Effect of Oculus Guided Physical Therapy in Adjunct to Conventional Therapy in Frozen Shoulder Patients- A Research Protocol

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Authors’ contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: Frozen shoulder is a musculoskeletal ailment that causes pain and limits the range of motion of the shoulder joint. Traditional therapy, which includes mobilization, has traditionally been utilized to treat and rehab frozen shoulder patients. But, nowadays, virtual reality is also playing important role in rehabilitation programs. This study focuses on effectiveness of oculus guided physical therapy in adjunct to conventional therapy in frozen shoulder patients.

Methods: 50 participants of age more than 40 years having frozen shoulder will be randomly selected and categorized in two groups: Group A (n=25) and Group B (n=25). The duration of study will be 6 months. The pre and post assessment form will be taken from both groups and data will be analysed with the help of outcome measures which includes Numerical Pain Rating Scale (NPRS), Range of motion, Shoulder Pain and Disability Index (SPADI).

Discussion: According to a previous study on maternal brachial plexus injury, virtual reality treatment is more successful than traditional physiotherapy in rehabilitating childrens upper extremity functions.

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1. INTRODUCTION

Frozen Shoulder (FS) is one of the most common musculoskeletal ailments which causes restricted range of motion and pain [1]. Onset of the adhesive capsulitis is at the age of 40 and it is usually appears during sixth decade of life [2]. Frozen shoulder patients typically experience gradual loss of passive range of motion which also leads to loss of active range of motion with insidious onset of discomfort. Most common complaints is a limited external rotation (ER) especially in a dependent position with the arm down by the side. Frozen shoulder subjects usually are unable to perform overhead activities, dressing, grooming etc [3].

Frozen shoulder is primarily a condition of unknown aetiology. Secondary frozen shoulder can be caused by a variety of predisposing factors like post-surgery or post-injury, or any known cause such as diabetes mellitus, cardiopulmonary diseases, cervical disc pathologies [3].

Frozen shoulder is categorized into three stages. Freezing is the painful stage and lasts for about 8-36 weeks, pain is gradual in onset and it worsens typically at night. Frozen stage last for 16—48 weeks and is characterized by progressive decrease in shoulder range of motion. Gradual return of range of motion experienced by patients during thawing stage takes 5-26 months [3,4,5]. Many patients may experience symptoms 6 years after the onset of the disease. Its annual incidence will calculated as 2.4 per 100000 people in a primary care observational survey, with prevalence ranging from less than 1% to 2% of the population [6].

However, for medical management of frozen shoulder, various operative and non-operative treatments are used, but for its administration, there is no accurate confirmation. Due to lack of good quality evidences, medical management strategies used to vary from higher international level to primary departmental level [6]. For management of frozen shoulder, there are conservative and operative methods.

Primarily, it is managed conservatively. Conservative management includes physical therapy, medications such as NSAID, corticosteroids etc. Physical therapy has been shown to be useful in lowering pain and restoring functional range of motion in previous studies. Physical therapy with combination of NSAIDs is more impressive in treatment of frozen shoulder. Also, intra-articular corticosteroids with physical therapy shows better improvement [5].

The aim of treatment of frozen shoulder are to reduce pain and to regain range of motion. Conservative treatment method includes medications and various physical therapy interventions. According to our standard books, conventional physical therapy includes variety of modalities such as electrotherapy, massage, exercises etc. Ice therapy, TENS (transcutaneous electrical nerve stimulation) and LASER (light amplification by stimulated emission of radiations). According to studies, in additional these modalities other modalities like mobilization techniques are also effective [7].

Maitland mobilisation is a process of evaluation, assessment, and treatment of musculoskeletal disorders via manipulative physiotherapy, according to the International Maitland Teachers Association (IMTA) [8].

Nowadays, in addition to conventional therapy, Virtual Reality (VR) is one of the new form of rehabilitation and treatment settings. Virtual reality uses computer stimulation to build a virtual world in three dimensions. It stimulates the senses of sound and sight, and most importantly, it makes consumers feel engaged in it. Interaction, Immersion, and Imagination are three basic components of VR. Recently, in the medical and rehabilitation professions, virtual reality is employed as a therapeutic aid [9]. Virtual Reality (VR) is a technology that allows patients to do numerous actions in a fun and somewhat realistic three-dimensional environment [10].

Oculus is one of the most advanced PC-powered gaming VR headset. Hand Physics Lab on Oculus quest is a game that control user hands and fingers to interact physically with virtually created environment and other objects [11]. With the help of VR headset, various exercises can be performed such as shoulder-elbow exercise. Hand Physics Lab, available on Oculus Quest, is a game that may be used to detect user movements and improve range of motion [12,13].
According to a previous study on maternal brachial plexus injury, virtual reality treatment is more successful than traditional physiotherapy in rehabilitating children's upper extremity functions [10]. Therefore, VR based exercise program for rehabilitation can be used as alternative to conventional therapy in chronic frozen shoulder patients. VR-based rehabilitation for shoulder range of motion can be given in both inpatient, outpatient and home exercise program [14,15].

However, there have been no studies on the effect of oculus guided physical therapy in patients with frozen shoulder to date. As a result, the purpose of this research is to see how effective oculus guided physical therapy is as a supplement to standard therapy in patients with frozen shoulder.

2. METHODOLOGY

2.1 Study Setting

This study will be carried out on patients from Musculoskeletal OPD, Musculoskeletal physiotherapy department, Ravi Nair Physiotherapy College, Sawangi (Meghe).

2.2 Study Design

Randomized Control Trail.

