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Association of temporomandibular joint dysfunction with the cervical spine pain

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ABSTRACT

BACKGROUND & OBJECTIVE: Temporo-mandibular dysfunction" is a terminology that is used to refer a broad/ wide range of interconnected conditions which affecting the Temporo-mandibular joint, muscles involve in the process of chewing, and clogging up of the joint. Cervical spine dysfunction is related with the temporomandibular joint dysfunction. To find out the association of temporomandibular joint dysfunction with the cervical spine pain.

METHODOLOGY: The study, conducted at Al-Hamd Institute of Physiotherapy & Health Sciences, Karachi involved 145 participants aged 18-30 years, with 145 samples in 3 months ranges February 09 to May 09, 2023 after the approval of research study from Ethical research committee. Numeric Pain Rating Scale and Questionnaire form for TMD were used. Results were analyzed using SPSS version 22, and interpreted using frequency and tables.

RESULTS: The test statistics of the cervical spine pain and chewing difficulty, uncomfortable bite, temple pain, and noises from the dysfunctional jaw (a = 10.898, a = 35.446, a = 18.813, and a = 14.345 respectively) have a p value of 0.000, which was less than the normal and standard p value of 0.05. So, there is association present between neck pain and chewing difficulty, uncomfortable bite, temple pain and noises from the dysfunctional jaw.

CONCLUSION: This study concluded that there is positive association between the pain in the cervical-region and resistance in chewing, uncomfortable feelings during bite, pain in the temple region, and noises from the jaw. But there is negative association present between the neck pain and locking sensation of the jaw.

KEYWORDS: Cervical Spine, Temporo-mandibular Dysfunction.

INTRODUCTION

Temporo-mandibular dysfunction are prevalent clinical condition associated with musculoskeletal abnormalities that affect the muscles around the joint between the jaws and are often characterized by restricted joint mobility, articular noises, or joint and muscular discomfort [1]. Patients having dysfunctional temporomandibular joint experience multiple symptoms related with the movement of the jaw such as ringing ear, heavy and fullness in the ear, pain, loss of the hearing, feeling of increased hearing frequency, and unsteadiness. These symptoms are related with the common nerve innervate the temporomandibular joint, muscles surrounding the jaw joint, and structural component of the ear [2]. Literature review also stated that TMD was also noted in the non-patient population of students. The most usual cardinal sign of TMJD was cracking and popping sounds out of all cardinal signs in non-patient population [3]. Mechanical problems in the cervical spine caused the dysfunction in the upper quadrant of the human body, temporomandibular joint and the and vice versa [4].

Previous researches proved that relation exits between the temporo-mandibular dysfunction, c-spine, the muscles of the mastication and the headache [5]. Many researches proved that the relation between the c- spine and TMJD is unclear and remains controversial [6]. Some of the justifications for the relation between the cervical spines, muscles of mastication, cranial region, and temporomandibular joint disorder which are responsible for the pathogenesis: The development of TMJD is influenced by various factors, including mechanical, neuromuscular, and psychosocial factors. Dysfunctions or imbalances in the cervical spine and muscles of mastication can contribute to the pathogenesis of TMJD by affecting joint mechanics, muscle control, and pain perception. Additionally, stress and emotional

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factors can also influence the development and exacerbation of TMJD symptoms, and these factors can impact both the cervical spine and masticatory muscles [7].

The study was conducted by the Paço et al. in 2021 assessed the cervico-cranial alignment in those patients having TMJD and undergo the dental and the orthotic treatment. They reported that physical therapy management of cervical spine was one of the effective treatment approaches for the pain and ROM [8]. On the other hand, many researchers found no relationship between the temporomandibular joint and cervical spine alignment [9]. Iunes et al. reported in their study that despite of biomechanical relation of the c-spine, TMJ, and the position of the head and common changes were noted in these regions in patients of the TMJD. But alignment of the cervical spine was not included in the causative factor for the pain in the TMJ [10]. Another study stated that patients having c-spine and temporomandibular joint abnormalities exist at the same time with trigger points in the muscles and limitations in the functions of the both cervical spine and the temporomandibular joint [11].

The study conducted in 2014 concluded that biomechanical changes in the c-spine and pain is associated with the temporo-mandibular dysfunction [12]. Severity of neck pain and disability index were also the main contributory factors in the TMD [13]. The study conducted on dental students of the Faisalabad; the study concluded that the clinical complaint was also present in non-patient population of students. The most usual cardinal sign of TMJD was cracking and popping sounds out of all cardinal signs [14].

