



Evaluating Dental Students' Knowledge of Complete Denture Occlusion

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Abstract

Background: Complete edentulism, defined as the complete loss of natural teeth, is still an important problem, especially in the elderly population. Complete denture (CD) rehabilitates this loss. Occlusion is one of the important factors in the success of a CD. Many studies, theories, and concepts have been proposed in the past and present for the selection of the occlusion to be used. Therefore, the dentist's knowledge of the occlusion is very important. There are many occlusion types for CDs. The aim of this study was to evaluate the occlusion knowledge level of dental students.

Methods: Istanbul University Faculty of Dentistry included fourth-year and final-year students in the study. The data were collected by using a questionnaire. The Statistical Package for the Social Sciences Statistics software, version 25.0 was used for statistical analysis.

Results: 43.3% of participants were fourth-year dental students, and 56.7% were final-year dental students. When the opinions of the participants regarding which occlusion concepts are used in CD were analyzed; it was found that the fourth-year students gave the highest level of "monoplane occlusion (with compensation curve and posterior balancing ramp)" with a rate of 69.0%. The final year students chose the highest level of "lingualized occlusion" with a rate of 68.4%.

Conclusion: Within the limitations of this study, final-year dental students have better knowledge than fourth-year students. There is a need to strengthen occlusal concepts in the teaching of CD. Therefore, dental students can be more confident and successful when they complete their practical training.

Keywords: Complete denture, dental student, knowledge, occlusion

INTRODUCTION

The masticatory system is a functional unit of the body responsible for chewing, speaking, swallowing, and even tasting and breathing. The system includes bones, joints, ligaments, teeth, and muscles. A complex neurological control system regulates and coordinates all these structural components.¹ The concept of occlusion has always been both the most important and the most confusing in all dental disciplines.

Complete edentulism is very common worldwide, especially in the elderly population, and is defined as the complete loss of all permanent teeth. With the large edentulous population worldwide, it is imperative that dentists have the skills and knowledge to produce good-quality complete dentures (CD). Complete dentures rehabilitation is the most economical and widely used treatment option for complete tooth loss. Occlusal discrepancies are often observed in patients with CD. The forces generated when artificial teeth come into contact with antagonists can cause discomfort in patients, leading to mucosal trauma and even neuromuscular changes and emotional distress.^{2,3}

The Glossary of Prosthodontic Terms defines occlusion as "1. the act or process of closure or of being closed or shut off; 2. the static relationship between the incising or masticating surfaces of the maxillary or mandibular teeth or tooth analogs."⁴ It is very important to establish an occlusion as close to ideal as possible.⁵

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There is some debate about the occlusal scheme required for an edentulous patient. Occlusal schemes for the CD can be categorized as balanced or nonbalanced.⁶ Examples of nonbalanced occlusal schemes are 1) anterior disclusion with canine guidance in mediolateral movements, regardless of the cuspal configuration, and 2) monoplane occlusion with no compensating curves or posterior balancing ramp. Examples of balanced occlusal schemes are 1) anatomic occlusion; 2) lingualized occlusion; 3) buccalized occlusion; and 4) monoplane occlusion with mediolateral and antero-posterior compensating curves or posterior balancing ramp.⁶ These occlusal schemes differ in the position of the teeth in the arch, the cusp morphology, and the relationship of the teeth during mandibular movements.⁷

To the best of the authors' knowledge, there is no study on dental students' knowledge regarding CD occlusion. The null hypothesis of the study was that there would be no difference between the literature and the knowledge of the students on the occlusion of CD. The aim of this study was to investigate the knowledge of dental students regarding the occlusal schemes in CD.

MATERIAL AND METHODS

The sample of the study consisted of people who voluntarily participated in the questionnaire given to dental students studying at Istanbul University Faculty of Dentistry. The inclusion criteria for the study were being a fourth-year or final-year (fifth year) student at Istanbul University Faculty of Dentistry. The exclusion criteria for the volunteers were not being a fourth-year or final-year student.

The study was approved by the Clinical Research Ethics Committee of the Istanbul University Faculty of Dentistry (578-2022/10). The participants were informed about the study and its purpose. The data were collected by using a questionnaire between February 10, 2022, and April 15, 2022.