2.3 Sample Size

Total 50 of patients will be used for the study and will be grouped into; (Group A- 25, Group B- 25).

2.4 Participants

2.4.1 Inclusion criteria

The study will involve patients aged 40-60 years of both genders with idiopathic or primary frozen shoulder in stages 2 or 3.

2.4.2 Exclusion criteria

Diabetic patients or patients with history of surgery on the same or affected shoulder. Patients with rheumatoid arthritis or a history of fracture and dislocation of the same shoulder.

2.5 Study Procedure

A simple random method will be used for assigning patients in 2 groups, 25 each (envelope method.) In which 25 envelopes will be labeled as Group A and 25 envelopes labeled as Group B and were mixed.

Group A: Interventions will be Oculus guided physical therapy and Maitlands mobilization.

Group B: Interventions will be Conventional therapy which includes Maitlands mobilization.

Patients in Group A will receive Oculus-guided physical therapy, which will include abduction, adduction, flexion, extension, internal and external rotation, as well as Maitlands mobilization, whereas patients in Group B will receive traditional therapy, such as Maitlands mobilisation. These envelopes were kept with registration clerk who handed over it to the patients on their visit and enrolling them for the study. In this way allocation bias were eliminated.

Group A: It includes Oculus guided physical therapy and Maitlands mobilization. Oculus guided physical therapy program involves upper extremity movements of the affected limb in flexion, extension, abduction, adduction, flexion, extension, internal and external rotation with the help of Hand Physics Lab on oculus quest. Therapist will demonstrate the use of Hand Physics Lab on oculus quest to the patients. In addition to Oculus guided physical therapy, Conventional therapy i.e. Maitlands mobilization can be given to the shoulder in grade 3 and grade 4. Maitlands mobilization Grade 3 is large amplitude movement at the end of the range and grade 4 is small amplitude rhythmic oscillations performed at the end of available range of movement. This treatment program is practiced for 2 weeks, with every session of 15-20 minutes daily.

Group B: It includes Conventional therapy which consists of Maitlands mobilization to the shoulder joint with grade 3 and grade 4. This intervention will also be given for 2 weeks, with every session of 15-20 minutes daily. For restricted range of frozen shoulder patients, Maitlands mobilization is performed on the patients daily, for 2 weeks.

2.6 Outcome Measures

2.6.1 Numerical pain rating scale

The Numerical Pain Rating Scale (NPRS) is a tool for assessing pain intensity. Its a one-dimensional scale with a range of 0 to 10. The lowest rating is 0, which indicates no pain, and the highest value is 10, which represents the most severe agony. This scale is easy to use take less than 1 minute for assessing pain. Its use is significant in chronic diseases.
2.6.2 Range of motion

The extent of movement across the joint is measured in degrees of circles, which is known as range of motion. It is a measure for assessing active, passive or combination of both joint movement.

2.7 Shoulder Pain and Disability Index (SPADI)

(SPADI) is a questionnaire with 13 items in it which is used to assess the pain level and the difficulties with performing upper-extreme activities of daily living (ADLs). The pain subscale contains five items, whereas the disability subscale contains eight. The patient is asked to choose a number that best depicts their level of pain and difficulty in doing the task. The pain scale adds up to 50 points, whereas the disability scale adds up to 80 points. As a percentage, the total SPADI score is calculated.

2.8 Data Collection

Information about study given at time of recruitment (elaborating the purpose, nature, procedure, benefits and after effects of the intervention) with all baseline tests and assessment will be repeated on 2 more occasions.

2.9 Statistical Analysis

Data collected will be analysed using SPSS latest version. All statistical analyses would be conducted with a 95% confidence interval (p-value < 0.05) to assess effect of two measures. Individual studies will be assessed for homogeneity of the two study classes using the Students t test. Mann-Whitney U will be used to compare Groups at the start of the study.

3. DISCUSSION

This will be the first study to investigate the effect of Oculus guided physical therapy in addition to traditional therapy in frozen shoulder patients, as far as we know. Virtual reality is currently being used in rehabilitation and therapeutic programmes [15]. Virtual reality produces a virtual world in three dimensions and provides an engaging
and realistic three-dimensional environment for users. Traditional therapy for frozen shoulder patients, including Maitlands mobilisation, has been employed in the past and has proven to be effective. However, in this study, in addition to traditional therapy, such as maitlands mobilisation, Oculus guided physical therapy will be used to compare the effectiveness of both modalities utilising the Hand Physics Lab on Oculus quest. Finally, the findings of this study will be useful in determining the efficacy of both therapies in Frozen Shoulder patients. The Numerical Pain Rating Scale (NPRS), Range of Motion, and Shoulder Pain and Disability Index (SPADI) are the study's end measures. These measures will be useful for assessing pain, restricted shoulder range of motion, and activities of daily living.

4. CONCLUSION

Conclusion will be drawn after the sample collection process is completed and statistical analysis is done. The study will be concluded accordingly.

CONSENT

Principal Investigators will obtain the written informed consent from the participant on a printed form (local language) with signatures and give the proof of confidentiality.

ETHICAL APPROVAL AND DISSEMINATION

The participant individuals of the study and DMIMSU who will fund it will be able to retrieve findings of study. After completion of study and publication of results data will be stored in the DMIMSU data repository.

CONFIDENTIALITY

The study program will be explained to the participant, the principal investigator will take subjective information. The consent form will include the confidentiality statement and signatures of the principal investigator, patient and a witnesses. If required to disclose some information for the study, consent will be taken from the patient with complete assurance of his confidentiality.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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