ISSN: 0976-3031

Available Online at http://www.recentscientific.com

CODEN: IJRSFP (USA)

International Journal of Recent Scientific Research
Vol. 10, Issue, 07(F), pp. 33731-33734, July, 2019

International Journal of Recent Scientific Research

DOI: 10.24327/IJRSR

Review Article

OCCLUSION AND POSTURE- A REVIEW

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DOI: http://dx.doi.org/10.24327/ijrsr.2019.1007.3736

ARTICLE INFO

Article History:

Received 15th April, 2019
Received in revised form 7th May, 2019
Accepted 13th June, 2019
Published online 28th July, 2019

Key Words:

Occlusion, temporomandibular joint, cranio-cervical joint.

ABSTRACT

The connection among stomatognatic and postural framework has long-term been examined among specialists in human services. But a certain amount of perplexity still obscure the subject because of the wide decent diversity of therapeutic methodologies structured to deal with it and the shortcoming of methodological design in the scientific researches that have been studied and published on it till date. Infact the physiological continuum that links occlusion and posture does not seem to be rare and direct connection, but rather a complex set of many contributing elements

The main objective of this review is to try to understand this amusing neurophysiological web through the examination of the already accomplished knowledge in order to find out the positive aspects that allow us to say whether a postural approach should be used during the dental treatment or not.

INTRODUCTION

The purpose of any dental treatment is to optimize the en masse of orofacial functioning and to improve the equilibrium of teeth in the arches, in association to skeletal structures, to the periodontium, to the joints, to bodily posture, and to the biopsychosocial actions of the patient[1]. Sherrington[2,3] said that the basis of movement is posture and all movement begins and ends in posture. There appears to be two school of thoughts which can be summarized as i) postural position is stable throughout the life[4] ii) postural position is ever changing[5]. First thought was supported by Thompson[6] and Brodie[7,8] and the latter by Atwood[9] and Posselt[10].

It is also believed that postural problems do have a correlation between the patient's cognitive and emotional status[11]. In a very general way of all the fields in dentistry, we are living in an era in which postural considerations are being harmonized into our therapy[12]. Also recently many postural diseases have been classified among occlusal-functional alterations, mostly on a clinical basis[13]; however some anatomic and physiologic aspects are still unknown[14].

The dental practioners all around the world believe that there is a strong inter-relationship between occlusion and posture which are governed by common neurological control systems and has become a leading research topic[15]. We all should remember that the "postural dimension" always relies majorly on holistic medical approaches like energetic, applied chiropractic, osteopathy and Chinese medicine, none of which are noted for their adherence to the evidence based approach[12].

Occlusion in dental context is simply defined as contact between the teeth. Posture is defined as the habitual stance of the body or parts of it supported by the action and constraints of tonic muscles that work to fix the body segments through joints designed to maintain equilibrium[12]. Postural sustenance is based on feedback and feedforward responses that undoubtedly depend back on information arising from the visual apparatus and from the proprioceptive and vestibular systems[15]. The proprioception is particularly precised and developed at the mandibular level. Mandibular proprioception which is arising from the masticatory muscle system receptors (neuromuscular spindles, Golgi tendon organs), the periodontal ligament receptors (encapsulated nerve endings) and the temporomandibular joint receptors (Ruffini and Pacini corpuscles, Golgi tendon organs in periarticular tissue and free nerve endings in the subsynovial space), is transmitted to the central nervous system via the trigeminal nerve[16].

A study was demonstrated by Gangloff and Perrin who showed that pharmalogically induced unilateral truncular anesthesia of mandibular nerve leads to a serious worsening of balance control measured by stabilometry and clearly stated that jaw position is been influenced by head position[17]. It was explained later as there exists a connection between the trigeminal and

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vestibular nuclei and also vestibulospinal bundle is very important in balance maintenance reactions[17].

The fitness of the masticatory framework relies mostly upon alignment and occlusion of dentition[18]. Occlusal contacts are controlled by Temporomandibular joint (TMJ), dentition and muscles of mastication[19]. The pattern of occlusion greatly authoritises the human vital function such as masticating, swallowing and speech[20]. More than static occlusal contacts, dynamic contacts influence the mastication and all other physiological activities[20]. Improper occlusal contacts, inappropriate head postures are considered to be the main causes for the start of pain in the TMJ later followed by TMJ disorders[21].