The questions in the study were based on the study conducted by Goldstein et al in 2020.⁶ A total of 4 questions were used to investigate the level of knowledge of CD occlusion among dental students. These questions are the following: 1) Which of the following occlusion concept(s) is/are used in CDs? 2) Which occlusion concept(s) do/does result in less alveolar bone loss? 3) Which occlusion concept(s) do/does result in more patient satisfaction? 4) Which occlusion concept(s) do/does result in better chewing ability?

The Statistical Package for the Social Sciences Statistics software, version 25.0 (Armonk, NY, USA), was used for statistical analysis. Descriptive statistical methods (mean, standard deviation, number, percentage, etc.) were used to evaluate the study data. Qualitative comparisons between groups were made using the chi-squared test and the Fisher exact

test. Results were evaluated at a 95% confidence interval, and significance was evaluated at $P < .05$.

RESULTS

A total of 201 participants were included in the study; 59.2% were female and 40.8% were male. The available data showed that 43.3% were fourth-year dental students and 56.7% were final-year dental students (Table 1).

When the opinions of the participants regarding which occlusion concepts are used in CD were analyzed; it was found that the fourth-year students gave the highest level of "monoplane occlusion (with compensation curve and posterior balancing ramp)" with a rate of 69.0% and the lowest level of "buccalized occlusion" with a rate of 13.8%. The final year students chose the highest level of "lingualized occlusion" with a rate of 68.4% and the lowest level of "buccalized occlusion" with a rate of 14.9%. The "lingualized occlusion" option was chosen by 31% of fourth-year students. There was a statistically significant difference between the fourth-year and final-year students in the level of participation in the "lingualized occlusion" option ($P < .001$) (Table 2).

Regarding knowledge about the concept of occlusion with less bone loss, 70.1% of the fourth-year participants and 76.3% of the final-year participants chose "balanced occlusion." The "nonbalanced occlusion" was chosen by 30.9% of fourth-year students and 23.7% of final-year students. Balanced occlusion was chosen significantly high by the all students. There was no statistically significant difference between the students' knowledge according to academic level (Table 3).

Regarding knowledge about the occlusion concept with higher patient satisfaction, 86.2% of the fourth-year participants and 86.8% of the final-year participants chose the option "balanced occlusion." Twenty-seven percent of fourth-year students chose, while 14% of final-year students chose "nonbalanced occlusion" (Table 4). According to the balanced occlusion concepts, it was determined that the highest level of "anatomical occlusion" with a rate of 42.8%, followed by lingualized occlusion at 34.3%, was chosen. Forty-four percent of the final-year students and 21.8% of the fourth-year students chose lingual occlusion. There was a statistically significant difference in the "lingualized occlusion" option according to the academic level ($P = .002$).

Table 1. Participants' Demographic Characteristics (N=201)

	n	%
Sex		
Female	119	59.2
Male	82	40.8
Total	201	100.0
Academic level		
Faculty of dentistry fourth-year student	87	43.3
Faculty of dentistry final-year student	114	56.7
Total	201	100.0

Table 2. Comparison of the Opinions of the Participants Regarding Which Occlusion Concepts Are Used in Complete Denture According to Academic Levels (N=201)

Occlusion Concept Used in Complete Dentures**	Academic Level		Significance	
	Fourth Year (n=87)	Final Year (n=114)	χ^2	P
Anatomic occlusion	27 (31.0)	33 (28.9)	0.103	.749
Lingualized occlusion	27 (31.0)	78 (68.4)	27.643	<.001*
Buccalized occlusion	12 (13.8)	17 (14.9)	0.000	.983
Canine guided occlusion	31 (35.6)	42 (36.8)	0.031	.860
Monoplane occlusion (with compensation curve and posterior balancing ramp)	60 (69.0)	69 (60.5)	1.529	.216
Monoplane occlusion (without compensation curve and posterior balancing ramp)	27 (31.0)	45 (39.5)	1.529	.216

*P < .05. **More than one option has been selected.

Table 3. Comparison of Participants' Opinions Regarding the Concept of Occlusion with Less Bone Loss According to Academic Levels (N=201)

Occlusion concept with less bone loss	Academic Level		Significance	
	Fourth Year (n=87)	Final Year (n=114)	χ^2	P
Balanced occlusion	61 (70.1)	87 (76.3)	0.977	.323
Nonbalanced occlusion	28 (30.9)	27 (23.7)	1.794	.180

Finally, knowledge about the occlusion concept with better chewing ability: 75.9% of students in the fourth year and 83.3% of students in the final year chose "balanced occlusion." The "nonbalanced occlusion" option was chosen only by 25.3% of fourth-year students and 17.5% of final-year students. No statistical difference was found when these data were analyzed by year of enrolment (Table 5).

