

Original Research Article

Evaluation of the relationship between temporomandibular disorders and global body posture: A cross-sectional study

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ABSTRACT

Objectives: To assess the association that exists between temporomandibular disorders (TMD) and global body posture in the Indian population.

Material and Methods: An observational cross-sectional study was undertaken whereby a pre-validated Fonseca questionnaire was used for the screening of participants with TMD. Global body posture in individuals with TMD was evaluated by using a smartphone application, i.e., PhysioCode.

Results: There was a moderate-to-strong positive association between craniocervical angle and TMD severity, especially in males.

Conclusion: Changes in body posture, as suggested by global craniocervical angle, are strongly related to the severity of TMD.

Keywords: Body posture, Craniocervical angle, Parafunctional habits, Temporomandibular disorders, Temporomandibular joints

INTRODUCTION

Temporomandibular disorders (TMDs) comprise a set of clinical conditions affecting the temporomandibular joint (TMJ), masticatory muscles, and the associated structures, representing the most common orofacial pain. Depending on their severity, TMDs may cause painful and functional limitations, often creating problems in social interaction.^[1,2] The TMJ is the most frequently used joint in the human body, in which opening and closing occur about 1500–2000 times a day. This may cause gradual deterioration of its associated structures (viz., muscles, bones, and cartilage). It has several important functions such as chewing, breathing, and pronunciation. Temporomandibular dysfunction is a condition that leads to functional and structural changes in the TMJ and muscles, resulting in pain and musculoskeletal stress patterns. If left unchecked, these adaptations could lead to changes in the typical posture of the body, primarily in the longitudinal plantar arches.

The interaction between the bone structures, ligaments, muscle chains, and fascia in every part of the human body in an upright position is known as body posture. Weight, minimum energy use, and maximum production are all perfectly matched under ideal circumstances.^[2]

Body posture and TMJ disorders have been suggested to be related. The anterior region of the cervical spine and TMJ is where the skull's maximum weight and center of gravity are found. The intricate anatomical and biomechanical relationships between the stomatognathic system and the head and neck position are interconnected. The forward head posture will change the mandible's position and function, which will increase the tension in the masticatory muscles and ultimately lead to TMD.^[3]

A posture and movement analysis tool called PhysioCode was created for use by fitness instructors, physical therapists, and medical experts. By examining body alignment and movement patterns, the app enables thorough postural examinations and may be able to spot imbalances or deviations that could lead to pain or discomfort. This can be used to evaluate a patient's posture when they have TMD.

Numerous studies have looked into the potential link between body posture and TMDs throughout the years, but the results are still conflicting, and there are not many studies conducted on Indian people.^[4]

Sample size

The sample size was 80.

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MATERIAL AND METHODS

This cross-sectional observational study was carried out in the Department of Prosthodontics, Ranjeet Deshmukh Dental College and Research Centre, Nagpur, after approval from the Institutional Ethics Committee, Rf No. IEC/VSPMDCRC/10/2014.

A pre-validated Fonseca questionnaire was circulated among the willing participants. It follows characteristics of a multidimensional evaluation comprising 10 questions, which include checking for the presence of pain in TMJ, head, back, and while chewing, parafunctional habits, movement limitations, joint clicking, perception of malocclusion, and sensation of emotional stress [Table 1].

This simple self-administered questionnaire would offer the advantage of faster application and thus low cost. In addition, it would provide a severity index with less influence from the examiner and less variability in the measures.^[5]

For the evaluation of body posture among the identified patients of TMDs, a software application PhysioCode, was used.^[6]

Data collection from the mobile app PhysioCode in the following manner [Figure 1].

RESULTS

Out of 81 participants, most were female (90.12%). Many participants were in the 21 to 30-year age group. Mild TMD was the most common type, affecting 79.01% of those involved. The average craniovertebral angle had a moderate to strong positive correlation with TMD severity ($r = 0.59$, $P = 0.0001$). This correlation was stronger in male participants, [Table 2-7], [Graph 1].

DISCUSSION

A pre-validated Fonseca questionnaire was circulated among the willing participants. It follows characteristics of a

multidimensional evaluation comprising 10 questions, which include checking for the presence of pain in TMJ, head, back, and while chewing, parafunctional habits, movement limitations, joint clicking, perception of malocclusion, and sensation of emotional stress.

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Although it is impossible to say whether postural abnormalities are the cause or the effect of temporomandibular dysfunction, there is a strong correlation between the two conditions. Therefore, postural assessment may play a significant role in the entire strategy for accurately preventing and treating temporomandibular dysfunction in patients.

In this study, the PhysioCode smartphone app—which uses digital image-based postural assessment software for photogrammetric postural evaluation—was utilized. A useful tool for clinical and research contexts, this method enables non-invasive and repeatable assessments of postural angles and distances.

The findings of this investigation align with earlier studies documented in the literature.

