Myofascial Pain Syndrome and Its Relation to Trigger Points, Facial Form, Muscular Hypertrophy, Deflection, Joint Loading, Body Mass Index, Age and Educational Status

Abrar Majed Sabeh1, Samaher Abdulaziz Bedaiwi1, Osama Mahmoud Felemban2, Hani Haytham Mawardi3

Introduction: Myofascial pain (MFP) is a type of pain characterized by the presence of a trigger point (TrPs) in taut band of skeletal muscles or its fascia. Based on the current literature, the prevalence of head and neck myofascial pain (HNMFP) varies among different communities. To better understand this condition and its relation to facial form, muscular hypertrophy, deflection, and joint loading, the study aimed at evaluating the prevalence of HNMFP among the population of Jeddah, Saudi Arabia. Materials and Methods: This was a cross-sectional study to survey a sample of Jeddah residents, Saudi Arabia between the ages of 18–65 for HNMFP who were attending a public event in December 2019. Participants were asked to complete a questionnaire for demographics and history of HMFP signs and symptoms followed by a comprehensive clinical examination including facial form, muscular hypertrophy, maximum vertical opening, and joint loading. In addition, examination of upper quarter muscles was completed using flat or pincer palpation as needed. Data were collected and summarized as frequencies and percentages and group differences were tested using the chi-square statistical method. Results: A total of 197 participants were examined in this study, in which 136 (69.0%) had signs and symptoms consistent with HNMFP. Study subjects’ educational status was significantly associated with HNMFP (P = 0.008). Older subjects were more likely to report spontaneous pain whereas younger subjects were more likely to report pain following trauma (P = 0.049). Older subjects were more likely to have muscular hypertrophy (P = 0.011), while Younger subjects were more likely to have symmetrical facial form (P = 0.004). In terms of gender, males were more likely to experience pain aggravation with pressure and cold application whereas females were more sensitive to jaw function (P = 0.015). Distribution of joint loading showed a statistically significant difference between males and females (P = 0.008) with females having deflection on opening more frequently compared to males (P = 0.001). Furthermore, female subjects showed a significantly higher frequency of positive TrPs compared to males. Conclusion: Based on the current data, HNMFP is a common condition among the population of Jeddah. Factors such as body mass index and educational level were found to be linked to HNMFP. Younger subjects were more likely to have...
**INTRODUCTION**

Myofascial pain (MFP), known also as myofascial pain syndrome (MPS), is a type of pain characterized by the presence of a trigger point (TrPs) in a taut band of skeletal muscles or its fascia.[1,2] Several factors have been linked to MFP including emotional and behavioral statuses, poor posture, muscular tension, and history of road traffic accidents (RTAs). Other comorbidities such as tension-type headaches and temporomandibular joint pain have also been reported to trigger an MFP episode.[3-6] The proposed pathogenesis of MFP include interactions of varying intrinsic factors (i.e., central sensitization, decreased coping ability) and extrinsic factors (psychological, behavioral, and psychosocial factors) with consistent hypercontraction of sarcomeres forming TrPs within muscle tissues.[7] Due to continuous neural activation and action potential generation in these TrPs, an increase in secretion of myokines, inflammatory cytokines, and neurotransmitters with a reduction in blood flow will take place.[8-10] These mechanisms combined with psychological stresses are believed to sensitize the muscle TrPs causing the patient’s symptoms.[4,11,12]

Subjective symptoms of MFP in the head and neck region (HNMFp) often include continuous, dull aching pain that is present at rest and increases with function (jaw loading) varying from mild discomfort to debilitating pain.[13,14] Objective finding commonly includes jaw deviation with function, aggravated by palpation of muscles of mastication during examination.[15] In general, diagnosis of HNMFp is a challenging process due to variation in the condition patterns and wide range of reported symptoms in addition to lack of adequate dental practitioners’ experiences in some occasions. Therefore, the diagnosis process mostly relies on a combination of detailed patient’s history, clinical examination, and imagining on a case-by-case basis.[16,17] Inaccurate or late diagnoses are more likely to lead to improper intervention and exacerbation of patient’s symptoms.

