MEDICAL SCIENCE

Rhomboid muscle spasms among the population of Saudi Arabia

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ABSTRACT

Background: The objective of the study was to study Rhomboid muscle Spasms among the population of Saudi Arabia. *Methods*: This cross-sectional study was conducted in different regions of Saudi Arabia. Individuals aged above 18 years of age were selected by cluster random sampling technique. The data was collected by filling out a pre-designed online questionnaire. *Results*: A total number of 316 participated in the study; among which there were 61% males and 39% were females of age group of 18-30 years. Rhomboid muscle spasm (RMS) was reported among 188 (60%) of the participants. Over a third (36%) had spasms at least once a year and nearly half (42%) had them at least once a month. Wrong sitting posture (cited by 86%), mental or emotional stress (36%), and lifting heavy weights (24%), were cited as the most common causes of these cramps. The general practices for the treatment of spasms reported by the patients were use of topical muscle relaxant 60%, 32% of them used painkillers and 32% applied warm or cold compresses to the area. *Conclusion*: There is a high prevalence of rhomboid muscles spasm among the population of Saudi Arabia. Rhomboid muscle spasm is frequently misdiagnosed among adults due to the subtle medical diagnosis and precise anatomical localization of the rhomboids.

Keywords: Rhomboid Muscle Spasm, Incidence, Questionnaire, Cross-sectional study, Saudi Arabia

1. INTRODUCTION

Rhomboids are a joint group of muscles consisting of large and small rhomboid muscles. Rhomboids are significant in order to facilitate arm and shoulder motion and the stabilization of both the scapula and shoulder girdle. Both rhomboids are innervated from the dorsal nerve of the scapula and its vascular source is the dorsal scapular artery. Variations have been found in the rhomboidal musculature, but they are very infrequent. Clinical diseases associated with the rhomboid muscle include rhomboid paralysis and winged scapula, however rhomboid muscle surgery is uncommon (Mitchell et al.,

2021). Rhomboid comprises two distinct muscles; major and minor muscles that lie deep in the trapezius (Martin and Fish, 2008).

The rhomboid minor muscle is derived from the C7, T1 vertebrae and the ligamentum nuchae and is cylindrical in shape. It is attached to the scapula at the medial border, adjacent to the scapular spine base. The major rhomboid is the trapezius muscle sited below the lesser rhomboid and is quadrangular in shape (Beger et al., 2018). The rhomboidal muscles are derived from the vertebral spinous processes from T2 to T5 and are attached to the scapula at its medial border just below the rhomboid minor (Paine and Voight, 2013). With the help of various muscles, the rhomboids support forms the shoulder girdle. These muscle groups are vital for upper limb movement and as a means of strengthening the shoulder by connecting it to the body.

The scapula is elevated by the functional retraction, rotation and raising action of the rhomboids. The medial edge of the scapula is lengthened and held securely against the back of the chest by these muscles as well (Martin and Fish, 2008). The weakening, loss of the function or dysfunction of the rhomboidal nerves lead to loss of scapula curvature at its medial border and inferior angle of the scapular rotation (Marecki and Wosicki, 1987). The largest organ is the skeletal muscle, which makes up to 50% of its weight (Martin and Fish, 2008; Beger et al., 2018; Paine and Voight, 2013).

Myofascial trigger points (MTrPs) are a common problem around the world and can affect any muscle in the body. They are foci of tenderness caused by excessively contracted muscle tissue that form taut bands or small knots in the pathological microscopic part of the image, causing pain and spasm due to the surroundings (Marecki and Wosicki, 1987). When it occurs in a localized group of muscles or a single muscle producing sensory, motor and autonomic symptoms, it is known as myofascial pain syndrome (MPS), which can be acute or chronic (Zhuang et al., 2014).

The majority of the population will suffer from myofascial pain at some time in their life; in fact, 85% of the population will do so (Zhuang et al., 2014; Farrell and Kiel, 2022). MTrPs can affect the rhomboidal muscles, causing muscle spasms and radiating pain along the shoulders (Farrell and Kiel, 2022). Rhomboidal muscle spasm is a common problem found in orthopedic and physiotherapy clinics in the Saudi Arabian community with very minute research on it. To fill this gap this research was conducted to study the prevalence of rhomboid muscle spasms among the population of Saudi Arabian. Furthermore, this study also focused to learn more about the potential dangers of rhomboid muscles and exploring the treatment modalities commonly used for management.

