International Journal of Research in Health and Allied Sciences

Journal home page: www.ijrhas.com

Official Publication of "Society for Scientific Research and Studies" [Regd.]

ISSN: 2455-7803

Original Research

Vitamin D deficiency in subjects with temporomandibular disorder

[1]Dr. Sipra Salaria, [2]Dr. Sahil Sarin

[1]Private consultant, Punjab, India;
[2]Assistant Professor, Department of Prosthodontics, Genesis Institute of Dental Sciences & Research, Firozpur, Punjab, India

ABSTRACT:
Background: Vitamin D is produced in the skin through the assistance of ultraviolet-B radiation and serves multiple functions within the body. Temporomandibular disorders (TMDs) constitute a collection of pathological conditions that impact the temporomandibular joints, masticatory muscles, and adjacent tissues. Hence, this study was conducted to assess the vitamin d deficiency in subjects with temporomandibular disorders. **Materials & Methods:** A total of 40 individuals were enrolled in the study, evenly distributed into two categories: 20 participants diagnosed with TMDs and 20 control individuals. Among those diagnosed with TMDs, 12 were classified as female, while 8 were identified as male. The collected data underwent analysis using the SPSS software, and statistical significance was defined with P values below 0.05. **Results:** Forty patients were included in the study and categorized into two sections: the temporomandibular disorder (TMD) group and the control group, each comprising 20 participants. **Conclusion:** In TMDs, vitamin D deficiency should be assessed and corrected.
Keywords: Vitamin D, deficiency, temporomandibular disorder.

Received: 19 February, 2020 Accepted: 26 March, 2020

Corresponding author: Dr. Sahil Sarin, Assistant Professor, Department of Prosthodontics, Genesis Institute of Dental Sciences & Research, Firozpur, Punjab, India

This article may be cited as: Salaria S, Sarin S. Vitamin D deficiency in subjects with temporomandibular disorder. Int J Res Health Allied Sci 2020; 6(2):113-116.

INTRODUCTION

The temporomandibular joint (TMJ) and its associated neuromuscular system are the two fundamental components of the temporomandibular system. The American Academy of Orofacial Pain broadly classifies temporomandibular disorders (TMD) into myogenous or muscle-related TMD, and arthrogenous or joint-related TMD. [1]The clinical features of TMD include pain in the temporomandibular region or muscles of mastication; radiation of pain to the face, behind the eyes, shoulder, neck and/or back; headaches and dizziness; tinnitus or ear-ache; clicking, locking or deviation of jaw; restricted jaw opening; clenching of teeth; and sensitivity of apparently healthy teeth without any oral disease. The most common symptom for which patients seek medical attention is pain in the associating region. [2] Patients with TMD who do not experience pain, may complain of popping, clicking and crepitus sounds, at the TMJ during joint movement. TMD has a multifactorial etiology. Several theories, including mechanical displacement, biomedical, trauma, osteoarthritis, muscle theory, neuromuscular, psycho-physiological and psychosocial theory, have been proposed to explain the etiology of TMD.[3]Temporomandibular disorders (TMDs) are a set of clinical problems involving the masticatory musculature, the temporomandibular joint (TMJ), surrounding structures, or combinations of these components.[4] Typical signs and symptoms of TMDs are facial pain, clicking or crepitus of the TMJs, limited jaw movement capacity, and a deviation in the movement patterns of the mandible.[5] Subsequently, chronic pain, joint noise, restriction of mandibular range of motion (ROM), and functional difficulty may also develop.[6] According to the diagnostic criteria for TMDs (DC/TMD), Axis I, TMDs can be divided into muscle disorders (Group I); intra-capsular disorders, including disc displacement (Group II); and arthralgia, arthritis, and arthrosis (Group III). [7]

25-hidroxyvitamin D (25-OHD), also known as vitamin D, is a fat-soluble vitamin, synthesized in the

skin (from a precursor), and obtained from dietary sources (e.g., oily fish, dietary supplements, or vitamin D-fortified foods). Among the causes of vitamin D deficiency, insufficient UVB exposure or decreased bioavailability are often mentioned, along with some medication, such as glucocorticoids, antiretroviral drugs, or anticonvulsants. [8]As the majority of human body tissues express vitamin D receptors, it is known that the lack of 25-OHD is implicated in a range of pathological conditions, including musculoskeletal disorders; metabolic, autoimmune, respiratory, and cardiovascular diseases; malignancies; psychiatric conditions; and chronic pain. [8,9] Hence, this study was conducted to assess the vitamin d deficiency in subjects with temporomandibular disorders.