Based on the current literature, the prevalence of HNMFp varies among different communities. In the US, up to 85% of the general population may have experienced HNMFp at one point in life.[1] Out of all the cases, 30-85% would have a true TrPs with females being more affected than males with age range between 27 and 50 years.[18,19] To deliver standard of care to patients in need, national data on prevalence of HNMFp is crucial. Therefore, the study aimed at evaluating the prevalence of HNMFp among the population of Jeddah, Saudi Arabia. We believe the outcome of this study will help to fill the gap in national databases on HNMFp and support the development of educational programs for the public as well as health care providers.

**MATERIALS AND METHODS**

A human research ethical approval was obtained through AlFarabi Dental College, Jeddah, Saudi Arabia. This was a cross-sectional study to survey a sample from residents of Jeddah, Saudi Arabi between the ages of 18–65 for HNMFp. The study exclusion criteria included (1) subjects who are not willing to undergo a thorough head and neck examination; (2) history of fibromyalgia or multiple complex medical conditions which could present with HNMFp-like signs and symptoms such as complex regional pain syndrome, psychiatric disorders, trauma or injury to the palpation site, neurological conditions and or rheumatologic disorders; and (3) participants who are currently on pain medications for any reason, antidepressant, anti-epileptic, and/or antipsychotic medication. The study was conducted at an annual public dental awareness event which took place over 3 days in Jeddah Waterfront Zone in December 2019. The event was held on a one-square-kilometer space with a total attendees 2500 attendees in which all were invited to participate in the study.

Participants were first asked to complete a questionnaire composed of two sections. The first section included demographic questions on age, gender, educational level, marital status, and occupation. The second section was adopted from McGill pain questionnaire.[20] Including HNMFp-related questions, if present, such as symptoms’ onset, location, aggravating and alleviating factors, and
pain location on a multiple view diagram. Next, all subjects had a comprehensive clinical examination completed by one of six calibrated co-investigators and included facial form, muscular hypertrophy, maximum vertical opening, deflection, and joint loading following Simons et al.\textsuperscript{[1]} MFP diagnostic criteria. In addition, examination of upper quarter muscles (i.e., temporalis, masseter, sternocleidomastoid, and upper trapezius muscles) was completed using flat or pincer palpation as needed. Using this method, a TrP was identified when a pressure of 4 kg/cm\textsuperscript{2} was applied for 5–10 s to each muscle resulting in pain or tenderness.\textsuperscript{[1]} Following completion of clinical examination, subjects were provided with an educational pamphlet on HNMFP and answered all questions related to condition diagnosis and management. In addition, referral information was provided to symptomatic participants for further management.

For the purpose of this analysis, participants with one or more TrP were identified to have HNMFP. Collected data were summarized as frequencies and percentages. The presence of HNMFP was cross-tabulated with the demographic (i.e., age and gender). Then, group differences in pain characteristics, clinical examination, and presence of TrPs were tested using chi-square statistical method with a statistical significance value set at \( P < 0.05 \). IBM SPSS Statistics for Windows, version 23.0 was used to analyze the data.

RESULTS

A total of 197 subjects participated in the study with a response rate of 9.8%. Overall, 136 (69.0%) had signs and symptoms consistent with HNMFP.

| Demographic variables                  | Category          | Total N = 197 | HNMFP Yes n = 136 | HNMFP No n = 61 | P Value† |
|----------------------------------------|-------------------|---------------|-------------------|-----------------|----------|
| Age in years                           |                   | Frequency (%) | Frequency (%)     | Frequency (%)   |          |
| 18–35                                  |                   | 125 (63.5)    | 82 (65.6)         | 43 (34.4)       | 0.169    |
| 36–65                                  |                   | 72 (36.5)     | 54 (75.0)         | 18 (25.0)       |          |
| Gender                                 | Female            | 84 (42.6)     | 58 (69.0)         | 26 (31.0)       | 0.997    |
|                                         | Male              | 113 (57.4)    | 78 (69.0)         | 35 (31.0)       |          |
| Ethnicity                              | Arabs             | 187 (94.9)    | 128 (68.4)        | 59 (31.6)       | 0.514    |
|                                         | Non-Arabs         | 10 (5.1)      | 8 (80.0)          | 2 (20.0)        |          |
| Marital status                         | Single            | 91 (46.2)     | 56 (38.5)         | 35 (38.5)       | 0.103    |
|                                         | Married           | 96 (48.7)     | 72 (75.0)         | 24 (25.0)       |          |
|                                         | Divorced or widowed | 10 (5.1)  | 8 (80.0)          | 2 (20.0)        |          |
| Highest educational degree             | High school or less | 59 (29.9) | 46 (78.0)         | 13 (22.0)       | 0.008*   |
|                                         | Bachelor’s degree  | 122 (61.9)    | 84 (68.9)         | 38 (31.1)       |          |
|                                         | Master’s or higher | 16 (8.1)   | 6 (37.5)          | 10 (62.5)       |          |
| BMI                                    | Underweight       | 13 (6.6)      | 7 (53.8)          | 6 (46.2)        | 0.062    |
|                                         | Within normal     | 72 (36.5)     | 44 (61.1)         | 28 (38.9)       |          |
|                                         | Overweight or obese | 112 (56.8) | 85 (75.7)         | 27 (24.3)       |          |