According to a study by Wiest *et al.*, a higher degree of cervical and thoracic curvature is linked to a higher severity rating for TMD.^[7] Still, further research is needed to determine how the body posture of segments farther away from the stomatognathic system relates to TMD. According to a different study by Saito *et al.*, the disc displacement group displayed posture-related abnormalities in the head, mandible, lumbar and thoracic spines, and pelvis.^[8] Their evidence at least confirms the occurrence of global body posture abnormalities and TMD, even though a cause-and-effect relationship cannot be positively stated. TMJ

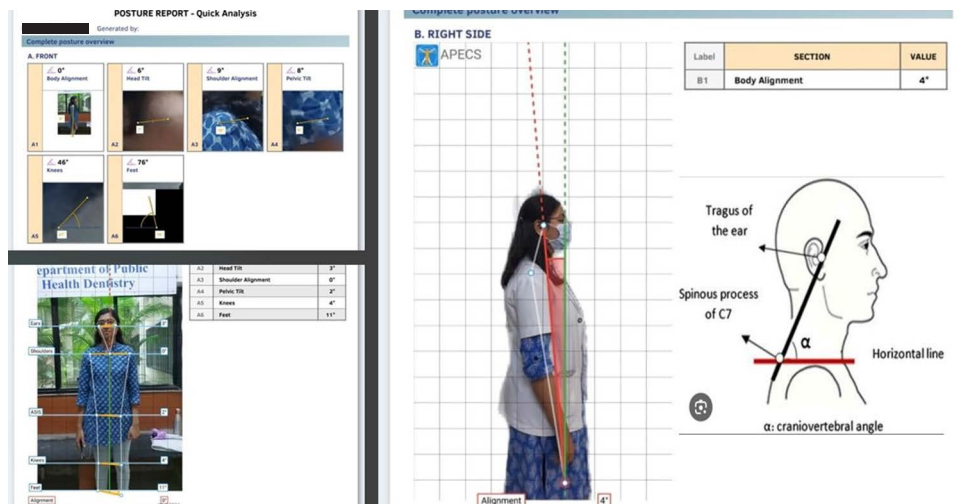


Figure 1: Data collection from the mobile app PhysioCode in the following manner

Table 1: Fonseca's questionnaire.

Questions	No	Sometimes	Yes
1. Is it hard for you to open your mouth?			
2. Is it hard for you to move your mandible side to side?			
3. Do you get tired/muscular pain while chewing?			
4. Do you have frequent headaches?			
5. Do you have pain in the nape or stiff neck?			
6. Do you have earaches or pain in craniomandibular joints?			
7. Have you noticed any temporomandibular joint clicking while chewing or when you open your mouth?			
8. Do you clench or grind your teeth?			
9. Do you feel your teeth don't articulate well?			
10. Do you consider yourself a tense (tense) person?			

Table 2: Scoring criteria.

Answer	No	Sometimes	Yes
Score	0	5	10

Table 3: Clinical index classification.

TMD classification	Score interpretation
Total between 0 and 15 points	No TMD
Total between 20 and 40 points	Mild TMD
Total between 45 and 65 points	Moderate TMD
Total between 70 and 100 points	Severe TMD

TMD: Temporomandibular disorder

Table 4: Age group distribution.

Age group	No. of respondents	%
11-20	28	34.57
21-30	53	65.43
Grand total	81	100.00

Table 5: Gender distribution.

Gender	No. of respondents	%
Female	73	90.12
Male	8	9.88
Grand total	81	100.00

Table 6: TMD type distribution.

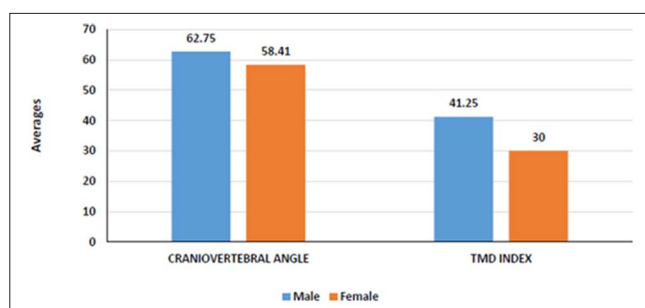
TMD type	No. of respondents	%
Mild	64	79.01
Moderate	17	20.99
Grand total	81	100.00

TMD: Temporomandibular disorder, SD: Standard deviation.

Table 7: Overall relation between TMD and craniovertebral angle.

Parameters	No. of respondents	Mean	SD	Correlation	P-value
Craniovertebral angle	81	58.84	7.11	0.59	0.0001
TMD index	81	31.11	11.26		

$P < 0.05$ is highly statistically significant. TMD: Temporomandibular disorder, SD: Standard deviation.



Graph 1: Mean craniovertebral angle and temporomandibular disorder index of respondents of two different genders. TMD: Temporomandibular disorder.

dysfunction can be aggravated by and contribute to poor posture. Common postural abnormalities associated with TMJ dysfunction include rounded shoulders, forward head posture, and increased cervical lordosis (swayback in the neck).^[9]

According to Chaves *et al.*, there is modest evidence of cervical postural misalignment in arthrogenous TMD and substantial evidence of craniocervical postural abnormalities in myogenous TMD.^[10]

Clinical implications

The findings support the hypothesis that global body posture is related to the severity of TMD. This could have clinical implications for the treatment and management of TMD, particularly in addressing posture-related issues.

CONCLUSION

- Relationship Between TMD and Global Body Posture: The study indicates a moderate to strong positive

significant correlation between Craniovertebral Angle and TMD. This suggests that individuals with altered global body posture (as indicated by the Craniovertebral Angle) are more likely to have more severe TMD.

- **Gender Differences:** The correlation is particularly strong in male respondents, though this finding needs to be interpreted with caution due to the small sample size.
- **Age Group Analysis:** Both age groups show a positive significant correlation, with the 21-30 age group having a slightly higher correlation, which may indicate that posture-related TMD issues are more pronounced in this age group.

Ethical approval: The research/study approved by the Institutional Review Board at Ranjeet Deshmukh Dental College and Research Centre, number IEC/VSPMDCRC/10/2014, dated 13th April 2024.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given consent for clinical information to be reported in the journal. The patient understands that the patient's names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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