RESEARCH ARTICLE

Self-reported musculoskeletal pain, headache, jaw pain and swallowing dysfunction in a sample of young Saudi adults who stutter

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Abstract

Objective: To report the prevalence of musculoskeletal pain, headache, jaw pain and difficulty in swallowing among people who stutter (PWS).

Method: The cross-sectioal study was conducted from October 3, 2021, to March 21, 2022, after approval from the ethics review committee of King Khalid University, Abha, Saudi Arabia, and comprised adult people who stutter belonging to different regions of Saudi Arabia. They were divided into five groups based on stuttering severity as estimated by Stuttering Severity Instrument-4. Data was collected on musculoskeletal pain in different body areas using a questionnaire.. Data ws analysed using SPSS 22.

Results: Of the 101 Arabic-speaking subjects, 63(62.4%) were males and 38(37.6%) were females. The overall mean age was 27±7 years (range: 18-39 years). The largest group was of subjects with moderate severity of stuttering 31(30.6%); 21(68%) males and 10(32%) females. The increase in number of musculoskeletal pain locations was related to the severity of stuttering ($p<0.05$). The most common musculoskeletal pain sites were the lower back 31(31%), neck 26(26%) and shoulder 26(26%). Frequent headaches and difficulty chewing hard food due to jaw pain were reported by 49(49%) and 22(22%) participants, respectively ($p<0.05$). Swallowing difficulty was reported by 9(9%) participants ($p>0.05$).

Conclusions: Widespread chronic musculoskeletal pain of low intensity was found to be common among people who stuttered, and the number of pain locations was positively related to stuttering severity.

Keywords: Stuttering, Musculoskeletal pain, Headache, Jaw, Deglutition. (JPMA 73: 32; 2023)

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Introduction

Stuttering is a fluency disorder characterised by the involuntary repetition of sounds, especially initial consonants, and significant problems with normal fluency and flow of speech.[1] It has been suggested that increased levels of severity in stuttering can negatively affect mental and emotional health and quality of life.[2] Stuttering can also negatively affect self-confidence, self-esteem and self-image, leading to increased anxiety levels, and, thus, can interfere with normal social and occupational functioning.[3]

Previous research has shown that people who stutter (PWS) frequently experience speech anxiety, which can be clinically significant.[2] Reports show that about 44% of people seeking treatment for stuttering are also diagnosed with social phobia and anxiety.[4] It has been reported that trait anxiety (personality based) is higher among PWS than fluent speakers, and state anxiety (situation based) in social communication is higher among severe stutterers than mild stutterers and fluent speakers.[5]

It is well known that anxiety can significantly affect different systems of the body and can lead to muscle tension and pain.[6] Muscle tension is the most common symptom that causes muscle discomfort and pain in people with anxiety, especially when they experience increased stress.[7] This phenomenon can strain the muscles, making them tense and causing dull and sharp pain over time. Feelings of panic, fear, worry, self-stigma and anxiety can frequently impact the whole body, and further contribute to pain and muscle tightness. Self-stigma affects not only psychological health, but also puts stress on physical health, satisfaction levels, social relationships and coping behaviours, which can lead to unfavourable health outcomes.[8] Since many PWS have social phobia and anxiety, it is reasonable to believe that the presence of musculoskeletal pain among them would be common.

A previous study focussing on electromyography (EMG) to determine muscle tension in PWS showed tremor-like oscillations in speech. Comparing the oscillations for the fluent and dysfluent phases, more irregular oscillations

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were observed during the dysfluent speech, and the muscle tension was more in the laryngeal regions.[9] Another study based on EMG analysis has reported significantly lower activity of upper lip muscle in stuttering group than in the control group of fluent speakers.[10]

Muscle tension and overuse are known to be among the common causes of muscle pain, and anxiety is also related to muscle pain.[7] Since muscle overuse due to the production of repetitive involuntary sounds and muscle tension due to anxiety are prevalent among the PWS as well, it is reasonable to hypothesise that the prevalence of generalised musculoskeletal pain among the PWS would be high. In addition, there is a possibility that PWS can experience headaches, jaw pain and difficulties in the swallowing function. Relevant PWS data can provide additional knowledge that can lead to new strategies in managing and treating the stuttering disorder. However, to the best of our knowledge, such data has not previously been reported. The current study was planned to fill the gap by reporting the prevalence of musculoskeletal pain, headache, jaw pain and difficulty in swallowing among PWS. It was hypothesised that PWS experience widespread musculoskeletal pain in different body regions and have headaches, jaw pain and difficulty in swallowing.