A person is usually unconscious of his own muscles even if he's playing or at work, yet each of them is carefully adjusted to maintain the body at its correct posture[22]. The opening factors include the gravity, suprahyoid and infrahyoid muscles, and postcervical muscles which are the extensor muscles of the skull[23]. The closing factors include the muscles of mastication and the facial muscles[23]. In a close manner, the muscles of mastication and suprahyoid muscles hold the mandible in a postural position[23]. Posseltl[24] was the first person to apply this term to mandible, meanwhile many authors have stated that rest position of mandible varies with body posture.

The posture of the head is varied according to the physiological and functional activity of the man[19]. They are divided into an active feeding position posture, upward posture and extended head posture[19]. Incorrect forward head posture is known to cause neck, head, shoulder tension and pain with occlusal changes[25]. Severe dysfunction, leading to TMJ pain and myalgia can be caused by a very few microns of occlusal disturbance[19]. Occlusal indicators can be broadly classified based on their measurement capacity as qualitative and quantitative indicators[26]. Qualitative indicators are the ones which measure only location and number of tooth contacts like articulating paper and articulating silk also commonly used because of their low cost and ease of application[26]. Quantitative ones include electro-optic and resistive technique such as T-Scan pressure measurement systems which are quite expensive and comes with an added capability of measuring time force characteristics of tooth contacts[26,27].

Earlier skeletal radiographs, occlusograms were used to establish a positive correlation between head posture and occlusion[20]. Everyday actions which we all do normally like eating, drinking will alter the head posture[20]. During eating, head will extend forward approximately by 30^0, which is termed as active feeding posture[28,29]. This posture shifts the mandible and its closure path is anteriorly[28,29]. During drinking, head will extend around 45^0 which results in mandible shift posteriorly[28,29]. Cohen's lateral skull roent- genograms showed that the postural position may vary with head position[30].

Milidonis *et al* concluded that suprahyoid muscle activity was significantly increased in forward head posture[31]. Funakoshi *et al* proved that the masseter, temporal and digastric muscles were too much active in the dorsal flexion of neck[32]. Ohmure states condyles move posteriorly in subjects with forward posture which adds an unwanted force in the posterior region of the TMJ during eating or parafunction[18,29]. The bilaminar zone being the posterior structure is very weak compared to anterosuperior structure which is a strong load-bearing area[18,33-37]. The posterior displacement of condyle was reported to cause TMDs including disc displacement[33-37]. The extended influence of forward head posture on condylar position and its relationship with the TMD needs are still to be studied[33-37]. Hackley *et al* conducted a study on 22 patients who were diagnosed initially with internal derangement of TMJ with the control group, and proved that patients suffering from internal derangement of the temporomandibular joint need not necessarily hold their heads in an advanced position[38]. Visscher *et al* told that pain experienced in the masticatory apparatus is not dependent on cephalic posture[39].

A study resulted for the first time that the condylar position at the mandibular rest position in the intentionally forward head posture was majorly more posterior (approximately 1.1 mm on average) than that in the natural head posture[29]. Inturn, body posture seems to have an effect on the mandibular position[40], excluding centric relation and occlusion with maximum intercuspation, localization and reproducibility of both of which are not affected[41,42].

Nobili *et al*[43] conducted a study which included to review the literature supporting occlusion and posture, also to support the correlations by means of a balance platform on a group of 50 patients (30 males and 20 females, mean age considered as 25.8 years) which included every classification of Angle's malocclusion. Each subject were asked to stand on the balance platform and perform five different types of tests. The results showed that subjects showed an anteriorly displaced posture for a Class II malocclusion whereas subjects with a Class III malocclusion exhibited a posteriorly displaced posture[43]. Tardieu *et al*[61] discovered a strong relationship between occlusion and posture by studying the influence of different occlusal conditions on postural control. However, the correlation he found was found to be short-lasting which means the investigated subjects exhibited an adaptation to different postural conditions also was less effective because subjects were made repeatedly to record the sessions. Studies have shown that slight differences in occlusion, even induced by cotton rolls or an occlusal splint effects TMJ which inturn effects posture[17,40,44-46]. To support this Baldini *et al* experimented this difference using cotton rolls to change the mandibular position and yet proved occlusion has a bigger impact in body sway[44]. Another study by Bracco *et al* concluded the same results on measuring the effects of three different mandibular positions by using a force platform[45]. Meanwhile some studies also have declined to show the correlation between dental occlusion and body posture, but recent studies have shown that when comparing the significance of occlusion in stable and unstable balance resulted in insignificant difference in stable conditions but markedly significant in unstable balance and fatigue of subjects[47-49]. Atwood has proven that the presence or absence of dentures always affects the postural position of edentulous patients[50].

