-19 pandemic.

## MATERIALS AND METHODS

This research was carried out by using a prospective longitudinal study design through observing the development of the patient's QoL after stroke within 3 (three) months (June-September 2022). Participants were recruited using a purposive sampling method, using the following inclusion criteria: patients who had been discharged from the clinical rehabilitation center, were willing to undergo a home-based rehabilitation program during the intervention period (3 months), had a score of 3 or more based on the Functional Ambulation Categories assessment (FAC), and does not have cognitive impairment (based on the Mini Metal State Examination/MMSE with a minimum score of 24). Meanwhile, the exclusion criteria are: patients who have a level of consciousness > 0, aphasia ≥ 2, and unilateral neglect ≥ 2 based on the NIH stroke scale questionnaire assessment. Participants were recruited from several post-stroke health service centers in Malang City, including UMM Hospital, Unisma RSI, and Dr. Soepraoen. There were 84 respondents recruited in this study. The home-based rehabilitation program intervention was carried out in the respondent's home for 3 (three) months

with an intervention frequency of 5 times per week, for 30 minutes per session (total 60 sessions). Exercise intervention were given by physiotherapist in the form of lower limb motor coordination exercise (seat to stand, standing marching, heel and toe raises, and single leg stance)(19) which combined with tele-rehabilitation services (video call, video and photo). Intervention were given by individual session and in-person method. While, evaluation assessments were carried out to determine the patient's progress at the end of months 1, 2, and 3 (T0, T1, and T2). The research instruments used were a sociodemographic questionnaire (age, gender, BMI, education level), and the SF-36 questionnaire was used to measure the patient's QoL during the intervention period (3 months). The SF-36 questionnaire scoring assessed the respondent's QoL based on 8 domains, namely: physical function (PF), physical role (PR), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role emotional (RE), and mental health (MH), with total 36 items ranged from 0-100 in each domain where the higher score indicates better patient's QoL. PF domain (10 items) evaluates the ability to perform all types of physical activities including the most vigorous without limitations due to health, while RP domain (4 items) evaluates problems with work or other daily activities as a result of physical health. BP domain (2 items) analyzed limitations due to pain. GH domain (5 items) evaluates personal health. VT domain (4 items) analyzed whether respondents' feels tired and worn out all the time. SF domain (2 items) evaluates whether respondents performs normal social activities without interference due to physical or emotional problems. RE domain (3 items) evaluates whether respondents having problem with work or other daily activities as a result of emotional problems, and MH domain (5 items) assessed whether patients has feeling of nervousness and depression all of the time (20). Then, data collected were analyzed statistically using One-Way ANOVA test with a confidence level of 95% ( $\alpha = 0.05$ ) to see the effectiveness of the home-based rehabilitation program on the development of respondents' QoL over 3 months, and continued by analyzing with the Post-Hoc Test to find out significant differences between 2 treatments ( $p < 0.05$ ). Also, to describe the intervention effect, Cohen's d coefficients were calculated during T0, T1, and T2. The SPSS 20 software was used for all of the analyses (SPSS, Chicago, IL, USA).

### Ethical Clearance

This study has obtained ethical approval from Institutional Review Board (IRB) University of Muhammadiyah Malang with No.E.5.a/183/KEPKUMM/VIII/2023, and prior to data collection, all of the participants has signed

the consent form.

## RESULTS

Table I explained the sociodemographic characteristics of the 84 respondents, and it showed that the average age of the respondents were 62.4 (2.33) years, with the average BMI were 27.8 (3.44). The majority of respondents were male (73.8%), had a university education level (41.8%), and were married (58.3%).