2. MATERIALS AND METHODS

Study design

This cross-sectional observational study was carried out from May 2021 to April 2022 among residents of different regions of Riyadh region. General adult population different municipal districts were interviewed for rhomboidal muscle spasm. The study was supervised by the Orthopedic Department at Majmaah University.

Sample

A total of 316 persons responded to the questionnaire out of 500. 194 males and 122 female respondents enrolled for muscle rhomboid spasm.

Data collection

A cluster random sampling technique was used to recruit Saudi and non-Saudi residents of the province.

Study tool

An online questionnaire was used as a tool for data collection. An online questionnaire containing multiple choice answers with main variables of pain intensity, pain duration, pain management treatment modalities and patient's quality of life.

Inclusion criteria

Inclusion criteria involve patients of both genders. Patients aged 18 or above were selected.

Exclusion criteria

In exclusion criteria, all the patients having cardiovascular disorders, cerebrovascular accidents, performing vigorous exercise for more than 2 hours per week, pregnant women, cervical disc herniation and patients having rheumatoid arthritis were excluded.

Statistical analysis

Data was retrieved on an excel file and analyzed using IBM SPSS Statistics 24. Mean and standard deviation was estimated for quantitative variables. Frequencies and percentages were utilized for qualitative variables. Pearson chi-square was applied to observe associations between qualitative variables. A p-value of <0.05 was considered statistically significant.

Ethical issues

All individuals who were asked to take part in the study were given paperwork outlining the research's goals and their opportunity to decline participation. The study was approved by the Medical Ethics Committee of Majmaah University (ethical approval code: MUREC-May.22 / COM-2O22 / 6-3).

3. RESULTS

A total number of 316 participated in the study; among which there were 194 (61%) males and 122 (39%) females. The participants were in 18-30 age group and 76% participants completed their university degree. 53% participants were students followed by field workers (25%), Office workers (14%) and 7% of them were unemployed (Table 1).

Table 1 Socio-demographic and educational status of study participants

Variable	Category	Frequency	Percent
Sex	Male	194	61.4
	Female	122	38.6
Age	18-30	217	68.7
	31-40	63	19.9
	41-50	33	10.4
	51-60	3	0.9
Educational Level	Secondary School	49	15.5
	University Stage	239	75.6
	Masters stage	17	5.4
	PhD stage	11	3.5
Work Type	Student	168	53.2
	Fieldwork (requires physical effort)	81	25.6
	Office work	45	14.2
	Unemployed	22	7.0

Rhomboid muscle spasm was reported among 188 (60%) of the participants. Most of them 42% experienced a spasm once a month or more and 36% experienced it once a year or more. Pain lasted in less than 3 days in 52% of the cases and 35% had for 3-7 days. 50% reported that the pain affects their daily life. The major factors for these cramps were reported to be Wrong sitting position (86%), Mental or emotional stress (36%) and lifting heavy weights (24%). Cervical disc prolapse was diagnosed in 4% of the cases and 17% had a history of injury to the shoulder, scapula or upper back (Table 2).

Table 2 Prevalence and risk associated with Rhomboid muscle spasms

Variable	Category	Frequency	Percent
Rhomboid muscle spasm	Yes	188	59.5
	No	128	40.5
Pain intensity or Pain duration	Once a week or more	41	21.8
	Once a month or more	79	42.0
	Once a year or more	68	36.2
	Less than 3 days later, it disappears	97	51.6
	3 - 7 days	65	34.6
	8 - 13 days	10	5.3
	More than 14 days	16	8.5

Effect on Quality of life	Yes	93	49.5
	No	95	50.5
Pain severe to seek treatment	Yes	60	31.9
	No	128	68.1
Cervical disc prolapses	Yes	7	3.7
	No	181	96.3
Shoulder, scapula or upper back injuries	Yes	31	16.5
	No	157	83.5
Scapula or any upper back surgery	Yes	0	0.0
	No	188	100.0

Following are the factors associated with and contributed to the cramps or pain such as wrong sitting positions in daily life, daily emotional and mental stress, physical exertion and injuries (Figure 1).