MATERIALS & METHODS

A total of 40 individuals were enrolled in the study, evenly distributed into two categories: 20 participants diagnosed with TMDs and 20 control individuals. Among those diagnosed with TMDs, 12 were classified as female, while 8 were identified as male. The age spectrum of all participants spanned from 22 to 45 years. The diagnosis of TMDs encompassed both physical and radiographic evaluations, alongside measurements of 25 (OH) vitamin D levels in the bloodstream. To consider the potential impacts of age, gender, and seasonal fluctuations on serum 25 (OH) vitamin D levels, control participants were selected to align with these variables. Blood serum samples were obtained from all participants following an overnight fasting period and were promptly processed. The collected data underwent analysis using the SPSS software, and statistical significance was defined with P values below 0.05.

RESULTS

Forty patients were included in the study and categorized into two sections: the temporomandibular disorder (TMD) group and the control group, each comprising 20 participants. Vitamin D levels above 20 ng/mL were considered as the standard range. Among TMD patients, the average serum vitamin D level measured at 12.92 ng/mL. The findings did not show a significant outcome.

Table: characteristics in patients

Characteristics	TMD (n = 20)	Control group (n =20)	P - value
Vitamin D (ng/ml)	12.92	19.20	0.35

DISCUSSION

Multiple factors are involved in the etiology of TMDs, including local and systemic conditions; additionally, biological, environmental, emotional, and cognitive factors are known to be triggers for this pathology. [10]Among the systemic diseases, rheumatoid arthritis, inflammatory conditions, ankylosing spondylitis, and immune diseases such as lupus are known to be implicated in TMDs. [11] Hence, this study was conducted to assess the vitamin d deficiency in subjects with temporomandibular disorders.

In the present study, forty patients were included in the study and categorized into two sections: the temporomandibular disorder (TMD) group and the control group, each comprising 20 participants. A study by Im YG et al, investigated the association between serum 25-hydroxyvitamin D (25[OH]D) levels and TMD incidence using large-scale health data. Clinical data from the electronic health records of six secondary or tertiary hospitals in Korea were used to evaluate the relationship between serum 25(OH)D levels and TMD incidence. A cohort study was designed using the Cox proportional hazards model to examine the hazard ratio (HR) of TMD development after propensity score matching (PSM). An aggregate meta-analysis of the HR was subsequently performed. After 1:4 PSM, a target group with deficient 25(OH)D levels (<20 ng/mL) (N = 34,560) and comparator group with non-deficient 25(OH)D levels (≥20 ng/mL) (N = 47,359) were pooled from six hospital databases. HR meta-analysis demonstrated a significant association between deficient 25(OH)D levels and TMD incidence (pooled HR: 1.50; 95% confidence interval: 1.07–2.12). In conclusion, deficient 25(OH)D levels were found to be associated with an increased TMD risk. Therefore, vitamin D deficiency is a potential risk factor for TMD development.[12]

In the present study, vitamin D levels above 20 ng/mL were considered as the standard range. Among TMD patients, the average serum vitamin D level measured at 12.92 ng/mL. The findings did not show a significant outcome. Another study by Nemati M et al, subjects were assigned into two groups based on having signs and symptoms of TMD: Group 1: subjects had TMD, and group 2 healthy group (control group). The serum level of vitamin D was measured in the two groups. The independent t test was used to compare the serum level of vitamin D between the study and control groups.One hundred ten subjects were studied into two groups (55 subjects in each group). The mean serum level of vitamin D was 18.13 ± 6.38 ng/mL in the study group and 31.83 ± 7.00 ng/mL in the control group. Analysis of the data demonstrated a significant difference in the mean serum level of vitamin D between the study and control groups (p = 0.001).It seems the serum level of vitamin D is lower in TMD patients than in the healthy control group.[13] Gupta AK et al, thirty-six participants of 18–45 years of age gap with Vitamin D deficiency and TMD were included in the study. Preoperative values of Vitamin D levels in ng/ml, comfort mouth opening (CMO) in mm, maximum mouth opening (MMO) in mm, temporomandibular joint (TMJ) tenderness (grading 0–3), Visual analog scale score (VAS Score 0–10 cm), and total energy (TE) integral values of both left and right TMJ's in