Table 4. Comparison of Participants' Opinions on Which of the Occlusion Concepts Used in Complete Denture Patients Are More Satisfied with According to Academic Level (N=201)

Occlusion Concept with Higher Patient Satisfaction	Academic Level		Significance	
	Fourth Year (n=87)	Final Year (n=114)	χ^2	P
Balanced occlusion	75 (86.2)	99 (86.8)	0.000	1.000
Nonbalanced occlusion	18 (20.7)	16 (14)	1.117	.290

P > .05.

Table 5. Comparison of the Opinions of the Participants according to the Academic Level of the Participants Regarding which Occlusion Concept has a Better Chewing Function (N=201)

Occlusion concept with better chewing function	Academic Level		Significance	
	Fourth Year (n=87)	Final Year (n=114)	χ^2	P
Balanced occlusion	66 (75.9)	95 (83.3)	1.291	.256
Nonbalanced occlusion	22 (25.3)	20 (17.5)	1.352	.245

P > .05.

DISCUSSION

Complete dentures are still the most preferred method of rehabilitation for complete edentulism. When designing dentures, the ideal occlusion concept for the individual should be selected, correctly applied, and regularly followed up.

Goldstein et al analyzed many studies and reached a common consensus.⁶ These are as follows: 1) In CD patients with good alveolar crests and no neuromuscular problems, CDs have been shown to provide adequate function regardless of the occlusal scheme used if the CD is manufactured appropriately. 2) There is no strong support that bilateral balanced occlusion is better or worse in terms of patient satisfaction, preference, or chewing ability. 3) Increased alveolar bone loss has been observed in CDs with nonbalanced occlusion. 4) The need for bilaterally balanced occlusal schemes for patients presenting with loss of stability and retention is supported.

In this study, the participants were asked which occlusal schemes could be used in the construction of CD. When the

opinions on this subject were analyzed, it was found that the rate of participation in the answer "buccalized occlusion" was the lowest. According to this result, it can be said that the concept of buccalized occlusion is not sufficiently included in dental education. In addition, a significant difference was found between the participation of final-year and fourth-year students in the "lingualized occlusion" option, and it was observed that the participation rate of final-year students was higher than that of fourth-year students. The reason for this difference may be that final-year students are more informed about the concept of lingualized occlusion as a result of the practical and theoretical training received according to the dental level.

Goldstein et al concluded that balanced occlusion results in less alveolar bone loss than nonbalanced occlusion. This might be because the balanced occlusion may have resulted in less denture movement.^{6,8} In our study, most of the participants thought that less bone loss was observed in CD with a balanced occlusion concept. This result showed that the knowledge level of the participants was consistent with the published evidence-based conclusion.

The literature presented scattered results, with some supporting the concept of improved patient satisfaction with balanced occlusal schemes and other literature concluding there is no difference between balanced and nonbalanced occlusion for CDs.^{6,9} According to Borger et al, the choice of occlusal scheme affects the clinical performance of CD and patient satisfaction. Although anatomically balanced occlusion is traditionally used, lingualized occlusion tends to show better results for the clinical performance and satisfaction of CD wearers with normal or resorbed ridges. Monoplane occlusion does not give satisfactory results.⁷ In our study, most of the participants thought that there was less patient satisfaction in CDs with a nonbalanced monoplane occlusion concept and more patient satisfaction in CDs with a balanced anatomic occlusion concept. These results agree with the literature.

The literature presented weak evidence that the occlusal scheme did have an impact on the participants' chewing function.^{6,10} In our study, most of the participants thought that better chewing function in CD with balanced occlusion concept.

Occlusion is one of the most important factors influencing the success of a CD and an essential part of dental education. Within the limitations of this study, it can be concluded that dental students' knowledge of CD occlusion should be improved. It is recommended that if the deficiencies be filled in the dental curriculum, dental students

can be more confident and successful when they complete their training.

Ethics Committee Approval: Ethical committee approval was received from the Ethics Committee of Istanbul University Faculty of Dentistry (Approval no: 578-2022/10, Date: 22.02.2022).

Informed Consent: Written informed consent was obtained from the participants who agreed to take part in the study.

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