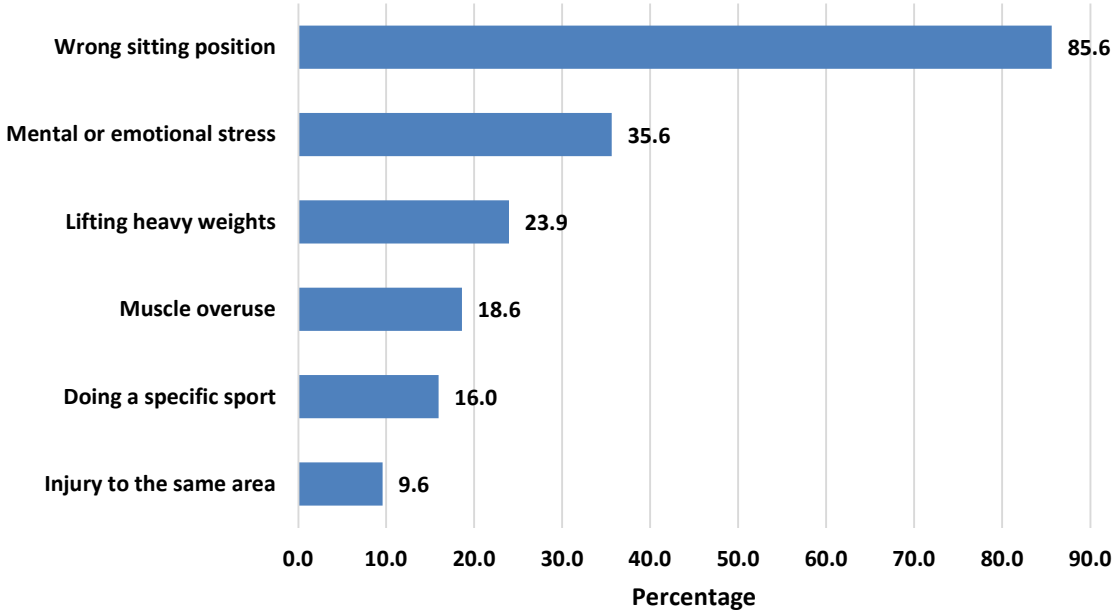

Figure 1 Factors caused or contributed to the cramps or pain

The general practices for the treatment of spasms reported by the patients were 'Use of topical muscle relaxant (Ointment or gel), (60%), 32% of them used painkillers and 32% applied warm or cold compresses to the area. 34% did not do anything (Figure 2). Majority of the patients went for Muscle massage for the clinical treatment (81%), followed by Muscle massage along with using a transcutaneous electrical stimulation device (11%), 5% went for Use of transcutaneous electrical stimulation device and 2% went for 'use of dry needles/ ultrasound therapy. Majority of the patients were satisfied with the treatment taken (64%) (Table 3).

Table 4 shows the association between rhomboid muscle spasms with different socio-demographic variables. Rhomboid muscle spasm was significantly associated with gender of the participants with more females (67.2%) experiencing more than males (54.6%). Respondents aged between 31-40 years (87.3%) and those working in the field that requires physical effort (77.8%) were seen to be more prone to develop muscle spasm than other age groups and participants with other work. Work type and age group of the participants was significantly associated with rhomboid muscle spasms (p-0value <0.05)