Patients and Methods

The cross-sectioal study based on non-probability sampling, was conducted from October 3, 2021, to March 21, 2022, after approval from the ethics review committee of King Khalid University, Abha, Saudi Arabia, and comprised adult PWS belonging to different regions of Saudi Arabia. The subjects had previously been diagnosed and treated for stuttering by a speech-language pathologist having >15 years of professional experience. People with any known medical condition, systemic illness and physical disabilities were excluded.

After taking informed consent from the participants, data was collected using a modified version of a questionnaire previously used to assess self-reported musculoskeletal disorders among dental students in Saudi Arabia.[11] The questionnaire was given along with written and verbal instructions to the participants who were invited for the purpose to the clinical facility where the speech-language pathologist was present.

The subjects were divided into five groups based on stuttering severity as estimated by Stuttering Severity Instrument-4 (SSI-4), which quantifies disfluency duration, frequency and physical features.[12] The SSI-4 enables the assessment of behavioural severity levels in readers and non-readers. Classification of stuttering severity, based on the total score and percentile ranks, is as follows: no = total score 10-17, percentile rank 1-11; mild=total score 18-24, percentile rank 12-40, moderate=total score 25-31, percentile rank 41- 77, severe=total score, 32-36, percentile rank 78-95, and very severe = total score 37-46, percentile rank 96-99.[12]

The original questionnaire was in English and it was translated into Arabic, following the standard guidelines.[13] It was modified in line with a previous study on self-reported musculoskeletal disorders[11] among PWS. Data about headaches, jaw pain and swallowing function was also collected. Before data collection, the validation of the modified questionnaire was established by means of face validation involving two experts in questionnaire-based surveys. The reliability was assessed by distributing six questionnaires randomly among 6 PWS, who were asked again to answer the questionnaire after two weeks. The similarity percentage of answers on the test-retest questionnaire was 95%.

The printed questionnaire was to be filled out by each participant by hand and was divided into two parts. The first part was about data on the personal information of the participants, such as age, gender, height, weight, nationality, and professional details. The second part had various subsections. The first subsection had questions on health, regarding any disease, physical disability, and the effect of stuttering on daily life routines. The subsequent sections contained questions related to headache, jaw pain and function, and chewing and swallowing function. If present, the participants were asked about the frequency and duration of headache and jaw pain. They were also asked to rate the pain severity on a scale of 1-10 visual analogue scale.[14] The last section was related to pain in the preceding week and in the preceding 6 months. The participants were asked about any pain in their shoulders, elbows, wrists, hands, upper back, lower back, hips, thighs, ankles and feet. Most questions were dichotomic; Yes or No which were scored 1 or 2, respectively.

Data was analysed using SPSS 22. The association between stuttering and pain features was determined using chi-square test. $P< 0.05$ was considered significant.

Results

Of the 101 Arabic-speaking subjects, 63(62.4%) were males and 38(37.6%) were females. The overall mean age was 27±7 years (range: 18-39 years). Mean height and weight among male subjects were 174.8±5.1cm and 80.2±16.4kg, respectively. The corresponding values for female subjects were 156.3±18.4cm and 60.7±12.8kg. All 101(100%) participants were native Arabic speakers, with 86(86%) being nationals of Saudi Arabia. The majority 71(71%) of the participants were non-smokers, and the education level

ranged from a high school diploma to a university degree.

The largest group was of subjects with moderate severity of stuttering 31(30.6%); 21(68%) males and 10(32%) females (Table 1).

Overall, 19% and 32% subjects reported musculoskeletal pain during the preceding week and 6 months, respectively. Corresponding values were 17% and 30% for males (n=63) and 23% and 34% for females (n=38). For all subjects (n=101) the most common self-reported pain sites during the preceding week were lower back (31%), neck (26%) and shoulder (26%). Corresponding values for the preceding 6 months were neck (51%), lower back (43%) and shoulder (36%). With respect to gender (n=63) the most common self-reported pain sites for males in the preceding week were neck (24%), shoulder (22%) and upper and lower back (19%). Corresponding values for the preceding 6 months were neck (51%), shoulder (35%) and lower back (33%). For females (n=38), the most common pain sites during the preceding week were lower back (50%), shoulder (35%) and neck (29%). Corresponding values for the last 6 months were lower back (63%), neck (53%) and upper back (45%).

Table-1: Severity of stuttering based on the assessment by using SSI-4.

Stuttering severity	**All subjects** (n= 101) n (%)	**Males** (n= 63) n (%)	**Females** (n= 38) n (%)
Mild	19 (18.8)	14 (22.2)	5 (13.1)
Moderate	31 (30.6)	21 (33.3)	10 (26.3)
Moderate to severe	16 (15.8)	9 (14.2)	7 (18.4)
Severe	15 (14.8)	11 (17.4)	4 (10.5)
Very Severe	20 (19.8)	8 (12.6)	12 (31.5)

SSI-4: Stuttering Severity Instrument-4th edition.