On the other hand, many researchers found that there is no relationship between the TMD and the cervical spine [15]. Lunes et al. stated that in spite of kinematic chain relationship between the TMJ, cervical spine and the position of the head, posture is not the contributory factor in causing the TMD, on the other hand, Weber et al. Showed that concurrence of cervical spine and TMJ pain both are treated by the common treatment protocol of the complex of trigeminal nerve and cervical spine and severe pain of TMD than to postural changes of the upper quarter of the body. Moreover, the disorders of the craniometrical junction linked with the temporomandibular dysfunction [16].

The systemic review was conducted in 2022 on patient having temporomandibular dysfunction, this systemic review concluded that different approaches of manual therapy were used to treat the patients having TMD which is originated due to muscular imbalance of cervical region [17].

METHODOLOGY

This descriptive study was conducted at the Al-Hamd Institute of Physiotherapy & Health Sciences, Karachi. All the participants were in the age range of 18-30 years. The study was completed within the duration of 3 months (from February 09, 2023 to May 09, 2023) after the approval from the Institute Research committee (IRC) with Ref No: AIHS/IERC/2302/003. The sample size was estimated by using the Rao Soft formula, which was 145.

$$\acute{X} = Z(c/100)2r(100-r)$$

$$N = N\,x/((N-1)E2 + x)$$

$$E = Sqrt[(N - n)x/n(N-1)]$$

Population size (N) is (245 was our population size), and Z(c/100) is the critical value for the confidence level c. Convenient sampling technique was used to collect data.

The demographic detail was collected from the selected participants and previous medical, surgical, history of systemic pathology and past medication history. The participants were excluded who has previous history of fall, injury of soft tissues, fractures of the c-spine and systemic disease related to the c-spine, ear, facial trauma, dental issues and disc related pathologies. Numeric Pain Rating Scale (NPRS) and Questionnaire Form for TMD were the outcome evaluating tools. They rated their pain from 0-10, 0 is no pain and 10 is the worst pain as it would be. Questionnaire Form for TMD has 9 questions related to the temporomandibular dysfunction (such as the pain in temple region, noises from TMJ, eating and chewing difficulties etc.). The data was analyzed using descriptive statistics and the chi-square test. The scoring of NPRS and Questionnaire form were entered in the SPSS version 22 for the data analysis. The data was expressed in the form of tables, frequencies, and graphs. When conducting the study, the privacy of study participants was secure, and the norms and rules were followed. The collected data was only used for research purposes. Everyone who participated gave written, informed permission. All data collection and information were kept confidential.

RESULTS

Al most 43 men (29.7%) and 102 (70.3%) out of the 145 participants in this study were female. Out of 145 individuals, 35 (24.1%) did not have any neck pains but did have TMD, and 110 (74.9%) did experience both neck pain and TMD. 34 participants (23.4%) did not have any difficulties chewing, whereas 111 participants (76.6%) had trouble chewing. 23 individuals (16.6%) had no jaw noises, while 120 participants (82.8%) made noises with their jaws moving. Participants who experienced discomfort when eating a bite were 103 (71.0%), whereas participants who had no difficulties were 42 (29.0%). Among the subjects, 63 (43.4%) reported no discomfort, whereas 82 (56.6%) reported temple pain. 129 (89.0%) were having no sensations of lock jaw and 16 (11.0%) were lock jaw sensations.

Table- I: Demographic Details of the Participants (n= 145)

Variables		Frequency	Percentage
Gender	Male	43	29.7%
	Female	102	70.3%
Age	18-24 Years	72	49.65%
	25-30 Years	73	50.34%
TMJ pain	No	35	24.1%
	Yes	110	75.9%
Neck pain	Mild	65	44.8%
	Moderate	76	52.41%
	Severe	4	2.8%
Difficulty chewing	Yes	111	76.6%
	No	34	23.4%
Jaw noises	Yes	120	82.8%
	No	23	16.6%
Uncomfortable bite	Yes	103	71.0%
	No	42	29.0%
Temple pain	Yes	82	56.6%
	No	63	43.4%
Lock jaw	Yes	16	11.0%
	No	129	89.0%

Table- II: Statistical Table of the cross tabulation of the TMJ Questionnaire and the Neck Pain (n= 145).

