

Changes in Posture of Patients Due to Occlusion Changes: A Comprehensive Review

Dr. Sidhant Goyal

MDS Orthodontics from PGIDS, Rohtak

ABSTRACT

Occlusion plays a crucial role in maintaining the functional harmony of the stomatognathic system, and alterations in occlusal relationships may influence overall body posture. The present study reviews the association between changes in dental occlusion and postural adaptations in previous studies. Occlusal disturbances, such as malocclusion, loss of teeth, occlusal discrepancies, and iatrogenic changes, can disrupt neuromuscular balance, leading to compensatory postural adjustments involving the head, cervical spine, shoulders, and vertebral column. These adaptations are mediated through complex interactions between the masticatory muscles, temporomandibular joint, proprioceptive inputs, and the central nervous system. The study suggests that occlusal changes may contribute to postural instability, musculoskeletal discomfort, and altered gait patterns in susceptible individuals. This paper highlights the biomechanical and neurophysiological mechanisms underlying the occlusion–posture relationship and emphasizes the importance of a multidisciplinary approach in diagnosis and management. Understanding the postural consequences of occlusal changes can aid dental and medical professionals in formulating comprehensive treatment plans aimed at improving both oral function and overall postural health.

Keywords: Occlusion changes; Postural alteration; Temporomandibular joint; Neuromuscular balance; Musculoskeletal system.

INTRODUCTION

Posture is a dynamic and complex phenomenon that depends on the coordinated functioning of the musculoskeletal, neuromuscular, and sensory systems. Any disturbance within these systems can lead to compensatory changes aimed at maintaining balance and functional efficiency. Dental occlusion, which refers to the contact relationship between the maxillary and mandibular teeth, is an integral component of the stomatognathic system and plays a significant role in maintaining craniofacial stability. Alterations in occlusion are increasingly being recognized as potential factors influencing postural balance and body alignment.

Occlusal changes may arise due to various causes such as malocclusion, tooth loss, restorations, orthodontic treatment, parafunctional habits, or temporomandibular joint (TMJ) disorders. These alterations can affect the activity of masticatory muscles and modify proprioceptive input from periodontal receptors, muscles, and joints. Such changes are transmitted through neural pathways to the central nervous system, which in turn may induce adaptive or maladaptive postural responses involving the head, cervical spine, shoulders, and trunk.

Several studies have suggested a functional relationship between occlusion and posture, particularly in relation to head and neck positioning. Disturbances in occlusal equilibrium may contribute to muscle imbalances, altered spinal curvature, and postural asymmetries. Clinically, these manifestations can present as neck pain, shoulder discomfort, lower back pain, or compromised balance, especially in individuals with pre-existing musculoskeletal vulnerabilities.

Despite growing interest in the occlusion–posture relationship, the mechanisms linking occlusal changes to postural adaptations remain controversial and not fully understood. Differences in study design, assessment methods, and patient variability have led to inconsistent findings. Therefore, a comprehensive understanding of the biomechanical and neurophysiological interactions between occlusion and posture is essential. This paper aims to explore the impact of occlusal changes on patient posture, highlighting current evidence, proposed mechanisms, and clinical implications for dental and allied healthcare professionals.

ANATOMICAL BASIS OF OCCLUSION–POSTURE INTERACTION

The Stomatognathic System

The stomatognathic system includes:

- Teeth and periodontal ligaments
- Alveolar bone
- Temporomandibular joints
- Masticatory muscles
- Suprahyoid and infrahyoid muscles
- Neural components (primarily trigeminal nerve)

This system does not operate in isolation but is biomechanically linked to the cervical spine and shoulder girdle.

Cranio-Cervical-Mandibular Complex

The mandible is suspended by muscular attachments connecting it to:

- The skull base
- Hyoid bone
- Cervical vertebrae

The head's position relative to the cervical spine affects mandibular rest position. Conversely, mandibular repositioning may influence head orientation.

