

## SCAPULAR CLINICAL ASSESSMENT AND THERAPEUTIC EXERCISES FOR CHRONIC SHOULDER PAIN: A NARRATIVE REVIEW

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### 1 INTRODUCTION

Previous studies have reported that a significant proportion of the general population will experience shoulder pain at some point of their lifetime [1], which could lead to disability [2]. Particularly, cases that evolve into chronic shoulder pain can further compromise shoulder function. Among the different joints of shoulder complex that could be involved in these conditions, the scapulothoracic joint, possibly due to its major role in the shoulder function and upper limbs' activities [3], is commonly associated with changes in scapular kinematics and related muscular activity [4, 5]. These findings, related to the chronicity of shoulder pain and to motor control adaptations, along with epidemiological data on this common musculoskeletal condition [1], justify the continued search for more effective rehabilitation approaches.

### 2 MAIN OBJECTIVE

The present narrative review aimed at contributing to the improvement of clinical reasoning in shoulder pain rehabilitation, by searching for and compiling several clinical tests available to assess scapular biomechanical adaptations as well as by identifying appropriated scapular therapeutic exercises that can be tailored to the specific needs of each subject, based on their clinical presentation. Secondly, the review seeks to propose an algorithm that integrates the aforementioned clinical tests and scapular therapeutic exercises to aid in planning the intervention for patients with chronic shoulder pain related with scapular adaptations.

### 3 METHODS

To identify each subject's needs, several laboratorial and clinical methods are available to assess the mechanics and function of the shoulder complex. From these, methods specifically focusing on the scapula's role and biomechanical adaptations have already been emphasized in the literature,

given the relevance of directing and tailoring chronic shoulder pain rehabilitation programs based on scapular movement impairments, and of understanding the relationship between scapular adaptations and the patients' symptoms [4]. Clinical tests – those that are readily available, are easy to perform in the clinical practice, provide immediate results, and that have established guidelines for application despite their inherent subjectivity [3] – were highlighted and used to develop the rationale for an intervention algorithm. Then, a search for therapeutic exercises appropriated to recruit or stretch the scapular muscles in subjects with shoulder pain and/or scapular adaptations was conducted. Neuromotor/strengthening scapular therapeutic exercises were considered if they elicited scapular muscle activity level higher than 20% of the maximal or the reference voluntary isometric contraction [6]. Stretching exercises were selected if targeted scapular muscle commonly reported as overactive or tight in cases of shoulder pain [4, 7].

#### **4 RESULTS**

Few clinical tests have been proposed to assess scapular adaptations, namely considering scapular kinematics or muscle function, strength, and length. Among the thirty studies reviewed and considered on scapular therapeutic exercises, numerous exercises were identified as effective for stretching or recruiting scapular muscles. The information gathered was used to develop a structured rationale, particularly through an algorithm designed to assist in the decision-making process of shoulder pain rehabilitation.

#### **5 CONCLUSIONS**

Tailoring exercises based on scapular-focused clinical tests and individual patient needs and goals can potentially enhance the rehabilitation process for individuals with shoulder pain related with scapular adaptations.

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