



## Awareness of the physiotherapists about the importance of using mirror therapy combined with exercises for stroke especially for upper extremity

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### Abstract

Millions of stroke patients are burdened with permanent neurological deficits as a result of physical disability after damage caused by lack of oxygen and glucose supply to the brain. is a key component for treating stroke patients to improve functional outcomes and rehabilitation. Mirror therapy is a technique used to improve motor function after stroke combined with traditional exercises. **Aim:** This study aims to determine the knowledge and the barriers facing the physiotherapist in using mirror therapy combined with traditional exercises among stroke patients. **Methodology:** A quantitative method design was used in this study, and data was collected utilizing a self-administrated questionnaire. The Statistical Package for Social Sciences (SPSS) version 27.0 was used for the capturing and analysis of the quantitative data. Descriptive statistics were employed to summarize demographic information as means, standard deviation, frequencies, percentages, bar charts, and Goodness of fit Chi-square test. **Results:** A total of 98 physiotherapists participated in questionnaire. **86** physiotherapists agreed to participate in the study and the response rate of **87.7%**. The mean age was **(30.74)** year-old (SD= 8.202) and (58.1%) of the sample was female and (86.0%) of the sample was baccalaureate degree. **Conclusion:** The findings revealed that the participants

have good knowledge to using mirror therapy combined with traditional exercises to stroke patients' benefits. They also have the necessary skills and beliefs to incorporate mirror therapy into their practice, the findings confirmed that the participants are well-prepared to utilize mirror therapy in their treatment plan, although there are some of barriers that participants face from using mirror therapy such as the presence of some health problems that prevent the use of a mirror (such as visual problems, dizziness, inability of the upper limb on the unimpaired side to move).

**Key word:** stroke, mirror therapy, physiotherapists.

## **Introduction**

Stroke is an important health problem with a high incidence and mortality that affects a large proportion of the population and causes disability in the survivors. Stroke is a non-traumatic, vascular-induced injury of the central nervous system (Cheung et al., 2014). Stroke is an acute neurological disorder of the blood vessels in the brain that occur when the blood supply to area stop (Bustamante et al., 2021). Many factors increase the risk of stroke as age, heart disease, hypertension, smoking, high blood cholesterol, obesity, diabetes, and a sedentary lifestyle (Alloubani et al., 2018). One of the common consequences of stroke is hemiparesis, which is the partial weakness or paralysis of one side of the body. Hemiparesis can impair the motor function and quality of life of stroke survivors, especially in the upper extremities. Functional loss in the upper extremity causes difficulty in performing daily living activities and causes to become dependent. Physiotherapy intervention supports and promotion of physical recovery after neurological condition (McDonald et al., 2012). According to Spanakis et al. (2022), indicated that most of the therapeutic approaches for neurological rehabilitation include promoting normal movement, controlling abnormal muscle tone, and facilitating function. Korhonen et al. (2020) confirmed that Healthcare professional as physiotherapists able to adopt, apply new approaches and be capable to train their patients during physiotherapy session. The World Confederation of Physical Therapy, (2011) emphasizes that the knowledge and experience of physiotherapists should be used to provide timely and coordinated services, including prevention, treatment/intervention, and rehabilitation. Mirror therapy is a simple, inexpensive, and patient-oriented treatment. Mirror therapy (MT) is a neuro-rehabilitation technique designed to re-modulate cortical mechanism (Thieme et al., 2018). One of new approaches during physiotherapy sessions is mirror therapy and defined as technique used to improve motor function after stroke. Mirror therapy involves the superimposition of the

reflections of healthy extremity movements on the affected extremity for the patient to observe them as if their extremity is moving. A mirror is placed at the midsagittal plane of the patient so that the healthy side image will be superimposed on the projection of the affected extremity (Thieme et al., 2018). MT is based on neuroplasticity due to the theory that the brain recognizes visual feedback prior to proprioceptive or somatic feedback (Lim et al., 2016). Neuroplasticity or the ability of the brain to restructure neural connections, specifically in response to learning or experience or after injury, is a lifelong process (Lauenroth et al., 2016; Spanakis et al., 2022).