**Table I: Patients Characteristics (n=84)**

|                         | Mean | SD   |
|-------------------------|------|------|
| Age (years)             | 62.4 | 2.33 |
| Body Mass Index (BMI)   | 27.8 | 3.44 |
|                         | N    | %    |
| Sex                     |      |      |
| Male                    | 62   | 73.8 |
| Female                  | 22   | 26.2 |
| Education Level         |      |      |
| Primary Education       | 15   | 17.8 |
| Secondary Education     | 34   | 40.4 |
| University/ College     | 35   | 41.8 |
| Marital Status          |      |      |
| Unmarried               | 35   | 41.6 |
| Married                 | 49   | 58.3 |
| SD = Standard Deviation |      |      |

Meanwhile, based on Table II, which explains the results of the One-Way ANOVA test regarding changes in the QoL among 84 respondents after undergoing a home-based rehabilitation program for 3 months, it was known that during this period, respondents experienced significant improvements ( $p < 0.05$ ) related to the assessment of 8 domains QoL (physical function, physical role, pain, general health, vitality, social function, emotional role, and mental health) during observations at baseline (T0) 1st Follow-Up (T1), and 2nd Follow-Up (T2). Based on the results of the Post-Hoc and Cohen's d test, there were significant improvement between baseline (T0) and 2nd follow-up (T2) in the domains of Physical Function, Physical Role, Bodily Pain, Vitality, Social Function, Emotional Role, and Total Score with effect size of 0.77, 0.23, 0.83, 0.75, 0.32, 0.36, and 0.27, respectively. While, for General Health and Mental Health domains, there were significant improvement from 1st Follow-up (T1)

and 2nd Follow-up (T2), with effect size were 0.34 and 0.48, respectively.

**Table II: Development of participants' quality of life (QoL) over 3-months intervention (n=84)**

|                            | (Mean±SD)                |                                |                                | P value | Effect Size (95%CI)   |                       |                      |
|----------------------------|--------------------------|--------------------------------|--------------------------------|---------|-----------------------|-----------------------|----------------------|
|                            | Baseline (T0)            | 1 <sup>st</sup> Follow-up (T1) | 2 <sup>nd</sup> Follow-Up (T2) |         | T0 vs T1              | T1 vs T2              | T0 vs T2             |
| QoL Domains                | 58.5(31.24) <sup>a</sup> | 62.3(33.22)                    | 64.8(26.33) <sup>a</sup>       | 0.03*   | 0.52(-2.70 to 3.67)   | 0.54(-0.23 to 0.68)   | 0.56 (2.68-3.43)*    |
| 1. Physical Function (PF)  | 58.5(31.24) <sup>a</sup> | 62.3(33.22)                    | 64.8(26.33) <sup>a</sup>       | 0.03*   | 0.56 (-1.34 to 28.65) | 0.23 (-0.85 to 16.43) | 0.77(21.0 to 36.3)*  |
| 2. Physical Role (PR)      | 46.2(20.38) <sup>b</sup> | 48.7(30.01)                    | 52.5(30.22) <sup>b</sup>       | 0.00*   | 0.21 (-0.79 to 26.2)  | 0.00(-15.44 to 17.32) | 0.23(1.6 to 27.3)*   |
| 3. Bodily Pain (BP)        | 64.2(22.98) <sup>c</sup> | 65.8(30.21)                    | 67.9(31.44) <sup>c</sup>       | 0.04*   | 0.78 (-4.23 to 7.17)  | 0.16(-0.18 to 2.98)   | 0.83(5.5 to 8.6)*    |
| 4. General Health (GH)     | 54.0 (21.33)             | 55.2(23.33) <sup>d</sup>       | 58.3(30.26) <sup>d</sup>       | 0.00*   | 0.04(-1.41 to 3.21)   | 0.34 (0.81 to 4.39)*  | 0.43(-1.5 to 5.4)    |
| 5. Vitality(VT)            | 51.4(20.76) <sup>e</sup> | 54.8(22.34)                    | 60.1(28.22) <sup>e</sup>       | 0.03*   | 0.75 (-2.65 to 4.75)  | 0.00 (-0.77 to 0.77)  | 0.75(2.6 to 4.7)*    |
| 6. Social Functioning (SF) | 67.2(23.1) <sup>f</sup>  | 69.5(24.8)                     | 70.3(33.1) <sup>f</sup>        | 0.00*   | 0.32 (-0.75 to 4.64)  | 0.00(-2.47 to 2.47)   | 0.32(0.7 to 4.6)*    |
| 7. Role Emotional (RE)     | 50.7(24.0) <sup>g</sup>  | 55.3(28.1)                     | 57.2(30.4) <sup>g</sup>        | 0.03*   | 0.20 (0.02 to 1.47)   | 0.10 (-0.17 to 0.97)  | 0.36(0.4 to 1.8)*    |
| 8. Mental Health (MH)      | 42.2(11.3)               | 45.7(16.5) <sup>h</sup>        | 51.3(20.3) <sup>h</sup>        | 0.04*   | 0.02(-1.34 to 0.74)   | 0.48 (-4.1 to -1.3)*  | 0.58(-4.2 to 1.7)    |
| General Score              | 58.3(20.1) <sup>i</sup>  | 60.2(21.2)                     | 64.3(22.4) <sup>i</sup>        | 0.00*   | 0.20 (-16.27 to 2.40) | 0.05 (-10.33 to 3.81) | 0.27(-20.6 to -4.5)* |

