

The Concepts of Complete Denture Occlusion amongst Dental Fraternity

Maria Shakoor Abbasi, Naseer Ahmed, Azad Ali Azad, Fatima Fouad, Humza Daudpota, Mina Farooq, Adil Bin Irfan

ABSTRACT:

Objectives: To assess the concepts of complete denture occlusion among dental fraternity.

Study Design And Setting: Cross-sectional study conducted at various dental hospitals and institutes of Karachi, for a period of six months, from 1st June 2019 to 30th November 2019

Methodology: Total 849 dental practitioners who are currently practising were included. A well-structured and validated questionnaire was used for data collection. SPSS version 25 was used.

Results: Bilateral balanced occlusion was an ideal occlusion by majority subjects i.e, 530(62.4%) in patients with well-formed ridges, followed by 464(54.7%) candidates with skeletal class 1, total 376(44.3%) chose it with uncontrolled diabetes mellitus, 365(43%) in single complete denture cases, 339(39.9%) with increased inter-arch space, 298(35.1%) with parafunction habits, 296(34.9%) in patients with history of neuromuscular disorder and 271(31.9%) where a complete denture opposes a removable partial denture. Furthermore, Lingualized occlusion was preferred by 341(40.25%) participants for patients with skeletal class 3. Total 316(37.2%) candidates chose it for patients with displaceable supporting tissue followed by 264(31.1%) who chose it for skeletal 2 and 260(30.6%) for cases of highly resorbed ridges. Lastly, 311(36.6%) chose canine guided occlusion with highly resorbed ridges accompanied by high aesthetic demand A significant difference between education level and knowledge of occlusal schemes was also found. Chi-square (73.87), df 6, p-value =0.000.

Conclusion: Dental practitioners lack adequate knowledge of occlusal schemes in terms of prescription in complete denture patients. A significant difference between the education level and knowledge of occlusal schemes was found. Therefore, awareness of various occlusal schemes should be increased at undergraduate level.

Keywords: Bilateral Balanced Occlusion, Canine Guided Occlusion, Complete Denture, Lingualized Occlusion, Monoplane Occlusion.

How to cite this Article:

Abbasi MS, Ahmed N, Azad AA, Fouad F, Daudpota H, Farooq M, Irfan AB. The Concepts of Complete Denture Occlusion amongst Dental Fraternity . J Bahria Uni Med Dental Coll. 2021; 11(2):65-69 DOI: <https://doi.org/10.51985/OYZP7463>

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non commercial use, distribution and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION:

Although advances in restorative dentistry have been

observed, conventional complete denture remains one of the most common treatment options opted by the patients due to its affordability, ease of use and maintenance.¹ One of the most important factors for success of a conventional complete denture is occlusion. Complete denture occlusion is basically the static relationship between the incising or masticating surfaces of the maxillary or mandibular teeth or tooth analogues.²

The occlusal concept in complete denture includes, Bilateral Balanced Occlusion (BBO), Canine-guided Occlusion (CGO), Lingualized Occlusion (LGO) and Monoplane occlusion (MPO). BBO is an artificial occlusion; occurs when all the posterior teeth makes bilateral, simultaneous contact in inter-cuspal position as well as in eccentric positions.” If such contact occurs in natural occlusion it is termed as premature contact on the non-working side and said to be pathological.^{1,3} Researchers argue that bilateral balanced occlusion is important for retention, stability, support and it also increases masticatory efficiency.^{4,5} Though some authors disagree and state that there is no clinical evidence to support this.⁶

Another occlusal concept is lingualized occlusion. It is a form of denture occlusion in which the maxillary lingual

Maria Shakoor Abbasi
Assistant Professor, Department of Prosthodontics,
Altamash Institute of Dental Medicine
Email: maria_shakoor@hotmail.com

Naseer Ahmed
Associate Professor, Department of Prosthodontics,
Altamash Institute of Dental Medicine

Azad Ali Azad
Professor, Department of Prosthodontics,
Army Medical College, Rawalpindi

Fatima Fouad
House Officer
Altamash Institute of Dental Medicine

Humza Daudpota
House Officer
Altamash Institute of Dental Medicine

Mina Farooq
House Officer
Altamash Institute of Dental Medicine

Adil Bin Irfan
Registrar, Department of Prosthodontics,
Altamash Institute of Dental Medicine