Table-2: Number of pain locations with respect to the severity of stuttering.

Severity	**No. of locations**									
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
The preceding 7 days										
Mild	19									
Moderate	12	12	3	4						
Moderate to severe	3	5	1	4	3					
Severe		4	5	1	2	2	1			
Very Severe			3	3	4	5	2	3		
The preceding 6 months										
Mild	15	2	2							
Moderate	7	5	10	4	3	2				
Moderate to severe		2	4	3	6				1	
Severe		2	3	3	3	2			2	
Very Severe					1	8	3	5	2	1

Table-3: Association between stuttering severity and self-reported pain at different body locations (n=101, df=4).

	Last six months			**Last seven days**		
Location	**X^2 value**	**Phi**	***p*-value**	**X^2 value**	**Phi**	***p*-value**
Neck	25.72	0.505	0.0001	20.078	0.446	0.0001
Shoulders	18.36	0.426	0.001	14.106	0.374	0.007
Elbows	27.540	0.522	0.0001	13.682	0.368	0.008
Wrist & hand	23.867	0.486	0.0001	23.206	0.479	0.0001
Upper back	44.40	0.663	0.0001	48.229	0.691	0.0001
Lower back	35.42	0.592	0.0001	26.991	0.517	0.0001
Hips & thighs	18.486	0.428	0.001	10.728	0.326	0.03
Knees	21.708	0.464	0.0001	22.645	0.474	0.0001
Ankle & feet	11.617	0.339	0.02	12.378	0.350	0.015

The number of pain locations concerning the severity of stuttering among the subjects during the preceding week and 6 months showed a general trend of pain locations increasing with increase in stuttering severity (Table 2).

There was a significant association between the severity of stuttering and pain at different body locations during the preceding week days and 6 months (Table 3).

Of the total, 49(49%) subjects reported frequent headaches; 29(46%) males and 20(53%) females. Among them, 39(80%) subjects had a headache 1-3 times per week, and 10(20%) had a headache >3 times per week. In 33(67%) participants, the average headache duration was >1 hour, and headache VAS values were between 5-7 (p=0.011).

Jaw pain was reported by 21(20%) subjects; 12(19%) males and 9(21%) females. Among the 21 subjects, 17(81%) had unilateral pain, with VAS 3-4. No significant relationship between jaw pain and the severity of stuttering was observed (p>0.05).

Difficulty in chewing hard food was reported by 22(22%) subjects; 7 males and 15 females. There was a significant positive relationship between difficulty in chewing hard food and severity of stuttering (p=0.048).

Tiredness or lack of endurance in jaw muscles while chewing food for a longer duration was reported by 49(49%) participants; 28(44%) males and 21(55%) females. There was a significant positive relationship between lack of endurance in jaw muscles and severity of stuttering (p=0.022). Difficulty in swallowing food was reported by 9(9%) participants; 6(10%) males and 3(8%) females. No significant relationship between swallowing difficulties and the severity of stuttering was observed (p>0.05). Yawning difficulties were reported by 13(13%) participants; 8(13%) males and 5(13%) females. No significant relationship between yawning difficulties and the severity of stuttering was observed (p>0.05).

In total, 69(68%) participants reported regular effect of stuttering on daily life; 40(64%) males and 29(76%) females. Further, 27(27%) participants reported occasional interference with their daily life; 19(30%) males and 8(13%)

females. There was a significant positive relationship between interference with their daily life due to stuttering and the severity of stuttering (p=0.032).

Discussion

The current study is the first of its kind in terms of assessing self-reported musculoskeletal pain in young PWS.

Previous studies have shown that stuttering is more common in males than females across all ages.[14] However, data on the prevalence of stuttering in general and specifically with reference to gender is scarce for Saudi population. The current results showed that the ratio of males to females in a sample of Saudi population was 1.63:1, which is generally in line with data from other countries.[14]

Chronic pain is the pain that lasts or recurs for >3 months.[15] Thus, it can be considered that 19% of the current participants had acute and 32% had chronic musculoskeletal pain. This finding suggests that stuttering contributes to the development of musculoskeletal pain among PWS. Previous studies from different countries have shown that the prevalence of musculoskeletal pain among adults is generally high, with varying results ranging from 10% to 55%.[16] The wide variation can be attributed to various factors, including inconsistency in definitions, data collection methods and geographical and cultural factors.[17,18]