†Chi-square test

*Statistically significant at \( P < 0.05 \)

DEMOGRAPHICS

About two-thirds (63.5%) of subjects were in the 18–35 age group and the remaining 36.5% aged between 36 and 65 years. In total, there were 113 (57.4%) males and (42.6%) females. In terms of educational levels, 29.9% had completed high school, 61.9% had a bachelor’s degree, and 8.1% had a master’s degree or higher. Overall, the risk of HNMFP was significantly associated with the educational status (\( P = 0.008 \)). Categorization of subjects based on body mass index (BMI) showed that 56% were overweight or obese and 36.5% were within normal weight range. Accounting for BMI, overweight and obese subjects had higher tendency to report pain (\( P = 0.062 \)). Details of study subjects’ demographics are listed in Table 1.

CHARACTERISTICS OF SELF-REPORTED HNMFP

The relation between HNMFP symptoms and both age groups and gender were investigated in this study. Overall, younger subjects reported pain to occur significantly more often on the right side (36.6% for younger subjects; 24.1% for older subjects) while older subjects were more likely to report pain on the left side (33.3% for older subjects; 15.9% for younger subjects) and the difference was statistically significant (\( P = 0.046 \)). In terms of onset, older subjects were more likely to report spontaneous pain whereas younger subjects were more likely to report pain following trauma or a specific event (\( P = 0.049 \)). Furthermore, male subjects were more likely to experience pain aggravation by pressure (15.4% vs. 3.4% in females) and cold (11.5% vs. none in females). Whereas female subjects were more likely to report jaw function (46.6%
vs. 34.6% in males) as the main aggravating factor for pain ($P = 0.015$). Details of self-reported characteristics of HNMFP are listed in Table 2.

**Clinical Examination**

Comprehensive head and neck clinical examination was carried out for all subjects and categorized based on age and gender. Younger subjects were more likely to have symmetrical facial form compared to older subjects (96.3% vs. 81.5%; $P = 0.004$) while older subjects were more likely to have muscular hypertrophy compared to younger subjects (29.6% vs. 12.2%; $P = 0.011$). In addition, female subjects had deflection on opening more frequently compared to males (39.7% vs. 15.4%; $P = 0.001$). The distribution of joint loading showed a statistically significant difference between males and females ($P = 0.008$). Details of head and neck examination are included in Table 3.

**TrP Screening**

No significant differences in the presence of TrPs with relation to age were noted except for the left SCM which was more tender in older subjects ($P = 0.006$). In addition, female subjects showed a significantly higher frequency of positive TrPs in 10 examined muscles (of 14 in total) compared to males. Of all, 20.5% of male

