

Virtual Reality in the Management of Lower Limb

CRPS: Case Study

Laura O'Brien, Specialist Pain Physiotherapist, NHS Fife Laura.obrien@nhs.scot



Introduction

High engagement and satisfaction with rehabilitative use of virtual reality (VR) headsets has been found in chronic pain populations. Darnall et al 2020 suggest VR could provide an increase in activity levels with the advantage of low levels of adverse effect. They showed that use of an oculus go VR headset reduced pain intensity and its impact on activity, mood and sleep.

Complex Regional Pain Syndrome (CRPS) involves the immune, nervous and vascular systems. Although it can resolve, 15-50% of sufferers can develop persistent symptoms. VR in CRPS can influence pain intensity and improve function (Sato et al 2010; Solca et al 2018; Chau et al 2020). Sato et al (2010) showed a 50% reduction in pain intensity after 3- 8 sessions.

The participant in this case study is a 31 year old male who had sustained a medially displaced calcaneus which required surgery. He was referred to Pain Services in 2017 and continued to receive pain education, desensitisation, graded motor imagery and exercises which had started in Physiotherapy 2 years previously. Despite intensive input he continued to struggle placing his foot on the ground with weight bearing in standing causing pain exacerbations.

Aim

The aim of the project was to investigate the use of VR(oculus quest 2) on CRPS in a clinical setting and improve the Brief Pain Inventory (BPI) by 2 points (clinically significant minimal amount).

Methodology

Outcome measures (NRS, BPI, PSEQ) were collected pre and post treatment throughout the pilot.

The applications "Beatsaber" for active movement and "Flowborne" for biofeedback meditation were used by the participant in a seated position. The duration was gradually increased as tolerance of foot placement on the floor improved. Graded exposure was used to increase tolerance with 3 minutes placement and 30 seconds rest. As tolerance and confidence improved, standing posture was adopted on initiation by the participant and the hand tracking app "First Hand" was added.

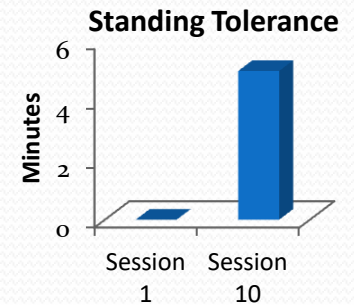
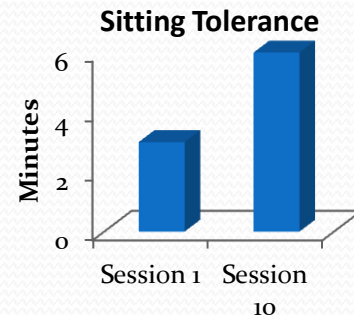
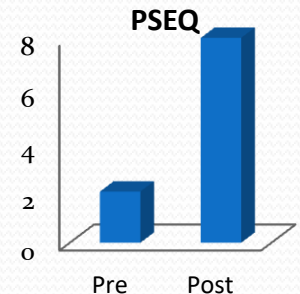
10 sessions with a build up to a maximum of 30 minutes was provided but home use of a personal VR headset was also encouraged.

Results

BPI showed a reduction in the Pain severity by 0.5 points, while the pain interference showed a reduction of 0.43. Neither of which were statistically or clinically significant.

PSEQ demonstrated a 6 point difference within 10 sessions which can be considered clinically significant.

Documenting tolerance levels from Session 1 to Session 10 showed a doubling in their sitting tolerance from 3min to 6min as well as a 500% improvement in their standing tolerance from 0min to 5min.



Discussion and Conclusion

Although the pilot did not meet the aim of a minimal clinically significant amount on the BPI, the participants weight bearing tolerance has significantly increased over 10 sessions which had not been achievable over 5 years with more established clinical treatments.

It may be that the VR was able to alter neural functioning in a different way to previous treatments but the mechanisms behind this process are unknown. Further studies with larger participant numbers are required to investigate the effects of VR in this CRPS population.