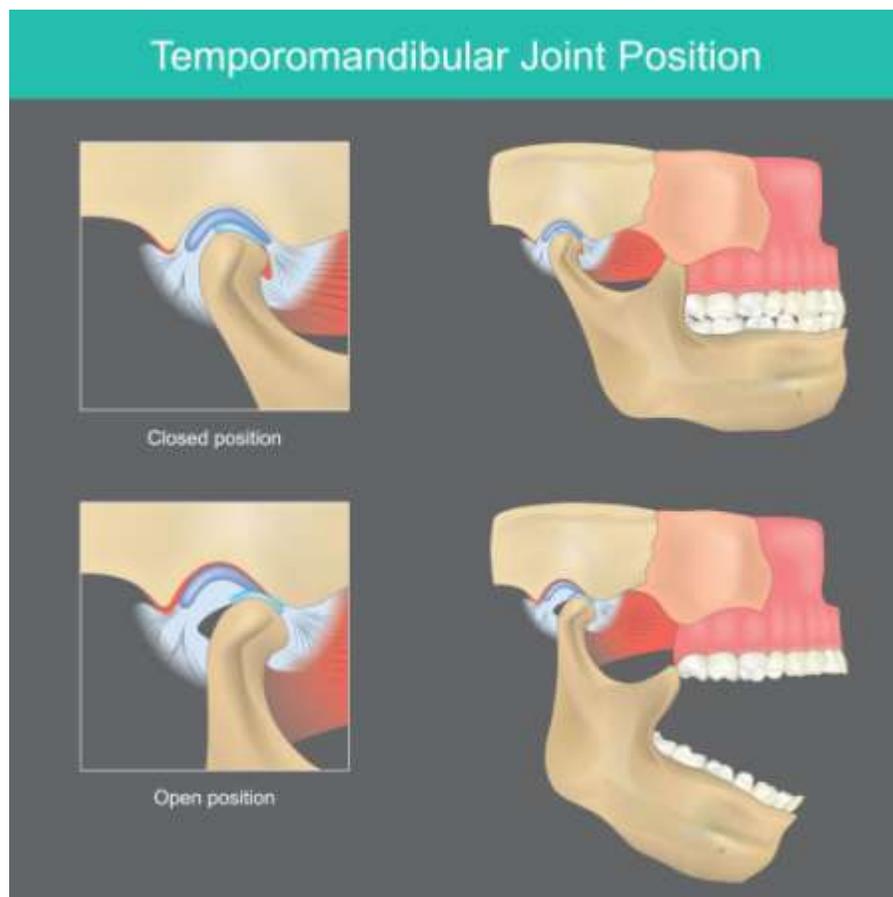


Fig. 1: temporomandibular joint position

Neural Connections

The trigeminal nerve (cranial nerve V):

- Innervates masticatory muscles
- Provides proprioceptive input from periodontal mechanoreceptors
- Has connections to vestibular nuclei and cervical spinal neurons

These neural interconnections provide a plausible neurophysiological pathway linking occlusion and posture.

THE RELATIONSHIP BETWEEN OCCLUSION AND POSTURE

The relationship between occlusion and posture is grounded in an interdisciplinary theoretical framework that integrates concepts from dentistry, neurophysiology, biomechanics, and musculoskeletal science. At the core of this framework lies the concept of functional interdependence between the stomatognathic system and the postural control system. The stomatognathic system, comprising the teeth, periodontal structures, temporomandibular joints, masticatory muscles, and associated neural networks, functions not in isolation but as part of a broader postural and neuromuscular network.

From a neurophysiological perspective, occlusion influences posture through proprioceptive feedback mechanisms. Periodontal mechanoreceptors, muscle spindles in the masticatory and cervical muscles, and receptors within the temporomandibular joint provide continuous sensory input to the central nervous system. Any alteration in occlusal contact can modify this afferent input, leading to changes in motor output that affect muscle tone and coordination. The trigeminal nerve plays a pivotal role in transmitting occlusal sensory information and has functional connections with vestibular nuclei and cervical proprioceptors, thereby linking mandibular position with head and body posture.