Hertz (Hz) were recorded using joint vibration analysis All the values of CMO, MMO, TMJ Tenderness and VAS were recorded at each follow-up at 1st week, 1st month, 2nd month, and 3rd month, respectively. Postoperative Vitamin D levels and TE of both TMJs were recorded at end of 3 months.In Intergroup comparison, a significant difference was seen in CMO, VAS score and MMO ($P < 0.05$) but not among mean values of TE of right and left TMJ, and Vitamin D levels ($P < 0.05$). In both groups, there were significant statistical variations in CMO, VAS score, MMO, and TE integral before and after treatment in the right and left TMJs ($P < 0.05$).The study concludes centric stabilization splint helps in improving symptoms of TMD patients and Vitamin D supplementation provided faster relief in those cases.[14]The management of TMDs encompasses patient education, biobehavioral therapy, pharmacologic therapy, physical therapy, oral appliance therapy, occlusal treatment, and surgical management.[15] Conservative treatment options, such as counseling, exercises, oral appliance therapy, and manual therapy, should be considered as the first-line therapy, and, in cases of severe acute pain or chronic pain, pharmacologic therapy, minimally invasive procedures, and surgical procedures may be necessary. [16] Recently, novel bioactive molecules and emerging therapeutic strategies, including intra-TMJ delivery systems, hold promise as innovative treatment approaches for TMDs. [17]Vitamin D has also been implicated in TMDs. Emerging evidence suggests a potential association between vitamin D deficiency and the development of TMDs. According to a recent systematic review, patients with TMDs commonly exhibit lower serum levels of vitamin D, and furthermore, the findings indicated a potential involvement of vitamin D receptor (VDR) polymorphisms in the development of TMDs. However, only a limited number of studies have investigated the association between vitamin D and TMDs, and the results have been inconsistent. [18-20]It has been shown that vitamin D plays a significant role in musculoskeletal disorders and that vitamin D deficiency can cause bone loss, hypocalcemia, and poor muscle strength, manifested by musculoskeletal pain.[21] Moreover, vitamin D seems to have a role in pain intensity and in the management of pain in varying clinical settings. [22] In this context, Wu et al. [23] conducted a systematic review to determine if vitamin D supplementation could reduce pain scores when compared with the placebo. The authors included 19 RCTs and concluded that vitamin D supplementation could have a role in the management of chronic pain. This concept must be taken into account since muscular TMDs could be attributed to common dysfunctions of the central pain regulation mechanisms (central sensitization), and could be associated with the development of craniofacial allodynia. [24]

CONCLUSION

In TMDs, vitamin D deficiency should be assessed and corrected.

