



IMPACT OF VIRTUAL REALITY EXERGAMING AND CONVENTIONAL PHYSIOTHERAPY IN STAGE 2 FROZEN SHOULDER PATIENT: A CASE REPORT



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ABSTRACT

Introduction- Frozen Shoulder which is also called as Periarthritis of shoulder joint. It is commonly seen in 40-60 years of age group. When the tendon gets inflamed from a long period of time it leads to Frozen Shoulder due to involvement of Subscapularis, Supraspinatus, Infraspinatus and Teres minor muscles and marked restriction in the movements which cannot be performed by the patient itself or by the help of therapist. Moreover, injury leads to inflammation of joint capsule which lead to pain and joint stiffness. **Aim and objective** of this case study is to check the effect of Virtual Reality and Conventional Physiotherapy in the patient having Frozen Shoulder. Outcome Measure were Pain and functional disability measured by Shoulder disability and disability index scale (SPADI), Range of Motion (ROM) measured by Universal Goniometer, Kinesiophobia was measured through Tampa Scale of Kinesiophobia (TAMPA) and Sleeping routine was checked through Pittsburgh Sleep Quality Index (PSQI). **Conclusions-** Four weeks of intervention, thrice a day in a week showed marked improvement in pain, Rom, fear of avoidance, sleep quality through Virtual Reality exergaming and Conventional Physiotherapy in Frozen shoulder patient.

Keywords: Virtual reality exergaming, Frozen shoulder, Pain, Function, Sleep, Tens.

INTRODUCTION

Frozen Shoulder is characterized by sharp pain and stiff joint involving glenoid cavity of scapula and humerus forming shoulder joint. It has also been named as a Periarthritis of shoulder joint or Adhesive Capsulitis. The women are more prone to Frozen Shoulder as compared to men. Moreover, it has been seen that both the shoulder joint is affected in it but some develops it in unilateral side. It is commonly seen in 40-60 years of age group.^[1] The primary cause is it is idiopathic in onset due to injury or operation. The secondary cause is due to shoulder pathology like fractures and dislocations around the shoulder, rotator cuff tendinitis, bicipital tendinitis.^[2] The non- shoulder causes is diabetes which is the most important comorbidity mainly insulin dependent, increase in level of thyroid hor-

mone, lack of blood supply to heart, joint inflammation, degeneration of spine in neck, complication of Colle's fracture and reflex sympathetic dystrophy.^[3] The possible mechanism of frozen shoulder is while performing same activities beyond the range of shoulder joint which causes load on the muscles mainly supraspinatus. It follows a sequence leading to redness, swelling, increase in local body temperature and pain causing hardening of the capsule present in shoulder joint. The work performed for a longer period of time damages the muscles surrounding the scapula and gives the burden on the joint leading to fibrosis of capsule present in the shoulder joint and finally the marked restriction in the function of shoulder. There are 3 clinical stages of Frozen Shoulder Stage 1- Freezing Phase (10 -36 weeks), Stage 2 -Frozen Phase (3-18 months), Stage 3- Thawing Phase (12-42).^[4]

Virtual Reality is a computer-aided learning for the people to interact with the help of atmosphere which is created while providing the immediate response of task.^[5] It works on the principle to enhance the skills while using the muscles which comprise of the number of times the action performed, potency, goal directed and keeps the patient engaged in its work.^[6] It also adjusts the requirement of the patient and alters the level of hardness to achieve the goal. It proved to be beneficial in the patient suffering from Frozen Shoulder.^[7]

The Conventional Therapy which was utilized in the treatment protocol of physiotherapy session was Ultrasound therapy which is the form of thermotherapy and leads in decreasing the pain in acute phase and chronic phase.^[8] The Ultrasound works on the principle of Piezoelectric effect and the electric current is transmitted with the help of transducer which contains quartz barium titanate or a lead zirconate crystal that deforms when subjected to various potential difference and is disseminated in the body. It is used for superficial tissue with 3 MHz frequency and for deep penetration 0.75 to 1 MHz frequency. The vibration in the molecules present in the tissues is produced by the sound waves. The ultrasonic gel is used as a conducting medium and ultrasonic therapy helps in reduction of pain.^[9] TENS is the form of electrical current which is of low intensity leading to decrease in pain. It works on blocking the pain and alters the level of pain. The 3 forms of TENS are High TENS, Low TENS and Burst TENS which varies in intensity and frequency. The frequency of TENS most commonly used is 100-150 Hz, in continuous mode with 12-30mA intensity for time duration of 10 -15 minutes.^[10]

CASE STUDY

A 58 years old male, right hand dominant, shopkeeper by his occupation was having pain in right shoulder since last 2 months. Pain was sudden in onset, progressive, dull, achy and was scored as (9/10) on VAS scale. Patient complains of discomfort during sleeping on right side, plucking the flowers and while keeping the purse in back pocket which was very painful for the patient and the pain got relieved on changing the position from lying to sitting. The patient had an appointment with orthopaedic surgeon in Sharda Hospital one month ago where doc-

tor prescribed him corticosteroid injections and pain killer for relief from pain. The patient had no improvement in pain and doctor gave him suggestion for visiting physiotherapy department in Sharda Hospital. Initially the assessment was taken of the patient where he had no family history of diabetes, no past drug history, no surgical history along with no social history of smoking, alcohol.