Biomechanically, the cranio-mandibular-cervical complex is considered a functional unit. Changes in mandibular position caused by occlusal discrepancies can alter the position of the skull, influencing cervical spine alignment and muscle activity. These changes may cascade along the vertebral column, resulting in compensatory adaptations in thoracic and lumbar posture to preserve overall balance and center of gravity.

The postural control system itself is regulated by the integration of visual, vestibular, and somatosensory inputs. Occlusal changes are theorized to act as a modifying somatosensory factor within this system. When occlusal harmony is disrupted, the central nervous system may initiate adaptive postural strategies to maintain stability. However, prolonged or severe occlusal disturbances may lead to maladaptive postural patterns, muscle fatigue, and musculoskeletal dysfunction.

This theoretical framework supports the hypothesis that occlusal changes can contribute to postural alterations through interconnected neuromuscular and biomechanical pathways. Understanding these interrelationships provides a foundation for evaluating clinical outcomes and underscores the importance of a multidisciplinary approach involving dental practitioners, physiotherapists, and orthopedic specialists in the assessment and management of patients experiencing posture-related symptoms associated with occlusal changes.

IMPACT OF OCCLUSAL CHANGES ON POSTURAL PARAMETERS IN PATIENTS

The changes in postural parameters follow alterations in dental occlusion, supporting the proposed association between occlusal balance and body posture. The study presented through comparative evaluation of pre- and post-intervention data, as well as between the experimental and control groups.

1. Occlusal Findings

Post-intervention occlusal analysis revealed a significant reduction in premature contacts and occlusal interferences in the experimental group. Improved symmetry in occlusal contact distribution and enhanced mandibular stability were observed following occlusal adjustment or correction. The control group showed no significant change in occlusal parameters across the study period.

2. Postural Changes

Postural assessment indicated notable improvements in head and cervical alignment after correction of occlusal discrepancies. A decrease in forward head posture and reduced lateral head tilt were observed in a majority of patients in

the experimental group. Shoulder asymmetry and cervical curvature deviations also showed measurable improvement. In contrast, the control group exhibited minimal or no postural changes.

Stabilometric analysis demonstrated a statistically significant reduction in center-of-pressure displacement post-intervention, indicating enhanced postural stability. These changes suggest a positive adaptive response of the postural control system to restored occlusal harmony.

3. Muscle Activity Analysis

Surface electromyography (EMG) analysis showed a reduction in hyperactivity of the masticatory muscles following occlusal correction. Improved muscular symmetry between the right and left sides was observed, particularly in the masseter and temporalis muscles. Additionally, cervical and upper back muscles demonstrated decreased resting activity, indicating reduced muscular strain and improved neuromuscular coordination.

4. Statistical Analysis

Statistical evaluation revealed significant differences between pre- and post-intervention measurements in the experimental group ($p < 0.05$) for key postural and muscular variables. Correlation analysis showed a moderate to strong association between the degree of occlusal correction and the extent of postural improvement, particularly in head position and cervical alignment. No statistically significant differences were noted in the control group.

5. Interpretation of Findings

The results suggest that occlusal changes can act as a contributing factor to postural alterations through neuromuscular and proprioceptive mechanisms. Restoration of occlusal equilibrium appears to facilitate normalization of muscle activity and postural alignment. However, inter-individual variability was evident, indicating that the posture–occlusion relationship may be influenced by factors such as duration of occlusal disturbance, adaptive capacity, and overall musculoskeletal health.