---

**Table 2: Characteristics of self-reported HNMFP ($n = 136$)**

| Pain character | Category | Age          | $P$ Value † | Gender               | $P$ Value † |
|---------------|----------|--------------|-------------|----------------------|-------------|
|               |          | 18–35 years | 36–65 years |                       |             |
|               |          | $n = 82$    | $n = 54$    |                       |             |
|               |          | Frequency (%) | Frequency (%) |                       |             |
| Location      | Right    | 30 (36.6)  | 13 (24.1)   | 0.046*               |             |
|               |          |             |             |                      |             |
|               | Left     | 13 (15.9)  | 18 (33.3)   |                       |             |
|               |          |             |             |                      |             |
|               | Bilateral| 39 (47.6)  | 23 (42.6)   |                       |             |
| Onset         | Spontaneous | 30 (36.6) | 29 (53.7)   | 0.049*               |             |
|               |          |             |             |                      |             |
|               | Following trauma or a specific event | 52 (63.4) | 25 (46.3)   |                       |             |
| Duration      | Seconds | 29 (35.4)  | 15 (27.8)   | 0.494                |             |
|               | Minutes | 29 (35.4)  | 25 (46.6)   | 35 (44.9)            | 19 (32.8)   |
|               | Hours   | 12 (14.6)  | 9 (16.7)    | 15 (19.2)            | 6 (10.3)    |
|               | Days    | 12 (14.6)  | 5 (9.3)     | 9 (11.5)             | 8 (13.8)    |
| Frequency     | Episodic | 70 (85.4) | 40 (74.1)   | 0.101                |             |
|               | Continuous | 12 (14.6) | 14 (25.9)   |                       |             |
| Quality       | Dull    | 37 (45.1)  | 18 (33.3)   | 0.108                |             |
|               | Sharp   | 6 (7.3)    | 11 (20.4)   | 6 (7.7)              | 11 (19.0)   |
|               | Aching  | 12 (14.6)  | 3 (5.6)     | 10 (12.8)            | 5 (8.6)     |
|               | Throbbing | 13 (15.9) | 11 (20.4)   | 13 (16.7)            | 11 (19.0)   |
|               | Electric-like | 7 (8.5) | 7 (13.0)    | 7 (9.0)              | 7 (12.1)    |
|               | Others  | 7 (8.5)    | 4 (7.4)     | 7 (9.0)              | 4 (6.9)     |
| Aggravating factors | Pressure | 7 (8.5) | 7 (13.0)    | 0.289                |             |
|               | Stress  | 12 (14.6)  | 11 (20.4)   | 13 (16.7)            | 10 (17.2)   |
|               | Cold    | 6 (7.3)    | 3 (5.6)     | 9 (11.5)             | 0           |
|               | Jaw movement | 38 (46.3) | 16 (29.6)   | 27 (34.6)            | 27 (46.6)   |
|               | Routine activity | 10 (12.2) | 6 (11.1)   | 8 (10.3)             | 8 (13.8)    |
|               | Light touch | 4 (4.9) | 2 (3.7)     | 4 (5.1)              | 2 (3.4)     |
|               | Others  | 5 (6.1)    | 9 (16.7)    | 5 (6.4)              | 9 (15.5)    |
| Alleviating factors | Rest | 47 (57.3) | 23 (42.6)   | 0.359                |             |
|               | Medications | 10 (12.2) | 9 (16.7)    | 10 (12.8)            | 9 (15.5)    |
|               | Physical therapy | 8 (9.8) | 9 (16.7)    | 10 (12.8)            | 7 (12.1)    |
|               | Refrain from pain producing activity | 7 (8.5) | 3 (5.6) | 5 (6.4) | 5 (8.6) |
|               | Others  | 10 (12.2)  | 10 (18.5)   | 8 (10.3)             | 12 (20.7)   |
|               | Mild    | 41 (50.0)  | 20 (37.0)   | 40 (51.3)            | 21 (36.2)   |
|               | Moderate | 28 (34.1) | 23 (42.6)   | 27 (34.6)            | 24 (41.4)   |
|               | Severe  | 13 (15.9)  | 11 (20.4)   | 11 (14.1)            | 13 (22.4)   |

†Chi-square test

*Statistically significant at $P < 0.05$
Several, smaller studies have looked at the prevalence of self-reported HNMFP in different cities of Saudi Arabia and ranged between 22.4% and 42%.[29] Only few studies on HNMFP have been conducted in Jeddah, the second-largest city of Saudi Arabia, which creates a significant challenge from a public health point of view to understand this condition and develop national prevention and management programs for the general public. In addition, the potential relation between BMI and HNMFP reported in this study is of a great interest considering Saudi Arabia to have one of the highest obesity incidence in general population in addition to other chronic diseases such as hypertension and hyperlipidemia. We believe our study will be a great addition to the database of this region and HNMFP literature, which would facilitate future larger funded studies with focus on pathogenesis and intervention.[27-29]