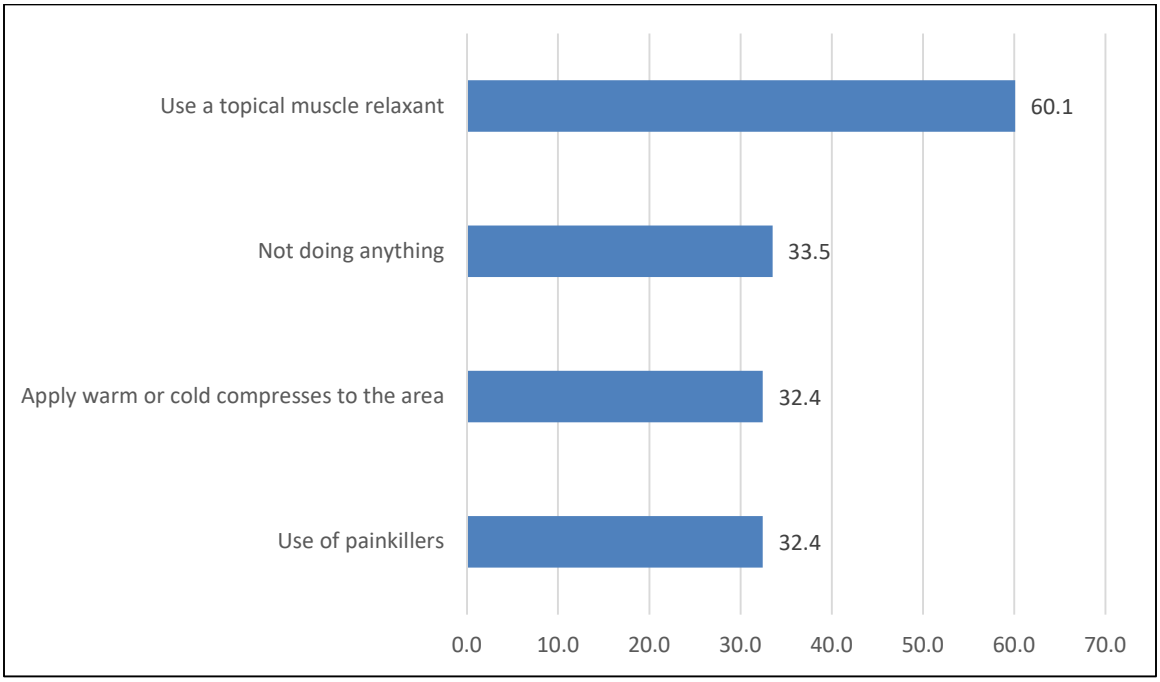

Figure 2 Participants approach to deal with muscles spasms

Table 3 Treatment Practices

Variable	Category	Frequency	Percent
Any Physical therapy	Yes	62	33.0
	No	126	67.0
Treatment Modalities	Muscle massage	50	80.6
	Muscle massage, Using a transcutaneous electrical stimulation device	7	11.3
	Use of dry needles	1	1.6
	Using a transcutaneous electrical stimulation device	3	4.8
	Ultrasound therapy	1	1.6
Treatment Satisfaction	Yes	120	63.8
	No	68	36.2

Table 4 Association between Rhomboid muscle spasm and socio-demographic characteristics

Variable	Category	Have you ever had a rhomboid muscle spasm?		Total	Chi-Square, P-value
		Yes	No		
Sex	Male	106 (54.6%)	88 (45.4%)	194 (100%)	4.914, 0.027
	Female	82 (67.2%)	40 (32.8%)	122 (100%)	
Age	18-30	107 (49.3%)	110 (50.7%)	217 (100%)	33.024, <0.001
	31-40	55 (87.3%)	8 (12.7%)	63 (100%)	
	41-50	23 (69.7%)	10 (30.3%)	33 (100%)	
	51-60	3 (100%)	0 (0%)	3 (100%)	
Educational Level	Secondary School	25 (51%)	24 (49%)	49 (100%)	4.175, 0.243
	University Stage	145 (60.7%)	94 (39.3%)	239 (100%)	
	Masters stage	9 (52.9%)	8 (47.1%)	17 (100%)	
	PhD stage	9 (81.8%)	2 (18.2%)	11 (100%)	
Work Type	Student	77 (45.8%)	91 (54.2%)	168 (100%)	29.220, <0.001
	Field work (requires physical effort)	63 (77.8%)	18 (22.2%)	81 (100%)	
	Office work	34 (75.6%)	11 (24.4%)	45 (100%)	
	Unemployed	14 (63.6%)	8 (36.4%)	22 (100%)	

4. DISCUSSION

The winged scapula caused by rhomboidal paralysis is the utmost communal pathologies characteristics of this group of muscles (Farrell and Kiel, 2022). Rhomboidal palsy is most often caused by injury to the dorso-scapular nerve. Dorsal scapular nerve compression is the common reason, but the particular site of the entrapment is unknown. In addition, the dorsal scapular nerve was damaged directly from anterior shoulder dislocation, trauma or abuse in athletes (*i.e.*, baseball and basketball) is the additional reasons for rhomboidal paralysis listed (Martin and Fish, 2008).

