Can visuomotor illusions improve shoulder pain, function and range of motion in people with adhesive capsulitis? A systematic review and meta-analysis

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Summary

Adhesive capsulitis (AC) is a shoulder musculoskeletal disorder characterized by pain and loss of movement, often lasting for >1 year. Conventional approaches to treatment typically target tissular adherences and flexibility. However, since chronic pain and limb immobilization are known to cause negative changes in the central nervous system, could therapeutic approaches targeting the brain, like visuomotor illusions (VMI), be effective in cases of AC? The goal of this systematic review and meta-analysis was to compare the efficacy of visuomotor illusions versus any control group or intervention to reduce pain, improve functional status and shoulder mobility.

Introduction

AC is a musculoskeletal disorder affecting around 5% of the population, mostly women and individuals between the ages of 50-70 years [1]. This condition causes severe pain and loss of movement, generally lasting between 1- 3 years. The etiology of AC is not well understood, hence challenging its prevention and treatment. To date, conventional approaches include different types of daily exercises, manual therapy and pain relief medication. Invasive approaches, such as corticosteroid injections, arthrodilatation, or surgery, are used when conventional approaches fail. All these treatment modalities focus on improving the strength and flexibility of shoulder tissues, without considering the brain as a potential target for AC management. Yet, chronic pain and immobilization are known to cause negative plastic changes in sensorimotor control networks. In recent years, there has been growing interest in VMI therapy targeting the central nervous system for musculoskeletal conditions like AC, such as graded motor imagery [2], mirror therapy [3] and action observation therapy [4]. They showed promising improvements, but the quality and strength of the findings remain unclear. The goal of the present systematic review and meta-analysis was to critically assess the impact of VMI therapy in people with AC.

Methods

Following PRISMA guidelines, the literature search was conducted in three databases (PubMed, SPORTDiscus and CINAHL) between October 2023 and November 2024 using a standardized search strategy. Additional relevant studies were hand-searched in the reference lists of the papers selected for the review. Two independent evaluators screened all studies according to the selection criteria. The MMAT was used to evaluate the quality of each article. A meta-analysis was realized when enough data was collected for active and passive range of motion, pain, and the *Shoulder Pain and Disability Index* (SPADI).

Results and Discussion

Eight studies met the inclusion criteria for the systematic review, and six articles were included in the meta-analysis. Varying quality levels, low sample sizes and missing data limit the quality and strength of the available evidence. Moreover, our results showed an unclear added value of VMI approaches compared to conventional therapies. The meta-analysis showed a significantly higher gain of active flexion for VMI compared to control groups ($p = 0.04$) with an overall large effect size (0.91 - Figure 1). However, 95% confidence intervals and heterogeneity across studies were high, and results for the other outcome measures (pain, SPADI, external rotation) were non-significant.

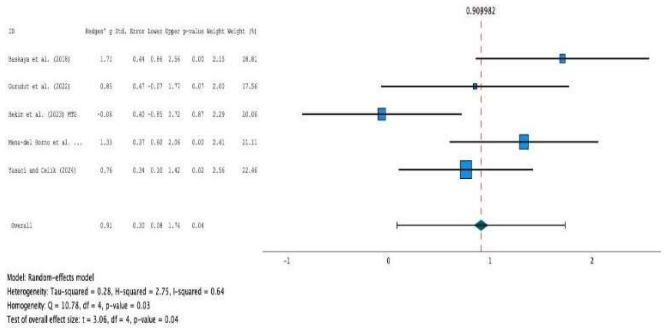

Figure 1: The Forest Plot for active shoulder flexion analysis

Conclusions

Results from the present review suggest an unclear, but still promising usefulness of visuomotor illusions for AC management. There is a need for further investigations into this topic, especially for well-designed randomized controlled trials of higher sample sizes. Based on the overall effect sizes from our meta-analysis, future studies should recruit at least 32 participants per subgroup to replicate the reported effects with 95% power.

References

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