On observation there was no swelling, redness and no rise in local body temperature in comparison with non-affected side of shoulder. The baseline measurement was taken for Pre and Post session for pain and Functional disability was checked through SPADI (Shoulder Pain and Disability Index), ROM was measured by Universal Goniometer, Kinesiophobia was measured through Tampa Scale of Kinesiophobia (TAMPA) which was one of the most important sources of information for checking the self-intuition of the patient and Sleeping routine was checked through Pittsburgh Sleep Quality Index (PSQI) which was the essential index in analysing the sleeping habits during the past month of the patient.

Patient was diagnosed with Frozen Shoulder (Stage 2-Frozen Phase). The protocol was planned for the patient thrice a week for 4 weeks. Total session were 12 sessions. On first day of physiotherapy session the Virtual Reality Exergaming was used with bobo motion sensor and patient was provided with an environment to concentrate his mind while playing submarine game. The patient was instructed to perform 10 Repetitions, 2 sets each with 30 seconds rest of Flexion, Abduction, Internal Rotation, External Rotation actively till Day 8 session. On Day 9 session the patient was instructed to play car game while increasing the level of difficulty and performing 15 Repetitions, 4 sets each with 1 minute rest till last Day of 12 sessions. The electrotherapy modality was used in combination like TENS (Trans cutaneous electrical nerve stimulation) in Asymmetric biphasic mode with 150 Hz frequency and the intensity was set according to level of tolerating capacity for 10 minutes to control the pain as it works on Pain-Gate-Control theory. The next deep heating modality was used for the patient was Ultrasound Therapy with 1.5 W/cm² intensity, frequency 3MHz in continuous mode for 10 minutes of time duration.

On the termination of physiotherapy session, the patient gave positive feedback that he had a significant relief from physiotherapy but no relief from medicines .

Table 1: ASSESSMENT OF RANGE OF MOTION

MOVEMENT	RIGHT PRE	RIGHT POST
Shoulder Flexion	96°	170°
Shoulder Abduction	62°	110°
Shoulder Internal Rotation	20°	45°
Shoulder External Rotation	5°	25°

Table 2: SPADI SCORES

PRE	POST
72%	25%

Table 3: TAMPA SCORE

PRE	POST
60	45

Table 4: PSQI SCORE

PRE	POST
8	4

DISCUSSION

The current case study shows that during the treatment of Frozen Shoulder the benefits of Virtual Reality and Conventional Physiotherapy were evaluated. [5] The treatment protocol was started while using Virtual Reality computer-aided learning for the people to inter-react with the help of atmosphere which is created while providing the immediate response of task. [6] It has shown the remarkable performance in the patient as it has enhanced the confidence of the patient to perform exercise without bothering about the pain.

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The Conventional therapy in the form of Ultrasound was used as a deep heating modality for decreasing the pain and inflammation. It consists of Transducer which is made up of piezoelectric substance, consumes the electric current and emits the sound waves which is disseminated from skin to deep tissues present in the body. [8] It is used for superficial tissue with 3 MHz frequency and for deep penetration 0.75 to 1 MHz frequency. It also leads to enhance the blood flow and healing effect so that the intensity of pain is decreased in the patient and the patient can carry out the daily activities without any discomfort. [9]

The next modality which was applied on the patient was TENS (Transcutaneous Electrical Nerve Stimulation). It works on Pain Gate Control Theory and Pain modulation. It uses low frequency current for subsiding the pain based on symptoms and to arouse the sensory nerves. These currents are excruciating at very high intensity to the patients. The frequency of TENS most commonly used is 100-150 Hz, in continuous mode with 12-30mA intensity for time duration of 10 -15 minutes. [10]

CONCLUSION

The effectiveness of Virtual Reality and Conventional Physiotherapy was examined in the patient in the form of case study. Moreover, the consequences of Virtual Reality and Conventional Physiotherapy was incorporated to see the outcomes in large number of patients who were seeking the treatment with the help of this technique. The benefits of above mentioned Physiotherapy lead to pain reduction, simultaneously increasing functional independence and reduction in fear of avoidance and improvement in sleep pattern and quality.

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