Received: 03-09-2020
Accepted: 05-03-2021

cusps articulates with the mandibular occlusal surfaces in centric occlusion, working and nonworking mandibular position". Only lingual cusps are kept in contact which reduces the potentially damaging lateral forces. Lingualized occlusion offers improved denture stability and patient comfort.⁵

On the other hand, Monoplane occlusion is an occlusal arrangement wherein the posterior teeth have masticatory surfaces that lack any cuspal height.⁷ Zero-degree or non-anatomic teeth are used. The flat cuspal inclines minimize the horizontal forces exerted on the supporting tissue which helps maintain and preserve the alveolar bone.^{8,9}

One of the recently introduced concept in complete denture occlusion is Canine-guided occlusion. It is a form of mutually protected articulation in which the vertical and horizontal overlap of the canine teeth disocclude the posterior teeth in the excursive movements of the mandible".⁷ Like bilateral balanced occlusion, canine guided occlusion involves simultaneous contact on both sides in centric occlusion but there are differences in eccentric movement. Recent studies have shown that compared to bilateral balanced occlusion, it has an easier and faster set-up with the same masticatory efficiency but better clinical performance.^{2, 10, 11}

The harmony of occlusal contacts is an important factor in determining the relationship between complete denture and the stomatognathic system. Studies have shown that the choice of occlusal scheme is necessary for denture stability and patient satisfaction. Any occlusal error such as premature contact or sliding will affect the denture's stability and retention, which in turn will hamper masticatory function, comfort and maintenance of residual ridge.¹² The occlusal scheme should be chosen based on the patient's age, the height and width of residual ridge, the presence of parafunctional habits, underlying systemic conditions, neuromuscular disorders, aesthetic demand, etc.^{13,14}

Therefore, the rationale of this study was to assess the concepts of complete denture occlusion of dental fraternity and to highlight this important aspect of stomatognathic system, moreover to provide an update for clinician about unique occlusal scheme prescription in future restorative procedures.

METHODOLOGY:

This cross-sectional study was conducted at various dental institutes and hospitals of Karachi for a period of six months, from 1st June'2019 to 30th November'2019. Prior approval from AIDM ethics and review board has been sought out; AIDM/EC/06/2019/10. Non-probability sampling was used, candidates who had a minimum qualification of bachelor's in dental surgery with at least 1 year of House job experience and currently practicing were included in this study. Students, dental technicians and non-practicing doctors were excluded. The sample size for this study was calculated through

OpenEpi software. Considering the mean values for bilateral balanced occlusion and canine guided occlusion 0.186 ± 0.041 and 0.167 ± 0.016 .⁶ With the power of study 80 and confidence interval of 0.05%, the sample size calculated with an overestimation effect to cover a large population was 898 participants.

The data was collected from participants working at various discipline of dentistry manually using a well-structured and validated proforma. A pilot study was carried out on 50 participants to validate proforma the internal consistency of items tested with intra class correlation showed a strong relation of 0.75. A consent statement for voluntary participations was included for all subjects to understand prior to their agreement. The proforma had two sections. The first section involved questions pertaining to demographic data, such as, the candidate's age, gender and qualification. The second section had questions about various clinical scenarios and the candidate's choice of an occlusal concept in that situation. The data collected was analysed through Statistical Package for Social Sciences (SPSS-Version 25). The descriptive statistics and chi-square test were performed, considering a p value of = 0.05 as statistically significant.

RESULTS:

Out of the total, 898 dental practitioners. 849 completed the proforma with a response rate of 94%. from 552 (65.01%) were females and 297 (34.98%) were males, with majority, 554 (65.25%) belonging to a common age bracket of 21-25 years. Furthermore, 590 (69.49%) were dental graduates, 90 (10.60%) were postgraduate trainees while 169 (19.90%) were consultants (restorative dentistry, prosthodontics) from various dental specialties as mentioned in Table 1.