The present results showed striking differences from a recent study on the prevalence of chronic musculoskeletal pain among a sample of 1,031 adult subjects from the general population of Saudi Arabia.[19] A direct comparison of our present results with the findings of this study is more appropriate, not only because the subjects in both the studies were of the same geographical and cultural background, but also of the same age group. Compared to the 11% subjects reporting any musculoskeletal pain in the study by El-Metwally et al., 19% and 32% of the PWS in the present study reported acute and chronic musculoskeletal pain, respectively. Similarly, in comparison, a higher percentage of PWS reported chronic musculoskeletal pain for all the studied body locations. For example, neck pain was reported by 51% of PWS compared to only 2% in the other study. Corresponding comparative values of PWS between the two studies for each location were; shoulders 36% and 1%, elbows 17% and 1%, wrist and hand 34% and 1%, upper back 31% and 2%, lower back 43% and 4%, hips and thighs 21% and 2%, knees 24% and 2%, and ankle and feet 27% and 1%. This comparison clearly shows that the prevalence of chronic musculoskeletal pain among adult PWS was higher than the non-stuttering adult population of the same age and of a similar cultural environment.[19]

Since none of the PWS in the present study was taking any treatment for musculoskeletal pain, so it can be assumed that the acute and chronic musculoskeletal pain reported by these subjects was of low intensity on a VAS scale. In addition, in contrast to the current results, females distinctly showed higher pain prevalence than males.[19,20] Taken together, the findings suggest that the severity of stuttering, rather than gender, plays a role in developing musculoskeletal pain among PWS.

Another interesting finding of the current study was the presence of a positive correlation between the severity of stuttering and the number of pain locations, both in the acute pain, defined as pain during the preceding week, and chronic pain, defined as pain in the preceding 6 months. The current data clearly showed that PWS with mild stuttering had pain at a maximum of 2 locations, and those with severe to very severe stuttering had pain at a minimum of 4 and up to 9 locations. The finding of a positive correlation between the severity of stuttering and the number of pain locations indirectly corroborated previous finding related to relationship between self-reported level of anxiety and stuttering severity.[5] In the current study, most subjects reported that stuttering affected their daily life regularly, which was indicative of anxiety. Since anxiety is known to cause musculoskeletal pain[21] it can be speculated that the higher severity of stuttering adds to the level of anxiety, which, in turn, can be a possible cause behind an increase in the number of pain locations in subjects with a higher severity of stuttering.

Another important current finding was that most participants (68% regularly and 27% occasionally) reported interference with their daily lives due to stuttering. This again points to anxiety as a contributing factor that stutterers experience daily.

The detrimental effect of musculoskeletal pain on motor activity and control is well documented.[22] As generally observed, speech is affected in people with pain. Since speech is also based on motor control, so pain can negatively affect the speech output. It has been shown that speech-motor rates become significantly slower with higher back pain.[23] It is also known that musculoskeletal pain can negatively influence body posture[24] whereas body posture can influence motor function and joint loading.[25] It has been shown that different body postures can influence oral functions, like swallowing[26] and the severity of stuttering.[27]

Compared to 20% participants in the study who reported jaw pain, a varied prevalence of jaw pain has previously been reported.[28] Also, 49% participants reported frequent

headaches, while two previous studies from Saudi Arabia have reported a headache prevalence of 66% and 84% in the general population.[29] Compared to 9% of the participants reporting swallowing difficulties, a prevalence ranging from 2% to 20% has been reported.[30] Data indicated that stuttering was not a factor directly affecting jaw and oral functions.

It has been previously reported that optimal body posture can help decrease the severity of stuttering.[26,27] Present findings of widespread low-intensity musculoskeletal pain among PWS and previous findings together call for implementing new strategies for the management and treatment of stuttering. The current findings could be of clinical significance, promoting a multidisciplinary approach to treating the condition. This implies that for better management and treatment of stuttering in adults, overall postural and musculoskeletal pain assessment and appropriate treatment of these conditions by qualified physical therapists can be of significant importance.

The current study has limitations as there exists a possibility of overestimation or underestimation bias because of the self-reported questionnaire. In addition, the possible effects of confounding factors influencing the presence of musculoskeletal pain among PWS were not evaluated.

Further studies need to be conducted to understand better the precise underlying mechanisms of the development of musculoskeletal pain in response to stuttering, and how the severity of stuttering contributes to an increase in the number of pain locations among the PWS.

Conclusion

Widespread chronic musculoskeletal pain of low intensity was found to be common among PWS. The number of pain locations was positively related to the severity of stuttering. Jaw and oral functions were not generally affected by stuttering.

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Author Contribution:
AA, HZ: Concept and design of the study.
AA: Collected the data
AA, HZ: Data analyses, manuscript writing, approved the final version
HZ: Final revision.