## Methodology

The study was conducted in public and private centers of physiotherapy in Az- Zawia city. The study was designed by the quantitative research method. A self-administered questionnaire was used to collect data. The questionnaire was adapted from previous research done by Roy et al., (2021). 98 hard copies of consent forms of questionnaires were distributed to public and private physiotherapy clinics. The population included all available physiotherapists at physiotherapy centers at Az, Zawia city. There was a total of (98) physiotherapists invited to participate in this study, there were (86) physiotherapists responded to the questionnaire. Complete data was captured on a spreadsheet in the Microsoft Excel programme in preparation for analysis. The data was transferred into the Statistical Package for the Social Sciences (SPSS) version 27.0. Descriptive statistics, including frequencies and percentages were employed to provide a description of the study sample. Prevalence tables were used to describe categorical data, while means and standard deviations were used to describe continuous data.

## Results

### Demographic characteristics of participants

All the physiotherapists were invited to participate in the study available in the public and private centers in physiotherapy department at Az-Zawia city. A total of **98** physiotherapists invited. **86** physiotherapists agreed to participate in the study and the response rate of **87.7%**. The demographic characteristic of the study is summarised in table**1.1**. The mean age was 30.74

year- old (SD= 8.202). (58.1%) of the sample was female and (86.0%) of the sample was bachelor's degree.

#### 1.1Table of demographic characteristics of the study sample (n=86).

| Variable | frequency(n) | percentage (%) |
|----------|--------------|----------------|
|----------|--------------|----------------|

|                                                         |    |       |
|---------------------------------------------------------|----|-------|
| <b>Age</b>                                              |    |       |
| 21-30                                                   | 58 | 67.4% |
| 31-40                                                   | 19 | 22.1% |
| 41-50                                                   | 6  | 7.0%  |
| 51-60                                                   | 3  | 3.5%  |
| <b>Gender</b>                                           |    |       |
| Male                                                    | 36 | 41.9% |
| Female                                                  | 50 | 58.1% |
| <b>Academic certificate</b>                             |    |       |
| Bachelor's degree                                       | 74 | 86.0% |
| Master's degree                                         | 8  | 9.3%  |
| PhD                                                     | 4  | 4.7%  |
| <b>Sample distribution based on years of experience</b> |    |       |
| Less than 5 years                                       | 41 | 47.7% |
| 5-10                                                    | 25 | 29.1% |
| 10-20                                                   | 10 | 11.6% |
| More than 20 years                                      | 10 | 11.6% |
| <b>Organization</b>                                     |    |       |
| Public centers                                          | 18 | 20.9% |
| Private centers                                         | 21 | 24.4% |
| Both                                                    | 47 | 54.7% |

### **Knowledge about the importance of using a mirror therapy for stroke patients**

The responses to the questions of knowledge of physical activity promotion were in agree to disagree options and the responses are summarized in table 3.2.

**Table 2.1 physiotherapists knowledge of using a mirror therapy for stroke (n=86) percentage (%)**

| <b>ITEMS</b>                                                                                           | <b>AGREE</b> | <b>DISAGREE</b> | <b>P- value</b> |
|--------------------------------------------------------------------------------------------------------|--------------|-----------------|-----------------|
| Do you have a good background on mirror therapy and its benefits and how to apply it?                  | 66 (76.7%)   | 20 (23.3%)      | 0.000           |
| Do you add mirror therapy to exercises for the treatment of upper extremity stroke patients?           | 43 (50.0%)   | 43 (50.0%)      | 1.000           |
| Can you describe how mirror therapy works on a neurophysiological level?                               | 64 (74.4%)   | 22 (25.6%)      | 0.000           |
| Can you successfully and safely set up the environment to administer mirror therapy?                   | 58 (67.4%)   | 28 (32.6%)      | 0.001           |
| Are you able to teach upper limb mirror therapy techniques to stroke patients?                         | 63 (73.3%)   | 23 (26.7%)      | 0.000           |
| Are you able to educate the patient on how mirror therapy works and how it can be beneficial for them? | 71 (82.6%)   | 15 (17.4%)      | 0.000           |
| Do you believe that patients could benefit from mirror therapy for the treatment of upper extremity?   | 79 (91.9%)   | 7 (8.1%)        | 0.000           |
| Do you believe that mirror therapy is an easy-to-administer therapy for upper extremity?               | 68 (79.1%)   | 18 (20.9%)      | 0.000           |

**Barriers facing the physiotherapist to using mirror therapy combined with traditional exercises with stroke patients**

The responses on questions on barriers to physical activity promotion were in agree and disagree. The responses are summarized in table 3.3