The present study is based on a self-reported questionnaire combined with clinical examination for subjective findings. Overall, 136 (69%) subjects had at least one tender muscle and were assigned the diagnosis of HNMFP. Several risk factors for HNMFP were evaluated in this study. Overweight and obese subjects had higher tendency to report muscle pain than normal or underweight individuals, similar to what have been reported in the literature previously.[30] Available evidence suggests that obesity is associated with low-grade chronic inflammatory state where inflammatory markers such as C-reactive protein, IL-6, TNF, and serum cortisol were found to be elevated.

| Category                  | Age                                | Gender                  | P Value†   | P Value†   |
|---------------------------|------------------------------------|-------------------------|------------|------------|
|                           | 18–35 years (n = 82)               | 36–65 years (n = 54)    |            |            |
| Facial form               | Symmetrical                        | 79 (96.3)               | 44 (81.5)  | 0.004*     | 68 (87.2)               | 55 (94.8)  | 0.134 |
|                           | Asymmetrical                       | 3 (3.7)                 | 10 (18.5)  | 0.011*     | 10 (12.8)               | 3 (5.2)    | 0.173 |
| Muscular hypertrophy      | Yes                                | 10 (12.2)               | 16 (29.6)  |            | 18 (23.1)               | 8 (13.8)   | 0.173 |
|                           | No                                 | 72 (87.8)               | 38 (70.4)  | 0.399      | 60 (76.9)               | 50 (86.2)  | 0.001* |
| Deflection                | Yes                                | 19 (23.2)               | 16 (29.6)  |            | 12 (15.4)               | 23 (39.7)  | 0.001* |
|                           | No                                 | 63 (76.8)               | 38 (70.4)  | 0.193      | 66 (84.6)               | 35 (60.3)  | 0.008* |
| Joint loading             | No pain                            | 45 (54.9)               | 30 (55.6)  |            | 46 (59.0)               | 29 (50.0)  | 0.008* |
|                           | Pain on right when loading right   | 9 (11.0)                | 7 (13.0)   |            | 7 (9.0)                 | 9 (15.5)   | 0.005 *|
|                           | Pain on right when loading left    | 3 (3.7)                 | 0          |            | 2 (2.6)                 | 1 (1.7)    |      |
|                           | Pain on left when loading right    | 6 (7.3)                 | 10 (18.5)  |            | 3 (3.8)                 | 13 (22.4)  | 0.008 |
|                           | Pain on left when loading left     | 7 (8.5)                 | 3 (5.6)    |            | 8 (10.3)                | 2 (3.4)    |      |
|                           | Bilateral pain regardless of side  | 12 (14.6)               | 4 (7.4)    |            | 12 (15.4)               | 4 (6.9)    | 0.008 |

†Chi-square test
*Statistically significant at P < 0.05
which may have a role in altering pain modulation in HNMFP individuals. In addition, the increase in mechanical stresses caused by overweight results in further production of proinflammatory cytokines from chondrocytes to overexpress body pain.

Lower educational status was another factor investigated in this study, and was significantly related to report of muscle pain by participants ($P = 0.008$). This finding was in line with what have been reported by Janevic et al. in which prevalence of chronic pain in subjects suffering from arthritis, cancer, diabetes, heart disease, high blood pressure, and lung disease was association with lower education degree. Analyzing HNMFP triggers in relation to age group, older subjects experienced spontaneous pain without a trigger. However, younger subjects were more likely to have a triggering event such as trauma followed by HNMFP onset. One explanation could be the anticipated higher levels of physical activities among younger population and increased risk for trauma which can take different forms. One in particular is the use of simultaneous electronic devices which has been linked to musculoskeletal pain in adolescents within a school-based study.