Preferred occlusal scheme opted by the dentists or participants for different clinical scenarios is depicted in Table 2. Bilateral balanced occlusion was thought to be an ideal occlusion by majority dentists or participants i.e, 530 (62.4%) in patients with well-formed ridges, followed by 464 (54.7%) dentists or participants who opted it for patients with skeletal class 1. In addition, 376 (44.3%) chose it in cases of uncontrolled diabetes mellitus, 365(43%) in single complete denture cases, 339 (39.9%) dentists or participants for patients with increased inter-arch space, 298 (35.1%) opted it for patients with known parafunction habits, 296 (34.9%) in patients with history of neuromuscular disorder and 271 (31.9%) opted it for cases where a complete denture opposes a removable partial denture.

Furthermore, Lingualized occlusion was thought to be an ideal occlusion by majority candidates i.e, 341 (40.25%) for patients with skeletal class 3. Total 316 (37.2%) candidates chose it for patients with displaceable supporting tissue followed by 264 (31.1%) who chose it for skeletal 2 and 260 (30.6%) opted it for cases of highly resorbed ridges.

Whereas, Canine guided occlusion was thought to be the

ideal occlusion by majority of our candidates, 311(36.6%), in patients with highly resorbed ridges accompanied by high aesthetic demand only.

Lastly, Monoplane occlusion was chosen as the preferred occlusion by majority of our candidates in cases of patients with decreased inter-arch space 225 (26.5%). In addition, a significant difference between education level and knowledge of occlusal schemes was found; Chi-square (73.87), df 6, p value < 0.000 as depicted in Table 3.

DISCUSSION:

Although complete denture is one of the most basic treatment modalities for edentulous patients, many essential variables have not been scientifically validated. Even today this conventional option faces many problems and difficulties, including the lack of expertise regarding high-quality complete dentures and scarcity of sound evidence supporting specific guidelines. The issue about which occlusal concept

is most appropriate for individual needs is clinically and economically relevant.

Out of the four occlusal concepts, BBO was thought to be the ideal occlusion for complete denture patients. Authors argue that balance is necessary during excursive moments as it improves stability and transmits equal and even distribution of forces thus preventing bone resorption.^{4,15} Majority of our candidates also shared the same school of thought as they opted for the BBO as the most suitable occlusion, in majority of the clinical scenarios, including: patients with well-formed ridges (62.4%), for patients with skeletal class 1 (54.7%) and uncontrolled diabetes mellitus (44.3%). Total 43% opted it for single complete denture cases, 39.9% for patients with increased inter-arch space, 35.1% opted it for patients with known parafunction habits, 34.9% in patients with history of neuromuscular disorder and 31.9% opted it for cases where a complete denture opposes a removable partial denture. This agrees with proponents of BBO and its importance in maintaining denture retention, stability and support.^{2, 16-18} But this contrasts with other authors, who suggested LGO or MPO would be ideal for patients having parafunctional habits, when complete denture opposes a removable partial denture and in uncontrolled diabetes.^{4,19,20} It has been further emphasized

Table 1: Demographic characteristics of participants (n=849)

Variables	Frequency	Percentage
Female	552	65.01
Male	297	34.98
21 to 25 years	554	65.25
25 years and above	295	34.74
Graduates	590	69.49
Postgraduates	90	10.60
Consultants	169	19.90

Table 3: Education level and knowledge of occlusal schemes (n=849)

Variables		Pearson Chi-Square		
Education	Knowledge of Occlusal schemes	value	df	p-value
		73.87	6	<0.000

Table 2: Frequencies of occlusal schemes selected by the participants (n=849)

