

VIRTUAL REALITY (VR) IN STROKE REHABILITATION – POST STROKE ARM REHABILITATION IN VR ENVIRONMENT

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1. INTRODUCTION

Stroke is the rapid loss of brain function due to interruption of blood supply to the brain whether due to blockage (thrombosis, arterial embolism) or hemorrhage. In Malaysia, stroke is the top five killer with 8.43/100000 rate in population [1], it has been one of the major causes for long term disability. An estimated about 40,000 people in Malaysia suffer from stroke every year. The complexity of the brain may affect the stroke patient in various forms including disability of muscle which, impact arm, legs and face. Usually, the side effects of stroke are hemiplegia and hemiparesis. Hemiplegia is the condition which one side of the body becomes paralyzed, while hemiparesis is the condition of one sided weakness, hemiparesis attack roughly about 80 percent of stroke patient. These muscle disabilities will affect daily activity such as eating, walking, dressing up and grabbing object in the same time will reduce the quality of life. To regain the muscle strength loss, stroke patients will need to undergo suitable rehabilitation.

Rehabilitation must starts as soon as 24 hours to 48 hours after stroke attack [2]. Motor impairment could be improved or treated with well planned and organized treatment modules including intense use of active movement in repetitive tasks and task-orientated activities which will result in improving motor skills and muscular strength by preventing muscle spasticity, muscle atrophy and osteoporosis [3,4,5,6]. Previous researchers

illustrated that a discrete and efficient rehabilitative environment can prove to be advantageous in the recovery process. Various approaches were taken into consideration in research to develop technology assisted arm rehabilitation devices including robotic rehabilitation, Virtual Reality (VR) rehabilitation, electrical stimulation and brain stimulation. Patient who participates as the active user of VR is usually immerses in the artificial environment where he or she can interact in a dynamically changing scenario, which the patient participated in. VR has its different capacity in today's improvement in restorative range which most have been utilized by the specialist for surgery reenactment furthermore for mental treatment for the brain.

As it stand VR has fill its need in the improvement of this task for restoration of the stroke tolerant. VR has becomes a popular platform among researchers and rehabilitation specialist in replacing the conventional stroke rehabilitation which is repetitive and boring. It is an effective way of establishing a variable and stimulating environment, allowing the patient to engage in meaningful and motivating therapeutic activities [7]. Despite sometime being less accurate and slower, by using virtual reality as rehabilitation systems for stroke patient is appropriate since results have proven its capacity to improve motor skills [8].

2. STROKE REHABILITATION

Stroke can occur to anyone at any time. Medically, it happened because brain cells die or begin to die since they did not receive oxygen supply due to blood clot or the blood vessel that carry the blood burst. Consequently, abilities such as muscle control and other activity control in our body that is controlled by the dying brain area will be lost. Stroke side effect will differ from one person to another depending on the area of the affected brain cells due to stroke. For severe stroke cases, if not death, stroke patient may be permanently paralyzed on one side of their body. Some patient may even loss their ability to speak. On the other hand for mild stroke, the patient might only have temporary weakness of their leg or arm muscle.