Patients often experience pain in the medial scapula, abnormal shoulder movements and discomfort in the back, shoulder and neck. On physical evaluation, a delicate side wing of the scapula is usually visible. As a consequence of the subtle discovery of examination and the deep anatomical location of the rhomboids, rhomboidal paralysis mostly remains undetected. EMG is precise for the analysis of rhomboidal paralysis and exhibits a protracted delay in the muscle action potential (Sultan and El-Tantawi, 2013).

Treatment is generally conventional and focuses on muscle relaxants, stabilization of the cervical spine, NSAIDs, physiotherapy, and in extreme cases, surgical treatment (Martin and Fish, 2008). The superior trapezoid is a huge superficial muscle that extends from the cervical vertebrae and occipital bone to the brachial and lateral clavicles. Most of the studies on shoulder and neck pain have focused on the trapezius muscle (Szeto et al., 2002; Straker and Duncan, 2000). Though trapezius muscle pain; tension in the superior trapezius muscle and chronic tenderness - is the communal diagnosis among adults clinically with self-reported shoulder/neck pain.

Though the levator scapula is smaller than the extensor of the neck and the subcapsular trapezius, forthcoming studies must emphasize on these muscles, not just the upper trapezius (Andersen et al., 2011). Comparing our results with the previous literature, the prevalence of rhomboid muscles spasm was noted in 59.5% of cases, 3.7% had cervical disc prolapse and shoulder and back pain was reported in 16.5%. However, the study of Andersen et al., (2011) reported a 30.3% prevalence of shoulder pain with two third the population of the research reporting tenderness of the upper trapezius muscle. Study by Grimby-Ekman et al., (2012) performed multiple regression analyses with an outcome of pain and period of pain. In multiple regression analyses, they observed that stress, smoking and gender are the risk factors for rhomboid muscles spasm.

Meanwhile, in our study, continuous practice of the same sport, injury, weightlifting and wrong sitting positions were the major risk factors. In our study, we also observed stress as a risk factor in 35% research population. Anna and colleagues study also reported no effect of physical activity on muscle spasms. Usually, rhomboid muscle is treated with muscle relaxants, anti-inflammatory and physical therapy. In our study total of 60.8% of patients were using muscle relaxants and 32.4% using pain killers as reported in many studies (Balcom and Pappas, 1995; Akuthota et al., 2004).

Since most of the shoulder/neck muscles studied are anatomically superimposed - e.g., the trapezius muscles cover both the supraspinatus and levator scapula - it may not be possible to completely discriminate between muscle tenderness (Metin-Ökmen et al., 2018; Galano et al., 2008). However, hand palpation using a previously learned pressure method provides reliable and quick information about the tenderness of muscles, therapists can use an available scanning tool to identify particular muscle tenderness in subjects with shoulder and neck pain, thus more effectively targeting rehabilitation exercises (Nguyen et al., 2016; Verenna et al., 2016).

5. CONCLUSION

Based on several anatomical locations, high prevalence of tenderness was observed in Saudi Arabian adults with non-specific neck/shoulder complex pain. Rhomboid palsy is frequently misdiagnosed due to the subtle medical diagnosis and precise anatomical localization of the rhomboids. Rhomboid palsy can be diagnosed accurately with an EMG, demonstrating prolonged muscle action potential latency. Treatment is typically conservative, focusing on cervical spine stabilization, physical therapy, muscle relaxants, NSAIDs and in severe cases surgery. Our findings suggest that further studies on shoulder/neck pain should concentrate on other muscles, not just the upper trapezius. These muscles include the levator scapulae, infraspinatus and neck extensors.

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Author Contributions

Conceptualization and design: Abdulmalik B Albaker and Daifallah Mohammed Alharbi; Methods: Abdulmalik B Albaker and Daifallah Mohammed Alharbi; data collection: Yousef Mansour Alobaysi, Marwan Shukri Alshehri and Batool Nawaf Almuhaysin

Ethical approval for study

The study was approved by the Medical Ethics Committee of Majmaah University (ethical approval code: MUREC-May.22 / COM-2O22 / 6-3.

Informed consent

Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript. Data was kept confidential and was used only for this study.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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