Clinical Scenarios	Occlusal Schemes			
	Balanced Bilateral Occlusion, Frequency (N%)	Lingualized Occlusion, Frequency (N%)	Canine guided Occlusion, Frequency (N%)	Monoplane Occlusion, Frequency (N%)
For patients with well-formed ridges	530 (62.4%)	65 (7.7%)	172 (20.3%)	82 (9.7%)
For patients with highly resorbed ridges	244 (28.7%)	260 (30.6%)	109 (12.8%)	236 (27.8%)
For patients with resorbed ridges accompanied by high esthetic demand	295 (34.7%)	144 (17.0%)	311 (36.6%)	99 (11.7%)
For patients with increased inter-arch space	339 (39.9%)	260 (30.6%)	152 (17.9%)	98 (11.5%)
For patients with decreased inter-arch space	195 (23%)	193 (22.7%)	219 (25.8%)	225 (26.5%)
For patients with displaceable supporting tissue	283 (33.3%)	316 (37.2%)	125 (14.8%)	125 (14.7%)
For patients with parafunctional habits	298 (35.1%)	195 (23.0%)	162 (19.1%)	194 (22.9%)
For patients with skeletal class 1	464 (54.7%)	102 (12.0%)	244 (28.7%)	39 (4.6%)
For patients with skeletal class 2	219 (25.8%)	264 (31.1%)	262 (30.9%)	104 (12.2%)
For patients with skeletal class 3	186 (21.9%)	341 (40.2%)	187 (22.0%)	135 (15.9%)
For cases where complete denture opposes removable partial denture	271 (31.9%)	151 (17.7%)	211 (24.9%)	216 (25.4%)
In single complete denture cases	365 (43.0%)	205 (24.1%)	208 (24.5%)	71 (8.4%)
In patients with uncontrolled diabetes mellitus	376 (44.3%)	165 (19.4%)	189 (22.3%)	119 (14%)
For patients with neuromuscular disorder	296 (34.9%)	196 (23.1%)	90 (10.6%)	267 (31.4%)

by Haralur et al that MPO should be preferred in patients with severe neuromuscular disorders and in patient with poor muscular control as it accommodates for irregular mandibular movement.²¹

Moreover, Rangarajan et al believed that there is no balancing contact on non-working side during mastication hence the forces distributed on both sides are uneven⁴. Therefore, there is no clinical evidence to support BBO as the ideal occlusion in complete denture cases. Studies have also shown that it does not improve masticatory efficiency and has little impact in clinical outcomes and patient satisfaction.^{6, 22}

The principles of teeth set-up in LGO, according to various authors includes placing the maxillary lingual cusps in articulation with the central fossa of the mandibular teeth, with the buccal cusps kept out of occlusion.^{4,19,20} In addition, it offers multiple advantages that include cross-arch stabilization and improved patient comfort, as only lingual cusps are kept in contact which reduces the potentially damaging lateral forces.² This scheme also allows the vertical forces to be centered on the mandibular ridge, hence, providing improved denture stability and help maintains soft and hard tissues.^{9, 15} According to resources LGO has better masticatory efficiency, improved patient comfort and increased chewing efficiency when compared to BBO.²³ At the same time researchers found that patients preferred it due to increased masticatory efficiency and improved esthetic in comparison to MPO.²⁴ Our results showed that LGO was the preferred choice by majority of candidates in cases of highly resorbed ridges (30.6%) This disagrees with Jones et al,⁸ who stated MPO is more advantageous in such conditions, as it eliminates the potentially damaging horizontal forces, providing increased stability. But if this situation exists along with high aesthetic demand, then LGO should be preferred.^{4,19} Approximately 31.1% of candidates in our study felt LGO was ideal in patients with skeletal class 2 and 40.25% for patients with skeletal class 3. But again, Jones et al⁸ argue that MPO is better choice as compared to LGO. LGO can be used effectively when a complete denture opposes a removable partial denture as in combination syndrome and in displaceable supporting tissue.²⁴ 23.1% of our candidates thought LGO would be ideal in cases of Parkinsonism which agrees with authors that state in mild cases of neuromuscular disorders such as Parkinson's, LGO offers better esthetics and masticatory efficiency, less distortion and limited lateral movement.²¹ On the other hand, MPO has multiple advantages according to Jones et al, which includes their ability to preserve alveolar bone, elimination of horizontal forces and imparts a sense of freedom to the patient as it doesn't lock the mandible in one position. It is indicated in cases of severe ridge resorption, due to flat cuspal inclines reducing the destabilizing horizontal forces.⁹ It is also more adaptable to unusual jaw relationships such as skeletal class 2 or class 3.⁸ MPO has been preferred

in patients with severe neuromuscular disorders and in patient with poor muscular control as it accommodates for irregular mandibular movement.²¹ In our study MPO was deemed as the most suitable occlusion by majority of candidates solely in cases of decreased inter-arch space (26.5%), though according to Zarb et al monoplane occlusion is ideal for uncoordinated muscular movements and severe cases of parafunctional habits¹⁵ though it has the disadvantage of decreased masticatory efficiency and compromised esthetics.⁴