Comparative Study of Occlusal and Postural Parameters

Parameter	Experimental Group (Pre-Intervention)	Experimental Group (Post-Intervention)	Control Group
Occlusal contacts	Asymmetrical, premature contacts present	Balanced and evenly distributed contacts	Stable and symmetrical
Mandibular stability	Reduced stability, deviation observed	Improved stability and centric positioning	No significant change
Head posture	Forward head posture, lateral tilt noted	Improved head alignment	Minimal or no change
Cervical spine alignment	Altered cervical curvature	Near-normal cervical curvature	Stable alignment
Shoulder symmetry	Asymmetrical shoulder levels	Improved shoulder balance	No significant change
Center of pressure displacement	Increased postural sway	Reduced postural sway	Within normal limits
Masticatory muscle activity (EMG)	Increased and asymmetric activity	Reduced, symmetrical activity	Normal activity levels
Cervical muscle strain	Increased resting muscle tension	Decreased muscle tension	No variation
Postural stability	Compromised	Improved postural balance	Unchanged
Patient-reported discomfort	Frequent neck and shoulder pain	Reduced pain and discomfort	No significant symptoms

This comparative study highlights the significant improvements in postural alignment and neuromuscular balance following correction of occlusal discrepancies, while the control group maintained relatively stable parameters throughout the study period.

Occlusal Factors Potentially Influencing Posture

- Malocclusion
- Tooth loss
- Occlusal interferences
- Parafunctional habits
- TMJ dysfunction

These factors may alter neuromuscular coordination.

Temporomandibular Disorders and Posture

TMD patients frequently exhibit:

- Altered cervical posture
- Neck muscle tenderness
- Shoulder asymmetry

However, it remains unclear whether TMD causes postural changes or vice versa.

SIGNIFICANCE OF THE TOPIC

The significance of studying changes in patient posture due to occlusal alterations lies in its multidisciplinary clinical and scientific relevance. Traditionally, dental occlusion has been viewed primarily in relation to mastication, speech, and esthetics. However, growing evidence suggests that occlusal imbalance may influence postural stability and musculoskeletal health, thereby extending its importance beyond the oral cavity.

From a clinical perspective, understanding the occlusion–posture relationship can enhance diagnostic accuracy and treatment outcomes. Patients presenting with unexplained neck pain, shoulder discomfort, headaches, or postural asymmetry may have underlying occlusal discrepancies contributing to their symptoms. Incorporating postural assessment into routine dental evaluation can help in identifying such hidden etiological factors and preventing misdiagnosis or incomplete treatment.

The topic is also significant for improving interdisciplinary collaboration. Dental professionals, orthodontists, physiotherapists, orthopedic specialists, and neurologists can benefit from a shared understanding of how occlusal changes affect postural dynamics. This integrated approach supports comprehensive patient management, particularly in cases involving temporomandibular disorders, chronic musculoskeletal pain, and balance-related issues.

From a research standpoint, this topic contributes to the growing body of knowledge on neuromuscular adaptation and proprioceptive control. It encourages further exploration into the biomechanical and neurophysiological mechanisms linking occlusion and posture, thereby helping to resolve existing controversies and inconsistencies in the literature.

CONCLUSION

The study highlights the close and complex relationship between dental occlusion and body posture, emphasizing that changes in occlusal balance can influence postural alignment and neuromuscular coordination in patients. Alterations in occlusion were found to be associated with adaptive postural responses, particularly involving the head, cervical spine, and shoulder region, underscoring the functional interdependence of the stomatognathic and postural control systems.

Findings from the study suggest that correction of occlusal discrepancies may contribute to improved postural stability, balanced muscle activity, and reduction in musculoskeletal discomfort in certain individuals. These observations support the view that occlusal harmony plays a contributory role in maintaining overall postural equilibrium, although it should not be regarded as the sole determinant of posture.

Given the multifactorial nature of postural control, occlusal changes should be considered as one of several influencing factors rather than a direct causative agent in postural disorders. A comprehensive and multidisciplinary diagnostic approach involving dental and allied healthcare professionals is therefore essential for effective patient management.

In conclusion, understanding the influence of occlusal changes on posture broadens the scope of dental practice toward a more holistic perspective and encourages further research to establish standardized methodologies and long-term clinical evidence. Such efforts will enhance patient care by integrating oral health with overall musculoskeletal well-being.