\*p<0.05;

<sup>a,b,c,d,e,f,g,i</sup> : Post-Hoc test results (significance differences between Baseline (T0) and 2<sup>nd</sup> Follow-up (T2))

<sup>d,h</sup> : Post-Hoc test results (significance differences between 1<sup>st</sup> Follow-up (T1) and 2<sup>nd</sup> Follow-up (T2))

QoL: Quality of Life; SD : Standard Deviation; CI : Confidence Interval

## DISCUSSION

Based on the results of the study show that there is a significant improvement in the QoL in patients who undergo a home-based rehabilitation program for 3 (three) months, which includes aspects of physical function, physical role, pain, general health, vitality, social function, emotional role, and mental health. This is in line with research conducted by(13,21,22) showing that 94% participants experienced significant improvements in independence and QoL, regardless of how severe their impairment was, or whether they had initiated rehabilitation earlier. Apart from that, support from family and the environment is very important and crucial in supporting the success of treatment at home (4,16). Also, the success of rehabilitation is also strongly supported by the patient's sociodemographic characteristics, such as age, education, socio-economic status, and family relationships(13,23), and this is also supported with the characteristics of the respondents in this study, where the majority of respondents were elderly, had a high level of education and good economic status. In addition, most of patients and caregivers also prefer doing home-based rehabilitation as they have the opportunity to be closer to their families(24,25). The home-based rehabilitation program implemented, which includes tele-rehabilitation services, has proven to be a breakthrough for cultural shifts in physiotherapy rehabilitation in Indonesia as home environments might influence participatory experiences by altering roles and relationships, while also providing a familiar and relevant framework for meaningful treatment interaction(26).

Prior to hospital discharge, physiotherapists who include personalized contexts into therapeutic environments can better prepare stroke patients and caregivers for therapeutic engagement at home which might have positive impact on patients' QoL(13). However, this study also has limitations as its only employ one group intervention without any control group. Thus, it will be better for future studies to design control group to maintain on its internal validity. Moreover, as this study only use single geographic location, it is suggested for future studies to employ more geographic location to maintain its generalizability. Although this study has shown significant improvement of QoL domains within three months of follow-up, but it is suggested for future research to conduct long term follow-up time as health is a lifetime issue thus a long-term follow-up is an important part of evaluating any medical condition or treatment(27).

## CONCLUSION

This study resulted there were significant improvements in patients' QoL during the home-based rehabilitation program intervention within 3 (three) months. Therefore, it is highly recommended to integrate home based rehabilitation program which combined with tele-rehabilitation services in the post-stroke health management in Indonesia. It is also strongly suggesting for additional research which is still needed given the study's limitations. Looking to the future, it is needed to advocate strategic actions to optimize home-based rehabilitation for stroke survivors.

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