REFERENCES

1. Jerjes W, Upile T, Abbas S, Kafas P, Vourvachis M, Rob J, et al. Muscle disorders and dentition-related aspects in temporomandibular disorders: Controversies in the most commonly used treatment modalities. Int Arch Med. 2008;1:23.
2. Gauer RL, Semidey MJ. Diagnosis and treatment of temporomandibular disorders. Am Fam Physician. 2015;91:378–86.
3. Chisnoiu AM, Picos AM, Popa S, Chisnoiu PD, Lascu L, Picos A, et al. Factors involved in the etiology of temporomandibular disorders – A literature review. Clujul Med. 2015;88:473–8.
4. Schiffman E., Ohrbach R., Truelove E., Look J., Anderson G., Goulet J.P., List T., Svensson P., Gonzalez Y., Lobbezoo F., et al. Diagnostic criteria for temporomandibular disorders (DC/TMD) for clinical and research applications: Recommendations of the international RDC/TMD consortium network* and orofacial pain special interest group† J. Oral Facial Pain Headache. 2014;28:6–27.
5. Okeson J.P. Bell's Oral and Facial Pain. 7th ed. Quintessence Publishing; Hannover, Germany: 2014.
6. de Souza R.F., Lovato da Silva C.H., Nasser M., Fedorowicz Z., Al-Muharraqi M.A. Interventions for the management of temporomandibular joint osteoarthritis. Cochrane Database Syst. Rev. 2012;2012:Cd007261.
7. Kapos F.P., Exposto F.G., Oyarzo J.F., Durham J. Temporomandibular disorders: A review of current concepts in aetiology, diagnosis and management. Oral Surg. 2020;13:321–334.
8. Straube S., Derry S., Straube C., Moore R.A. Vitamin D for the treatment of chronic painful conditions in adults. Cochrane Database Syst. Rev. 2015;5:CD007771.
9. Holick M.F. Vitamin D deficiency. N. Engl. J. Med. 2007;357:266–281.
10. Ryan J., Akhter R., Hassan N., Hilton G., Wickham J., Ibaragi S. Epidemiology of Temporomandibular Disorder in the General Population: A Systematic Review. Adv. Dent. Oral Health. 2019;10:555787.
11. Paduano S., Bucci R., Rongo R., Silva R., Michelotti A. Prevalence of temporomandibular disorders and oral parafunctions in adolescents from public schools in Southern Italy. Cranio. 2020;38:370–375.
12. Im YG, Han MY, Baek HS. Association of Serum Vitamin D Level with Temporomandibular Disorder Incidence: A Retrospective, Multi-Center Cohort Study Using Six Hospital Databases. Nutrients. 2023 Jun 24;15(13):2860.
13. Nemati M, Tabrizi R, Rasooli F, Ghafari S. Is the Prevalence of Vitamin D deficiency in Patients with Temporomandibular Disorder Higher than Healthy Control Group? J Maxillofac Oral Surg. 2022 Dec;21(4):1205-1208.
14. Gupta AK, Gupta R, Gill S. Effectiveness of Vitamin D along with Splint therapy in the Vit D deficient patients with Temporomandibular disorder-A Randomized, double-blind, placebo-controlled clinical trial. J Indian Prosthodont Soc. 2022 Jan-Mar;22(1):65-73.

15. De Leeuw R., Klasser G.D. Orofacial Pain: Guidelines for Assessment, Diagnosis, and Management. 5th ed. Quintessence; Hanover Park, IL, USA: 2013. Chapter 8. Diagnosis and management of TMDs
16. Wieckiewicz M., Boening K., Wiland P., Shiau Y.Y., Paradowska-Stolarz A. Reported concepts for the treatment modalities and pain management of temporomandibular disorders. J. Headache Pain. 2015;16:106.
17. Wu M., Cai J., Yu Y., Hu S., Wang Y., Wu M. Therapeutic Agents for the Treatment of Temporomandibular Joint Disorders: Progress and Perspective. Front. Pharmacol. 2020;11:596099.
18. Ferrillo M., Lippi L., Giudice A., Calafiore D., Paolucci T., Reno F., Migliario M., Fortunato L., Invernizzi M., de Sire A. Temporomandibular Disorders and Vitamin D Deficiency: What Is the Linkage between These Conditions? A Systematic Review. J. Clin. Med. 2022;11:6231.
19. Yildiz S., Tumer M.K., Yigit S., Nursal A.F., Rustemoglu A., Balel Y. Relation of vitamin D and BsmI variant with temporomandibular diseases in the Turkish population. Br. J. Oral Maxillofac. Surg. 2021;59:555–560.
20. Hong S.W., Kang J.H. Bone mineral density, bone microstructure, and bone turnover markers in females with temporomandibular joint osteoarthritis. Clin. Oral Investig. 2021;25:6435–6448.
21. Singh V., Misra A.K., Singh M., Kumar B., Midha N.K., Ambwani S. A prospective, cross-sectional study on association of serum vitamin D level with musculoskeletal symptoms and blood pressure in adult population. J. Fam. Med. Prim. Care. 2020;9:1628–1632.
22. Helde-Frankling M., Björkhem-Bergman L. Vitamin D in pain management. Int. J. Mol. Sci. 2017;18:2170.
23. Wu Z., Malihi Z., Stewart A.W., Lawes C.M., Scragg R. Effect of vitamin D supplementation on pain: A systematic review and meta-analysis. Pain Physician. 2016;19:415–427.
24. Furquim B.D., Flamengui L.M., Conti P.C. TMD and chronic pain: A current view. Dent. Press J. Orthod. 2015;20:127–133.