**Table 3.1 physiotherapists barriers to using mirror therapy for stroke patients (n=87) percentage (%).**

| ITEMS                                                                                                                                                                     | AGREE      | DISAGREE   | P-value |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------|---------|
| I don't think that the mirror therapy technique will be effective or useful                                                                                               | 19 (22.1%) | 67 (77.9%) | 0.000   |
| Not having enough time to apply this technique                                                                                                                            | 50 (58.1%) | 36 (41.9%) | 0.131   |
| unavailability of a suitable environment?                                                                                                                                 | 58 (67.4%) | 28 (32.6%) | 0.001   |
| The unavailability of specific mirror dedicated to this technique in the center where I work                                                                              | 62 (72.1%) | 24 (27.9%) | 0.000   |
| The patient's inability to bear the cost of the session when this technique is added (when applying the mirror therapy technique, the price of the session will increase) | 45 (52.3%) | 41 (47.7%) | 0.666   |
| The patient may refuse to apply the technique                                                                                                                             | 44 (51.2%) | 42 (48.8%) | 0.829   |
| The presence of some health problems that prevent the use of a mirror (such as visual                                                                                     | 72 (83.7%) | 14 (16.3%) | 0.000   |

|                                                                                 |  |  |  |
|---------------------------------------------------------------------------------|--|--|--|
| problems, dizziness, inability of the upper limb on the unimpaired side to move |  |  |  |
|---------------------------------------------------------------------------------|--|--|--|

## Discussion

Recent studies showed the efficiency of Mirror therapy (MT) of restoring the motor function of upper extremity (Gurbuz et.al 2016), based on these studies physiotherapists must have full awareness about the efficiency of MT technique and the importance of its role in the basic exercises. Physiotherapists intervention to their patient due to the knowledge and skill in using exercises (Ngarambe, 2011). The results indicate that a majority of the participants in the sample possess a good background knowledge of mirror therapy and understand how to apply it. This study found the majority of the participants believed the patients could benefit from mirror therapy for the treatment of upper extremity and they believed the mirror therapy is an easy-to-administer therapy for upper limb extremity. These results similar to the study conducted in Karachi, Pakistan on physiotherapists by Kumar et al. (2020) indicated Most of the participants believed the mirror therapy is an easy-to-administer therapy and half of the participants appear to add mirror therapy to exercises for the treatment of upper extremity stroke patients. the study found the most of the participants can describe how mirror therapy works on a neurophysiological level and they can possess ability to successfully. In the other study conducted by (Roy et al., 2021) about using mirror therapy for stroke reported similar results that the participants have a high knowledge, good background to using MT and they can able to teach their patient, add the MT to exercises, describe how MT works and they believed their patients could benefit from MT, also they had a good confidence to use MT for stroke. The results of the study found that mirror therapy combined with routine physical therapy showed better results in reducing phantom limb pain according to (Mpemba et al., 2020). While the most previous researches have focused on the efficiency of MT on upper extremity of stroke patient, our study focused on the level of the awareness of physiotherapists and the barrier that prevent the use of mirror therapy. In this study, we found that the majority of the participants (83,7%) reported that “The presence of some health problems that prevent the use of a mirror (such as visual problems, dizziness, inability of the upper limb on the unimpaired side to move...)” as the commonest barrier to use MT, and unavailability of a mirror dedicated to this technique in the center where they work. the cost of the session when this technique is added,

when applying the mirror therapy technique, the price of the session will increase also mentioned by majority of participants that similar to De Silva jaques et al., (2023) done about physiotherapy interventions in Zambia reported the cost of the sessions considers as barrier. While other study done by Bayley et al., (2012) found that most common barriers to implement training as lack of time and study in physiotherapy interventions for stroke done by Mpemba et al., (2020) indicated that the time as common barriers.

## **Conclusion**

The aim of this study was to investigate awareness of physiotherapists toward the importance of adding mirror therapy to exercises to treat stroke patients. This aim was achieved in the current study outcomes, which physiotherapists have a good knowledge on the importance of MT, its benefits and how to apply it, the physiotherapists are well-prepared to utilize mirror therapy effectively in the treatment of stroke patients. the results revealed that there are barriers prevent physiotherapists from adding mirror therapy, such as not having enough time to apply this technique and the presence of some health problems that prevent the use of a mirror (such as visual problems, dizziness, inability of the upper limb on the unimpaired side to move and the unavailability of specific mirror dedicated to this technique in the centers where they work.