In our study CGO was thought to be the ideal occlusion by majority of our candidates in cases of highly resorbed ridges accompanied by high aesthetic demand. This disagrees with Rangarajan et al and Kamath et al who have stated that in this clinical scenario LGO would be preferred^{4,19}. Authors used to believe that CGO would impair masticatory function due to the oblique forces, resulting in trauma and ulceration. However, Brandt S et al concluded that canine guidance can be recommended as a comfortable alternative to bilateral balanced occlusion for complete dentures.²⁵ Similarly, Farias, et al, showed no difference in outcomes between CGO and BBO.⁶ BBO complicated and time-consuming construction compared to CGO. Studies have shown that patients preferred CGO in terms of chewing ability when compared to other occlusal concepts.²⁵ It can be successfully used in mandibular denture, providing adequate retention, aesthetic appearance and chewing ability. The relative ease of the procedure associated with canine guided occlusion, along with improved masticatory efficiency and clinical outcome when compared to BBO, makes it a rational recommendation as an occlusal concept in complete denture patients.^{4, 11}

No such study about the knowledge and attitude regarding the concepts of complete denture occlusion amongst dental fraternity has been conducted yet. Moreover, our study along with assessing the concepts of complete denture occlusion of dental fraternity also provided an update for clinician about CG occlusal scheme prescription in future restorative procedures. The limitations of our study included the lower ratio of specialist as compared to graduates or post graduate trainees and had a small sample size that represented a limited population. Further studies with a larger sample size and equal participation of consultant, specialists and dental practitioners from both genders are required.

CONCLUSION:

It was concluded that lack adequate knowledge of occlusal schemes in terms of prescription in complete denture patients. A significant difference between the education level and knowledge of occlusal schemes was found amongst the participants. Therefore, awareness of various occlusal schemes should be increased at undergraduate level. Moreover, the importance of choosing an occlusal concept according to the clinical scenario should be emphasized.

Authors Contribution:

Maria Shakoor Abbasi: Conception and design, Manuscript writing
Naseer Ahmed: Statistical analysis, Final review
Azad Ali Azad: Critical review, Final review
Fatima Fouad: Manuscript writing, Literature review
Hamza Daudpota: Data collection, literature review
Mina Farooq: Data collection, literature review
Adil Bin Irfan: Data collection

REFERENCE:

1. Abbasi MS, Ishfaq M, Ahmed N, Rahman MA, Kanwal Y, Ahmed N, Irfan AB. Awareness of Denture Cleansers and its Recognition among Dental Professionals. *J Bahria Uni Med Dental Coll.* 2020;10(3): 211-4
2. Sabir S, Reragui A, Merzouk N. Maintaining occlusal stability by selecting the most appropriate occlusal scheme in complete removable prosthesis. *Jpn Dent Sci Rev.* 2019;55(1):145-150. doi:10.1016/j.jdsr.2019.09.005
3. Imran T, Ahmed N, Nazeer B. Pattern of occlusal contacts in intercuspal position of natural teeth. *Int J Dent Res.* 2016;4(1):19-21.
4. Rangarajan V, Gajapathi B, Yogesh PB, Ibrahim MM, Kumar RG, Karthik P. Concepts of occlusion in prosthodontics: A literature review, part I. *J Indian Prosthodont Soc.* 2015;15(3):200-205
5. Engelmeier RL, Phoenix RD. The development of lingualized occlusion. *J Prosthodont.* 2019;28(1):e118-31.
6. Farias Neto A, Mestriner Junior W, Carreiro AD. Masticatory efficiency in denture wearers with bilateral balanced occlusion and canine guidance. *Braz Dent J.* 2010;21(2):165-9.
7. The Glossary of Prosthodontic Terms: Ninth Edition. *J Prosthet Dent.* 2017;117(5S):e1-e105. doi: 10.1016/j.prosdent.2016.12.001.
8. Jones PM. The monoplane occlusion for complete dentures. *J Am Dent Assoc.* 1972;85(1):94-100. doi: 10.14219/jada.archive.1972.0293.
9. El-Dayem MAA, Mahmoud IE, Asaad AS, Badaw MM, Mohamed MS (2016) Comparison of Monoplane Occlusion and Median Lingualized Occlusion in Implant-Retained Mandibular Complete Overdenture. *J Dent Oro Surg* 2016;1(3): 116-120 .
10. Lemos CAA, Verri FR, Gomes JML, Santiago Júnior JF, Moraes SLD, Pellizzer EP. Bilateral balanced occlusion compared to other occlusal schemes in complete dentures: A systematic review. *J Oral Rehabil.* 2018;45(4):344-354. doi: 10.1111/joor.12607
11. Schierz O, Reissmann D. Influence of guidance concept in complete dentures on oral health related quality of life—Canine guidance vs. bilateral balanced occlusion. *J Prosthodont Res.* 2016;1;60(4):315-20
12. Sabir S, Reragui A, Merzouk N. Maintaining occlusal stability by selecting the most appropriate occlusal scheme in complete removable prosthesis. *Jpn Dent Sci Rev.* 2019 Nov;55(1):145-150. doi: 10.1016/j.jdsr.2019.09.005.
13. Singh S, Mishra SK, Chowdhary R. Patient expectations and satisfaction with conventional complete dentures: a systematic review. *Tanta Dent J.* 2019;1;16(2):55-67
14. Qureshi AW, Rahim S, Abbasi MS, Akhtar Q, Qureshi SW. ORAL STEREOGNOSTIC SCORE IN EDENTULOUS PATIENTS. *Pakistan Oral & Dental Journal.* 2019 Oct 10;39(3):309-13.
15. Phoenix RD, Engelmeier RL. Lingualized occlusion revisited. *J Prosthet Dent.* 2010;104(5):342-6. doi: 10.1016/S0022-3913(10)60153-9.
16. Zarb GA, Hobkirk J, Eckert S, Jacob R. Prosthodontic treatment for edentulous patients-e-book: complete dentures and implant-supported prostheses. Elsevier Health Sciences; 2013.
17. Ali, M. Effect of Bilateral Balanced and Monoplane Occlusion of Implant Retained Mandibular Overdenture on Biting Force and Masticatory Efficiency. *Al-Azhar Assiut Dent J.* 2019; 2(1): 41-49. doi: 10.21608/adj.2019.60183
18. Butt M, Sharif M, Azad AA. Comparison of occlusal schemes in complete denture patients. *Pakistan oral dent j.* 2016;31;36(1):141-143
19. Kamath R, Sarandha DL, Thomas S, Sachdeva D. Lingualized occlusion: an emerging treatment paradigm for complete denture therapy: a review article. *J Med Dent Sci Res.* 2015 Mar;2(3):6-9.
20. Becker CM , Swoope CC, Guckes AD .Lingualized occlusion for removable prosthodontics. *J Prosthet Dent* 1977;38:601-608
21. Haralur SB. Clinical strategies for complete denture rehabilitation in a patient with Parkinson disease and reduced neuromuscular control. *Case Rep Dent.* 2015;2015:352878. doi: 10.1155/2015/352878
22. Farias-Neto A, Carreiro AD. Bilateral balanced articulation: science or dogma?. *Dent update.* 2014; 2;41(5):428-30.
23. Ahmed AR, Muneer MU, Hakeem S. Masticatory efficiency between balanced and lingualized occlusion in complete denture wearers. *Pakistan Oral Dent J.* 2013;1;33(1):200-206
24. Kamalakidis S, Anastassiadou V, Sofou A, Pissiotis A. Success of complete denture treatment, detailed investigation of construction protocols, occlusal schemes and evaluation questionnaires. *Balkan J Dent Med.* 2018;1;22(3):115-22.
25. Brandt S, Danielczak R, Kunzmann A, Lauer HC, Molzberger M. Prospective clinical study of bilateral balanced occlusion (BBO) versus canine-guided occlusion (CGO) in complete denture wearers. *Clin oral investing.* 2019;1;23(11):4181-8.