Also authors stated that the significance of jaw on general posture is more from an anatomical support[51-53]. D'Attilio *et al*[51] studied different degrees of cervical lordosis in different skeletal classes, however it showed that degree of cervical lordosis was less in class III, and more in class II comparatively. These differences indicated that there was a

need for antero-posterior equilibrium of the craniocervical complex, a very important aspect given the distance that separates this complex from the ankle, was considered to be the fulcrum around which humans oscillate in order to maintain one's balance[51]. Tecco proved that a palatal expansion treatment actually worked in modifying the cervical lordosis, which did not have any clinical importance[52]. Festa *et al* proved that cervical lordosis and mandibular length does not have a correlation at all through his cross-sectional study on 70 caucasian adult women by taking lateral skull radiographs in their natural head position(mirror position)[53]. Researchers have found that increased cranio-cervical angulation is mostly associated with crowding in the lower anterior region[54,55]. This is supported by a hypothesis which speaks about the stretching of soft tissues is in accordance with patients exhibiting extended craniocervical posture, hinders the sagittal growth of dental arches from the dorsal tension exerted on them[55,57]. Speaking of maximal biting force, it is always increased in the extended head position than in a natural position[11].Maximal biting force is greater when the head is extended than it is when the head is held in a natural position[56].

CONCLUSION

The postural position of the mandible is very important to all branches of dentistry because it is the position from which all noncontact movements start and end. Like discussed above there are many articles which says that number of tooth contacts differs in different head position, and likewise in different body postures we see a difference in tooth contacts, occlusal forces, muscle activity and force and also change in the condyle position of TMJ. In the final analysis, by including these postural considerations in our diagnosis, it will take the clinicians to a total corporal analysis of our patients. All these parameters should be taken into consideration before a clinician carries out any dental treatment. This approach will improvise our communications with the other health care deliverers and will help us in multi-disciplinary collaboration with other specialities.

Conflicts of Interest: The authors have reported no conflict of interest.