## **Recommendation**

Physiotherapists should get beyond any obstacles in the way of integrating mirror treatment with conventional workouts and identify workable solutions.

The significance of combining mirror treatment with conventional exercises should be covered in seminars for physiotherapists.

## **References**

Alloubani, A., Saleh, A., & Abdelhafiz, I. (2018). Hypertension and diabetes mellitus as a predictive risk factors for stroke. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, 12(4), 577-584.

Bustamante, A., Penalba, A., Orset, C., Azurmendi, L., Llombart, V., Simats, A., ... & Montaner, J. (2021). Blood biomarkers to differentiate ischemic and hemorrhagic strokes. *Neurology*, 96(15), e1928-e1939.



Bayley, M. T., Hurdowar, A., Richards, C. L., Korner-Bitensky, N., Wood-Dauphinee, S., Eng, J. J., ... & Graham, I. D. (2012). Barriers to implementation of stroke rehabilitation evidence: findings from a multi-site pilot project. *Disability and rehabilitation*, *34*(19), 1633-1638.

Cheung, R. T. F. (2014). A systematic approach to the definition of stroke. *Austin Journal of Cerebrovascular Disease & Stroke*

Da Silva Jaques, E., Figueiredo, A. I., Schiavo, A., Loss, B. P., da Silveira, G. H., Sangalli, V. A., ... & Mestriner, R. G. (2023). Conventional Mirror Therapy versus Immersive Virtual Reality Mirror Therapy: The Perceived Usability after Stroke. *Stroke Research and Treatment*.

Gurbuz, N., Afsar, S. I., Ayaş, S., & Cosar, S. N. S. (2016). Effect of mirror therapy on upper extremity motor function in stroke patients: a randomized controlled trial. *Journal of physical therapy science*, *28*(9), 2501-2506.

Lim, K. B., Lee, H. J., Yoo, J., Yun, H. J., & Hwang, H. J. (2016). Efficacy of mirror therapy containing functional tasks in poststroke patients. *Annals of rehabilitation medicine*, *40*(4), 629-636.

Korhonen, O., Väyrynen, K., Krautwald, T., Bilby, G., Broers, H. A. T., Giunti, G., & Isomursu, M. (2020). Data-driven personalization of a physiotherapy care pathway: case study of posture scanning. *JMIR Rehabilitation and Assistive Technologies*, *7*(2), e18508.

Kumar, P., Fernando, C., Mendoza, D., & Shah, R. (2022). Risk and associated factors for hemiplegic shoulder pain in people with stroke: a systematic. *PHYSICAL THERAPY REVIEWS*, *27*(3), 191-204.

Lauenroth, A., Ioannidis, A. E., & Teichmann, B. (2016). Influence of combined physical and cognitive training on cognition: a systematic review. *BMC geriatrics*, *16*, 1-14.

McDonald, C. M. (2012). Clinical approach to the diagnostic evaluation of hereditary and acquired neuromuscular diseases. *Physical medicine and rehabilitation clinics of North America*, *23*(3), 495-563.

- Mpemba, M., Shula, H. K., & Chiluba, B. C. (2020). Stroke Disability and Physiotherapy Interventions: A Quantitative Evaluation of Physiotherapy Treatment Approaches in Zambia. *Indonesian Journal of Disability Studies*, 7(1), 92-100.
- Ngarambe, R. (2011). Physical Activity Levels and Health Promotion Strategies Among Physiotherapists in Rwanda.
- Roy, N., Daburger, A., Goodfellow, N., Herr, D., Schramm, M., Eng, J. J., & Louie, D. R. (2021). Mirror therapy for lower-extremity hemiparesis: a knowledge translation study using an educational module to change physiotherapists' perceptions. *Physiotherapy Canada*, 73(3), 218-225.
- Spanakis, M., Xylouri, I., Patelarou, E., & Patelarou, A. (2022). A Literature Review of High-Tech Physiotherapy Interventions in the Elderly with Neurological Disorders. *International Journal of Environmental Research and Public Health*, 19(15), 9233
- World Confederation for Physical Therapy. Policy Statement: Description of Physical Therapy. World Physiotherapy. 2011. Available online: <https://world.physio/policy/ps-description>. PT (accessed on 12 March 2022).
- Thieme, H., Morkisch, N., Mehrholz, J., Pohl, M., Behrens, J., Borgetto, B., & Dohle, C. (2018). Mirror therapy for improving motor function after stroke. *Cochrane database of systematic reviews*, (7).