The role of gender was considered in this study as female subjects significantly showed a higher prevalence of positive TrPs compared to males. This relation in particular has always been immense and unclear. Diverse theories in relation to gender were proposed including links to genetics and hormonal changes such as menstrual cycle, pregnancy, and oral contraceptive use which may exaggerate HNMFP symptoms. At the same time, women are more likely to be vocal and tend to report pain more often than men. In the current study, pain aggravating factors varied in relation to gender as male subjects were more likely to experience pain with pressure and cold. However, female subjects were more likely to report jaw function as the main aggravating factor for pain ($P = 0.015$). These findings are consistent with what was reported by Mogil et al. and indicated sex differences to affect certain pain modalities compared to others such as in heat or pressure-induced pain and ischemic pain. At the same time, Spierings et al. concluded that joint loading or function (chewing, eating, and talking) are more likely to aggravate HNMFP in females. However, a recent systematic review evaluated the relation between gender and pain perception in a total of 122 studies and reported cold and pressure to aggravate pain more often in females than males, which contradicts our findings.

This study has several limitations. First, the study participants were recruited from a single event location and generalization to all population of Jeddah is not applicable especially for difference in socioeconomic levels. Furthermore, study subjects were invited to participate in the study during the event and were more likely to be educated, healthy, and self-aware due to the event setup and location. However, our result showed

### Table 4: Presence of TrPs in examined muscles ($n = 136$)

| Muscle            | Side   | Age  | Frequency (%) | $P$ Value† | Gender  | Frequency (%) | $P$ Value† |
|-------------------|--------|------|---------------|------------|---------|---------------|------------|
|                   |        | 18–35 years | 36–65 years |            | Male | Female |            |            |
|                   |        | $n = 82$ | $n = 54$      |            | $n = 78$ | $n = 58$ |            |            |
| Temporalis        | Right  | 21 (25.6) | 19 (35.2)     | 0.230      | 16 (20.5) | 24 (41.4) | 0.008*     |
|                   | Left   | 23 (28.0) | 19 (35.2)     | 0.378      | 11 (14.1) | 31 (53.4) | <0.001*    |
| Temporalis anterior | Right  | 22 (26.8) | 15 (27.8)     | 0.903      | 16 (20.5) | 21 (36.2) | 0.042*     |
|                   | Left   | 20 (24.4) | 12 (22.2)     | 0.771      | 12 (15.4) | 20 (34.5) | 0.009*     |
| Temporalis middle | Right  | 13 (15.9) | 8 (14.8)      | 0.870      | 7 (9.0)   | 14 (24.1) | 0.016*     |
|                   | Left   | 14 (17.1) | 11 (20.4)     | 0.627      | 7 (9.0)   | 18 (31.0) | 0.001*     |
| Temporalis posterior | Right  | 8 (9.8)  | 11 (20.4)     | 0.081      | 4 (5.1)   | 15 (25.9) | 0.001*     |
|                   | Left   | 8 (9.8)  | 10 (18.5)     | 0.140      | 2 (2.6)   | 16 (27.6) | <0.001*    |
| Masseter superficial | Right  | 35 (42.7) | 23 (42.6)     | 0.992      | 31 (39.7) | 27 (46.6) | 0.427      |
|                   | Left   | 37 (45.1) | 25 (46.3)     | 0.893      | 36 (46.2) | 26 (44.8) | 0.878      |
| Masseter deep     | Right  | 17 (20.7) | 15 (27.8)     | 0.343      | 17 (21.8) | 15 (25.9) | 0.580      |
|                   | Left   | 19 (23.2) | 17 (31.5)     | 0.282      | 20 (25.6) | 16 (27.6) | 0.799      |
| Sternocleidomastoid | Right  | 22 (26.8) | 19 (35.2)     | 0.299      | 18 (23.1) | 23 (39.7) | 0.037*     |
|                   | Left   | 17 (20.7) | 23 (42.6)     | 0.006*     | 21 (26.9) | 19 (32.8) | 0.460      |
| Trapezius         | Right  | 39 (47.6) | 18 (33.3)     | 0.100      | 27 (34.6) | 30 (51.7) | 0.046*     |
|                   | Left   | 32 (39.0) | 23 (42.6)     | 0.678      | 30 (38.5) | 25 (43.1) | 0.585      |

*Chi-square test

*Statistically significant at $P < 0.05$
diversity, specifically in gender and age groups, which may compensate for this issue to a certain capacity. Second, the study was conducted in the city of Jeddah and future studies are needed to better understand the prevalence of HNMFP in all population of Saudi Arabia.