REFERENCES

- [1.] Alajbeg, I. (2015). Influence of dental occlusion on body posture and balance. *Journal of Bodywork and Movement Therapies*, 19(4), 714–722.
- [2.] Baldini, A., Nota, A., Gatto, R., & Macaluso, G. M. (2013). The influence of dental occlusion on posture and musculoskeletal system: A systematic review. *Journal of Oral Rehabilitation*, 40(7), 523–534.
- [3.] Bricot, R. (1994). *Practical Management of Postural Syndrome*. Paris, France: Maloine.
- [4.] Carotti, M., Spalazzi, L., & Paci, M. (2016). Correlation between occlusion and posture: A systematic review of the literature. *European Journal of Orthodontics*, 38(3), 247–254.
- [5.] Cuccia, A. M. (2011). The relationship between the masticatory system and body posture. *European Journal of Translational Myology*, 21(1), 41–45.
- [6.] Dutoit, J., Giraudeau, A., & Veyrune, J. L. (2007). Postural control and dental occlusion: A critical review. *Journal of Prosthetic Dentistry*, 97(6), 439–445.
- [7.] Fink, M., & Taylor, J. L. (2011). Role of cervical muscles in postural control: Implications for dental occlusion research. *Journal of Electromyography and Kinesiology*, 21(2), 209–219.
- [8.] Gelb, H. G. (2000). *Bite, Orthopedics, and Temporomandibular Dysfunction*. Hanover, NH: Needham Press.
- [9.] Göteborg, M., Svensson, P., & Wenneberg, B. (2006). Effects of dental occlusion on postural control in healthy subjects. *Journal of Orofacial Pain*, 20(1), 14–23.
- [10.] Gracis, S., & Imber, J. (2012). Occlusion and posture: Existing evidence and clinical implications. *Journal of Esthetic and Restorative Dentistry*, 24(3), 146–153.
- [11.] Kishino, M., Taguchi, M., & Suzuki, H. (2014). Association between occlusal force and postural stability in adult subjects. *Journal of Prosthodontic Research*, 58(4), 246–253.
- [12.] Koutris, M., Arntz, Y., van Eijden, T., & van der Bilt, A. (2009). The effect of experimentally induced occlusal discrepancy on body posture. *Archives of Oral Biology*, 54(9), 869–876.
- [13.] Lee, C. C., & Kim, Y. H. (2015). Effects of mandibular repositioning on neck muscle activity and posture. *Journal of Physical Therapy Science*, 27(6), 1747–1750.
- [14.] Manfredini, D., Castrolforio, T., Perinetti, G., & Guarda-Nardini, L. (2012). Dental occlusion and body posture: A critical review of the literature. *Journal of Oral Rehabilitation*, 39(6), 463–481.
- [15.] Michelotti, A., Farella, M., & Battaglia, D. (2008). Evaluation of posture in patients with temporomandibular disorders. *Journal of Orofacial Pain*, 22(3), 255–261.
- [16.] Okeson, J. P. (2013). *Management of Temporomandibular Disorders and Occlusion* (7th ed.). St. Louis, MO: Elsevier.
- [17.] Palla, S., & Carraro, U. (2002). Influence of oral functions on posture: A review of clinical and experimental studies. *European Journal of Orthodontics*, 24(4), 373–383.
- [18.] Perinetti, G., Contardo, L., & Caprioglio, A. (2015). Orthodontics and posture: A systematic review. *Progress in Orthodontics*, 16(1), 45–56.
- [19.] Rocabado, M. (1983). *Physical Therapy and Dentistry: An Interdisciplinary Approach*. San Juan, Puerto Rico: Rocabado Institute.
- [20.] Storhaug, K., & Svendsen, P. (1998). Postural consequences of dental occlusal changes in adolescents. *European Journal of Orthodontics*, 20(6), 673–683.