References

1. Amat P. Occlusion et posture: faits et convictions. Revue d'Orthopédie Dento-Faciale. 2008 Sep 1;42(3):325-55.
2. Sherrington, C. S.: Problems of Muscular Receptivity, Nature (London) 113:929, 1924.
3. Sherrington, C. S.: Reflexes Elicitable From the Pmna Vibrassae and Jaws of Cats, *J. Physiol*. 51:404, 1917.
4. Hickey, J. C., Williams, B. H., and Woelfel, J. B.: Stability of Mandibular Rest Position, J. PROS. DEN. 11566, 1961.
5. Storey, A. T.: Physiology of a Changing Vertical Dimension, J. PROS. DEN. 12:912, 1962.
6. Thompson, J. R. : The Rest Position of the Mandible and its Significance to Dental Science, J.A.D.A. 33:151, 1946.
7. Brodie, A. G.: Anatomy and Physiology of Head and Neck Musculature, Am. J. Ortho- dontics 36:831, 1950.
8. Thompson, J. R., and Brodie, A. G.: Factors in the Position of the Mandible, J.A.D.A. 29:925, 1942.
9. Atwood, D. A.: A Review of Fundamentals in Rest Position and Vertical Dimension, Internat. D. J. 9:1, 1959
10. Posselt, U.: The Physiology of Occlusion and Rehabilitation, Philadelphia, 1962, F. A. Davis Company. Thompson
11. Kemoun G. La posturographie peut-elle participer a l'étude des désordres thymocognitifs? Lettre Méd Phys Réadapt 2007;23:153-7.
12. Amat P. Occlusion and posture: facts and beliefs. Journal of Dentofacial Anomalies and Orthodontics. 2008 Sep;11(3):186-211.
13. Perinetti G. Temporomandibular disorders do not correlate with detectable alterations in body posture. J Contemp Dent Pract 2007;8:60-7.
14. Hanke BA, Motschall E, Turp JC.: "Association between orthopedic and dental findings: what level of evidence is available?" J Orofac Orthop 2007;68(2):91-107.
15. Amat P. Occlusion, orthodontics and posture: are there evidences? The example of scoliosis. international journal of stomatology & occlusion medicine. 2009 Mar 1;2(1):2-10.
16. Chinappi AS, Jr., Getzoff H.: "Chiropractic/dental cotreatment of lumbosacral pain with temporomandibular joint involvement". J Manipulative Physiol Ther 1996;19(9):607-612.
17. Gangloff P, Perrin PP.: "Unilateral trigeminal anaesthesia modifies postural control in human subjects". Neurosci Lett 2002;330(2):179-182.
18. Okeson JP. Management of temporomandibular disorders and occlusion-E-book. Elsevier Health Sciences; 2014 Jul 21.
19. Gupta S, Tarannum F,Gupta N.K, Upadhyay M, Abdullah A. Effect of head posture on tooth contacts in dentate and complete denture wearers using computerized occlusal analysis system. J Indian Prosthodont Soc. 17(3): 250-4.
20. Haralur S, Al-Gadhaan S, Al-Qahtani A, Mossa A, Al-Shehri W, Addas M, authors. Influence of functional head postures on the dynamic functional occlusal parameters. Ann Med Health Sci Res. 2014;4:562-6.
21. Reinhardt R, Tremel T, Wehrbein H, Reinhardt W, authors. The unilateral chewing phenomenon, occlusion, and TMD. Cranio. 2006;24:166-70.
22. Preiskel HW. Some observations on the postural position of the mandible. Journal of Prosthetic Dentistry. 1965 Jul 1;15(4):625-33.
23. Martone, A. L., and Edwards, L. F.: The Phenomenon of Function in Complete Denture Prosthodontics, *J. PROS.* DEN. November, 1961 to April, 1962.
24. Posselt, U.: The Physiology of Occlusion and Rehabilitation, Philadelphia, 1962, F. A. Davis Company. Thompson
25. Weon JH, Oh JS, Cynn HS, Kim YW, Kwon OY, Yi CH, authors. Influence of forward head posture on scapular upward rotators during isometric shoulder flexion. *J Bodyw Mov Ther*. 2010;14:367-74.