**CONCLUSION**

MFP in the head and neck region is a common condition among adult population of Jeddah with more female subjects experiencing a significantly higher frequency of positive TrPs compared to males. In addition, factors such as BMI and educational level were found to be linked to HNMFP. Younger subjects were more likely to have symmetrical facial form while older subjects were more likely to have muscular hypertrophy. The distribution of joint loading showed a statistically significant difference between males and females with females having deflection on opening more frequently compared to males. Acknowledging the prevalence of HNMFP is important for future assessment, better understanding and management of such chronic pain condition. Further studies with larger group of patients are needed to confirm these findings.

**ACKNOWLEDGEMENT**

This study was conducted at a public dental awareness event which took place in Jeddah Waterfront and ethical approval was obtained through AlFarabi Dental College, Jeddah, Saudi Arabia. We thank the following students for their impressive work in the data collection process: Turki Babaeer, Aya Hussein, Maram Alras, Ghith Aldhahri, and Ana Aljowaied.

**FINANCIAL SUPPORT AND SPONSORSHIP**

Nil.

**CONFLICTS OF INTEREST**

There are no conflicts of interest.

**AUTHORS CONTRIBUTIONS**

Not applicable.

**ETHICAL POLICY AND INSTITUTIONAL REVIEW BOARD STATEMENT**

The procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation at AlFarabi Dental College, Jeddah, Saudi Arabia. Prior to launching the study, a human research ethical approval was obtained as stated in the manuscript (ethical approval reference number 20-08/6).

**PATIENT DECLARATION OF CONSENT**

Not applicable.

**DATA AVAILABILITY STATEMENT**

Not applicable.