Variables	Categories	Neck Pain			Chi-Square value	P-Value
		Mild	Moderate	Severe		
Difficulty chewing	Yes	47	63	1	10.898	0.01
	No	18	13	3		
Jaw noises	Yes	53	64	4	10.898	0.01
	No	12	12	0		
Uncomfortable bite	Yes	45	57	3	18.813	0.01
	No	20	19	1		
Temple pain	Yes	28	32	3	35.446	0.01
	No	37	44	1		
Lock jaw	Yes	35	40	1	3.143	0.06
	No	22	31	3		
Headache	Yes	55	46	3	10.046	0.07
	No	10	30	1		

The chi-square table revealed no association between lock jaw and headache with neck pain with the $p=0.06 > 0.05$, although there was a positive relation between neck pain and the difficulty in the chewing process, noises from the jaw, pain in the temple region and the uncomfortable feelings while taking bite with the $p=0.01 < 0.05$.

DISCUSSION

This study concluded that the pain in the neck region and dysfunction related to the neck pain both were associated with the temporomandibular dysfunction such as pain in temple region, joint noises, uncomfortable feelings in bite etc. And also concluded that pain in the neck region and disability due to the neck pain both significantly changes with the different types of the TMD [18].

This descriptive study concluded that patient experience noises from the jaw while eating and performing any jaw movement, which is compared by another study conducted in the 2020 in Tuiuti University of Paraná, which concluded in their study that ringing ears or jaw noises was the highest prevalent symptom in the TMD accompanied the heavy and fullness in the ear [19]. Another study concluded that most noticeable symptoms were the altered joint motion with change in the kinetics of the jaw, aches sensation in the head, and jaw noises.

Other symptoms include muscle or articular discomfort that worsens with chewing. In a clinical examination, TMDs are often detected by limited mandibular range of motion, discomfort, crepitation, or clicking in the TMJ [20]. This study concluded that there is significant association between the cervical spine dysfunction, disability and difficulty with the chewing process. In contrast to our study conducted on coordinated movement of mandible and the cervical spine (head and neck movement). This study concluded that pattern of the lower jaw movement was harmonized with the head and the neck movement. In the start of the jaw movement cycle, head extension was noted. This study also concluded that physiological relationship between the temporomandibular joint movement and the neuromuscular structures of the neck and the head region. New concept suggested that "physiological jaw movement cycle" was stimulated by the effectiveness of the neck musculature, AO joint (Atlanto-occipital joint) movement and the joints of the cervical spine [21].

Our study concluded that their positive association between neck pain and the pain in the temple region, in comparison to our study, new and old studies concluded that a wide range of connection between the temporomandibular dysfunction and the pain in the neck region. [22]. Tenderness and trigger points in the trapezius (upper part) and the temporalis muscle were highly linked the major level of neck and jaw disability and abnormal function. Furthermore, prominent neck dysfunction was linked with the prominent jaw dysfunction. This conclusion suggested the importance of neck and its structure while treating the patient the patient of the TMD [23]. Already studies done on the TMJ and neck musculature relationship, these studies concluded that mandible and neck muscles contracts in conjunction with each other [24].

CONCLUSION

This study concluded that there is positive association between the pain in the neck region and difficulty in chewing process, uncomfortable feelings during bite, pain in the temple region, and noises from the jaw. But there is negative association present between the neck pain and locking sensation of the jaw.

LIMITATION

Our participants were only restricted to a single setting only. We have not linked specific regions of the cervical spine with the TMJD. It was difficult to explain the study to participants because many of them decline to participate due to ethical concerns or their fear of having their personal information sheared.

RECOMMENDATION

This study recommended to conduct research on a larger sample size and more than one study to generalize the study's findings. This study recommended that to conduct the research on the upper back posture and temporomandibular dysfunction association and also the association between the dental issues, and ear issues with the TMD. This study results also recommended that prevention strategies and treating the c-spine to decrease the burden the disease.

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Author's Contribution:

Dr. Muhammad Waqas Ghauri : Substantial contributions to the conception and design of the work.
Dr. Nosheen Rao:The acquisition, analysis, and interpretation of data for the work
Dr. Shabana Rahim: Drafting the work.
Dr. Amna Batool Naz: Reviewing it critically for important intellectual content.
Dr. Nasir Mehmood: Final approval of the version to be published.

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