

UNIVERSITI TEKNOLOGI MARA

**EFFECTS OF MIRROR VISUAL
FEEDBACK THERAPY ON UPPER
LIMB FUNCTION AND BRAIN
ACTIVITY AMONG STROKE
SURVIVORS: A SINGLE-SUBJECT
STUDY**

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ABSTRACT

Upper limb disability is common among patient with stroke. Mirror Visual Feedback (MVF) is a visual stimulation therapy that is a promising approach to improve upper limb function. The mirror therapy process is designed to trick the brain into experiencing movements in the paralyzed limb. There are two types of MVF which is unilateral (moving only one side) and bilateral (moving both limbs). However, the mechanism of this therapy remains unclear. Changes in cortical activity and improving upper limb function after MVF require further exploration. The aims of this study were to explore the changes of upper limb function and brain activities after six weeks of MVF, to compare between two MVF protocols (unilateral and bilateral) and to see if there is any relationship between upper limb function and brain activities in chronic stroke. Single subject design known as withdrawal design was used by using a purposive sample of ten subjects. Ten participants were recruited from rehabilitation department were recommended by the medical doctors. They were assigned either to one of the two groups (unilateral or bilateral group). The participants completed a six-week training which they need to perform two types of exercises, simple movements and functional tasks using foldable MVF. Measurements were taken at four times (weeks 0, 3, 6 and 12) to document the progression in the upper limb function and brain activities. Motor outcomes are evaluated using Action Research Arm Test (ARAT) for activity based and Fugl-Meyer Assessment (FMA) for impairment level, while brain activities looking at mu rhythm, DAR, and BSI captured by EEG. This study showed improvement in the upper limb function in both groups. Moreover, MVF impacted mu rhythm suppression, which increased brain activation and aided upper limb recovery. MVF therapy is easy to apply, and patients can perform it independently. It is also cost-effective. Therefore, it is considered to be useful as part of a rehabilitation program for chronic stroke patients.

Keywords: Electroencephalogram, Mirror Visual Feedback, Stroke

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CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter outlines the background of this study and the problem statement that related to the mirror visual feedback therapy in chronic stroke survivors. This chapter also discusses the study's research objectives, scope, delimitation, and significance of the study.

1.2 Research Background

Research According to a 2016 report, 5.53 million people worldwide suffered from a stroke. Stroke was the second-highest in the ranking based on early death and secondary disabilities (Aziz et al., 2019). The impact of stroke can be devastating and may result in severe deficits, which reduce the quality of life (Hamza et al., 2012). Stroke is the most common cause of disability among adults because it causes both physical and mental problems. It may tremendously impact the patient's functionality or capacity to perform activities (Haghighi et al., 2013).

Loss of the upper limb movement is one of the direct consequences following of stroke. The recovery process from stroke typically takes more than six months, especially in the upper limbs. Evidence has shown that about 83% of stroke survivors learn to walk again, but only 5 to 20% of stroke survivors achieve full functional recovery of their affected upper limbs. Approximately 70% to 80% of stroke people were not recovered from upper limbs disability which could render them reliant on their daily living or family activities (Khandare et al., 2013). Difficulties in daily living activity will decrease the quality of life because it often leads to a dependency on long-term care (Rothgangel & Braun, 2013). In Malaysia, the incidence of stroke is still rising, with over 50, 000 new cases reported annually. Around 40% of working-age individuals were affected by stroke, and up to 70% of post-stroke patients suffer a disability that impedes their ability to perform their daily living activities. Stroke, therefore, places a considerable burden not only on individuals and carers but also to the healthcare system (Ong, 2019).

There is insufficient evidence that some forms of intervention in stroke