26. Babu RR, Nayar SV. Occlusion indicators: A review. The Journal of Indian Prosthodontic Society. 2007 Oct 1;7(4):170.
27. Sidana V, Pasricha N, Makkar M, Banwait S, authors. Computerized occlusal analysis: Review. *Indian J Dent Sci*. 2013;5:141-4
28. Mohl N, author. Head posture and its role in occlusion. Int J Orthod. 1977;15:6-14.
29. Ohmure H, Miyawaki S, Nagata J, Ikeda K, Yamasaki K, Al-Kalaly A, authors. Influence of forward head posture on condylar position. *J Oral Rehabil*. 2008;35:795-800.
30. Cohen, S. : A Cephalometric Study of Rest Position in Edentulous Persons: Influence of Variation in Head Position, J. PROS. DEN. 7:467, 1957.
31. Milidonis MK, Kraus SL, Segal RL, Widmer CG. Genioglossi muscle activity in response to changes in anterior /neutral head posture. *Am J Orthod Dentofacial Orthop*. 1993; 103:39-44.
32. Funakoshi M, Fujita N, Takehana S. Relations between occlusal interference and jaw muscle activities in response to changes in head position. *J Dent Res*. 1976; 55:684-690.
33. Bumann A, Lotzmann U. TMJ Disorders and Orofacial Pain. New York: Thieme, 2002.
34. Radu M, Marandici M, Hottel TL. The effect of clenching on condylar position: a vector analysis model. *J Prosthet Dent*. 2004;91:171-179.
35. Pullinger AG, Solberg WK, Hollender L, Guichet D. Tomographic analysis of mandibular condyle position in diagnostic subgroup of temporomandibular disorders. *J Prosthet Dent*. 1986;55:723-729.
36. Imai H, Sakamoto I, Yoda T, Yamashita Y. A model for internal derangement and osteoarthritis of the temporomandibular joint with experimental traction of the mandibular ramus in rabbit. Oral Dis. 2001;7:185-191.
37. Hibi H, Ueda M. Body posture during sleep and disc displacement in the temporomandibular joint: a pilot study. *J Oral Rehabil*. 2005;32:85-89.
38. Hackney J, Bade D, Clawson A. Relationship between forward head posture and diagnosed internal derangement of the temporomandibular joint. *J Orofac Pain* 1993;7:386-90.
39. Visscher CM, De Boer W, Lobbezoo F, Habets LL, Naeije M. Is there a relationship between head posture and craniomandibular pain? *J Oral Rehabil* 2002; 29:1030-6.
40. Sakaguchi K *et al*. Examination of the relationship between mandibular position and body posture. Cranio 2007; 25:237-49.
41. Tripodakis AP, Smulow JB, Mehta NR, Clark RE. Clinical study of location and reproducibility of three mandibular positions in relation to body posture and muscle function. *J Prosthet Dent* 1995; 73:190-8.
42. Campos AA, Nathanson D, Rose L. Reproducibility and condylar position of a physiologic maxillomandibular centric relation in upright and supine body position. *J Prosthet Dent* 1996; 76:282-7.
43. Nobili A, Adversi R. Relationship between posture and occlusion: a clinical and experimental investigation. CRANIO®. 1996 Oct 1; 14(4):274-85.
44. A. Baldini, A. Nota, D. Tripodi, S. Longoni, and P. Cozza, "Evaluation of the correlation between dental occlusion and posture using a force platform," Clinics, vol. 68, no. 1, pp. 45-49, 2013.
45. P. Bracco, A. Deregibus, and R. Piscetta, "Effects of different jaw relations on postural stability in human subjects," Neuroscience Letters, vol. 356, no. 3, pp. 228-230, 2004.
46. Julià-Sánchez S, Álvarez-Herms J, Gatterer H, Burtscher M, Pagès T, Viscor G. The influence of dental occlusion on the body balance in unstable platform increases after high intensity exercise. Neuroscience letters. 2016 Mar 23;617:116-21.
47. Perinetti G. Dental occlusion and body posture: no detectable correlation. Gait & Posture. 2006 Oct 1;24(2):165-8.
48. Ferrario VF, Sforza C, Schmitz JH, Taroni A. Occlusion and center of foot pressure variation: is there a relationship?. The Journal of prosthetic dentistry. 1996 Sep 1;76(3):302-8.
49. P. Era, N. Konttinen, P. Mehto, P. Saarela, and H. Lyytinen, "Postural stability and skilled performance- a study on top7Applied Bionics and biomechanicslevelandnaiverifleshooters,"JournalofBiomechanics,vol.29, no. 3, pp. 301-306, 1996.
50. Atwood, D. A.: A Review of Fundamentals in Rest Position and Vertical Dimension, Internat. D. J. 9:1, 1959.
51. D'Attilio M, Caputi S, Epifania E, Festa F, Tecco S.: "Evaluation of cervical posture of children in skeletal class I, II, and III". Cranio 2005;23(3):219-228.
52. Festa F *et al*. Relationship between cervical lordosis and facial morphology in Caucasian women with a skeletal Class II malocclusion: a cross-sectional study. Cranio 2003;21:121-9.
53. Tecco S, Caputi S, Festa F.: "Evaluation of cervical posture following palatal expansion: a 12-month follow-up controlled study". *Eur J Orthod* 2007;29(1):45-5.
54. AlKofide EA, AlNamankani E. The association between posture of the head and malocclusion in Saudi subjects. Cranio 2007; 25:98-105.
55. Solow B, Sonnesen L. Head posture and malocclusions. *Eur J Orthod* 1998; 20:685-93.
56. Hellsing E, Hagberg C. Changes in maximum bite force related to extension of the head. *Eur J Orthod* 1990; 12:148-53.
57. AlKofide EA, AlNamankani E. The association between posture of the head and malocclusion in Saudi subjects. Cranio 2007; 25:98-105.
58. Brenman HS., Amsterdam M. Postural effects on occlusion. Dental Progress 1963; 4:43-7.
59. Huggare J, Pirttiniemi P, Serlo W. Head posture and dentofacial morphology in subjects treated for scoliosis. Proc Finn Dent Soc 1991; 87:151-8.
60. Huggare JA, Raustia AM. Head posture and cervicovertebral and craniofacial morphology in patients with craniomandibular dysfunction. Cranio 1992; 10:173-7.
61. Tardieu C, Dumitrescu M, Giraudeau A, Blanc JL, Cheynet F, Borel L.: "Dental occlusion and postural control in adults". Neurosci Lett 2009;450(2):221-224.