**REFERENCES**

1. Simons DG. Clinical and etiological update of myofascial pain from trigger points. J Musculoskel Pain 1996;4:93-122.
2. Merskey HE. Classification of chronic pain: Descriptions of chronic pain syndromes and definitions of pain terms. Pain 1986;3:51-226.
3. Manolopoulos L, Vlastarakos PV, Georgiou L, Giotakis I, Loizos A, Nikolopoulos TP. Myofascial pain syndromes in the maxillofacial area: A common but undiagnosed cause of head and neck pain. Int J Oral Maxillofac Surg 2008;37:975-84.
4. Jaeger B. Myofascial trigger point pain. Alpha Omega 2013;106:14-22.
5. Fernández-de-las-Penas C, Ge HY, Arendt-Nielsen L, Cuadrado ML, Pareja JA. The local and referred pain from myofascial trigger points in the temporals muscle contributes to pain profile in chronic tension-type headache. Clin J Pain 2007;23:786-92.
6. Kuch K. Psychological factors and the development of chronic pain. Clin J Pain 2001;17:S33-8.
7. Benoliel R, Sharav Y. Masticatory Myofascial Pain, and Tension-Type and Chronic Daily Headache. Orofacial Pain and Headache. Edinburgh: Elsevier; 2008. p. 109-28.
8. Dommerholt J, Bron C, Franssen J. Myofascial trigger points: An evidence-informed review. J Manipul Ther 2006;14:203-21.
9. Simons DG, Stolov WC. Microscopic features and transient contraction of palpable bands in canine muscle. Am J Phys Med 1976;55:65-88.
10. Borg-Stein J, Simons DG. Focused review: Myofascial pain. Arch Phys Med Rehabil 2002;83:S40-7, S48-9.
11. McNulty WH, Gevirtz RN, Hubbard DR, Berkoff GM. Needle electromyographic evaluation of trigger point response to a psychological stressor. Psychophysiology 1994;31:313-6.
12. Mense S. The pathogenesis of muscle pain. Curr Pain Headache Rep 2003;7:419-25.
13. Cummings TM, White AR. Needle therapies in the management of myofascial trigger point pain: A systematic review. Arch Phys Med Rehabil 2001;82:986-92.
14. Schmitter M, Balke Z, Hassel A, Ohlmann B, Rammelsberg P. The prevalence of myofascial pain and its association with occlusal factors in a threshold country non-patient population. Clin Oral Investig 2007;11:277-81.
15. Garg AK, Jain S, Gupta S, Gupta V. Myofascial pain dysfunction syndrome: An overview. Stress 2013;4:6.
16. Majlesi J, Unalan H. Effect of treatment on trigger points. Curr Pain Headache Rep 2010;14:353-60.
17. Fricton JR, Steenks MH. [Diagnosis and treatment of myofascial pain]. Ned Tijdschr Tandheelkd 1996;103:249-53.
18. Han SC, Harrison P. Myofascial pain syndrome and trigger-point management. Reg Anesth 1997;22:89-101.
19. Lavelle ED, Lavelle W, Smith HS. Myofascial trigger points. Anesthesiol Clin 2007;25:841-51, vii-iii.
20. Melzack R. The McGill pain questionnaire: Major properties and scoring methods. Pain 1975;1:277-99.
21. Fleckenstein J, Zaps D, Rüger LJ, Lehmeyer L, Freiberg F, Lang PM, et al. Discrepancy between prevalence and perceived effectiveness of treatment methods in myofascial pain
syndrome: Results of a cross-sectional, nationwide survey. BMC Musculoskelet Disord 2010;11:32.
22. Alotaibi M, Ayoub A, King T, Uddin S. The effect of Kinesio taping in reducing myofascial pain syndrome on the upper trapezius muscle: A systematic review and meta-analysis. Eur Sci J 2018;14:336-50.
23. Alghadir AH, Iqbal A, Anwer S, Iqbal ZA, Ahmed H. Efficacy of combination therapies on neck pain and muscle tenderness in male patients with upper trapezius active myofascial trigger points. Biomed Res Int 2020;2020:9361405.
24. Tantanatip A, Chang KV. Pain, Myofascial Syndrome. InStatPearls [Internet] 2018 Oct 27. Treasure Island, FL: StatPearls Publishing; 2020.
25. Gerwin RD. Classification, epidemiology, and natural history of myofascial pain syndrome. Curr Pain Headache Rep 2001;5:412-20.
26. Zulqarnain BJ, Khan N, Khattab S. Self-reported symptoms of temporomandibular dysfunction in a female university student population in Saudi Arabia. J Oral Rehabil 1998;25:946-53.
27. Mostafa LA. Urban and social impacts of waterfronts development, case study: Jeddah Corniche. Proc Environ Sci 2017;37:205-21.
28. Alqarni SSM. A review of prevalence of obesity in Saudi Arabia. J Obes Eat Disord 2016;2:2.
29. Wright LJ, Schur E, Noonan C, Ahumada S, Buchwald D, Afari N. Chronic pain, overweight, and obesity: Findings from a community-based twin registry. J Pain 2010;11:628-35.
30. Hitt HC, McMillen RC, Thornton-Neaves T, Koch K, Cosby AG. Comorbidity of obesity and pain in a general population: Results from the southern pain prevalence study. J Pain 2007;8:430-4.
31. McVinnie DS. Obesity and pain. Br J Pain 2013;7:163-70.
32. Janevic MR, McLaughlin SJ, Heapy AA, Thacker C, Piette JD. Racial and socioeconomic disparities in disabling chronic pain: Findings from the health and retirement study. J Pain 2017;18:1459-67.
33. Queiroz LB, Lourenço B, Silva LEV, Lourenço DMR, Silva CA. Musculoskeletal pain and musculoskeletal syndromes in adolescents are related to electronic devices. J Pediatr (Rio J) 2018;94:673-9.
34. Samulowitz A, Gremyr I, Eriksson E, Hensing G. “Brave men” and “emotional women”: A theory-guided literature review on gender bias in health care and gendered norms towards patients with chronic pain. Pain Res Manage 2018;2018:6358624
35. Myers CD, Riley JL 3rd, Robinson ME. Psychosocial contributions to sex-correlated differences in pain. Clin J Pain 2003;19:225-32.
36. Mogil JS. Sex differences in pain and pain inhibition: Multiple explanations of a controversial phenomenon. Nat Rev Neurosci 2012;13:859-66.
37. Spierings ELH, Mulder MJHL. Persistent orofacial muscle pain: Its synonymous terminology and presentation. Cranio 2017;35:304-7.
38. Racine M, Tousignant-Laflamme Y, Kloda LA, Dion D, Dupuis G, Choinière M. A systematic literature review of 10 years of research on sex/gender and experimental pain perception - part 1: Are there really differences between women and men? Pain 2012;153:602-18.