Predoctoral Prosthodontic Clinical Curriculum for Complete Dentures: Survey in Turkish Dental Schools


Abstract: The aim of this study was to evaluate predoctoral complete denture curricula in the dental schools of Turkey in terms of materials, techniques, and approaches. A questionnaire with twenty-two multiple-choice questions was prepared and sent by e-mail to the directors of the prosthodontic departments of the seventeen long-established dental schools in Turkey. All schools responded for a response rate of 100 percent. All schools (100 percent) reported using irreversible hydrocolloid impression material for preliminary impression, impression compound for border molding, zinc oxide eugenol for a final impression, and heat curing technique for complete denture processing. A majority of schools said they used similar materials in complete dentures: cold cured acrylic resin in fabrication of record bases (70.5 percent) and anatomic teeth for posterior region (70.5 percent). The majority of schools did not use eccentric interocclusal records (76 percent) or occlusal equilibration and face-bow preservation (94 percent) and did not treat patients who require tooth-supported overdentures (70.5 percent). None of the schools taught treatment of implant-retained overdentures in their curriculum. Eleven schools (65 percent) used positioning mandible in centric relation techniques performed by both the clinician and the patient. It can be concluded that dental schools in Turkey have different prosthodontic curricula regarding complete dentures, although some topics are the same.

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Keywords: dental education, prosthodontics, complete dentures, Turkey

Submitted for publication 12/23/11; accepted 2/7/12

Currently, there is much speculation among dentists and health care planners that tooth loss, edentulism, and need for complete dentures will decrease in the future as a result of improvements in preventive dentistry. However, an extended lifetime and a large increase in the number of older adults are also expected in the future. Therefore, the need and demand for complete dentures could possibly increase. An epidemiological study conducted by Douglass et al.¹ predicted that the complete denture needs of the adult population will increase from 33.6 million in 1991 to 37.9 million in 2020 in the United States. If such expectations exist, the importance of knowledge and skills in treating edentulous patients will continue as the century progresses.²

Although implant therapy is an alternative method for edentulous arches, the long-term treatment period, higher cost (dental insurance does not cover implant therapy in Turkey), and possible concomitant systematic disorders may increase the demand for conventional complete dentures.³ Therefore, dental schools and educators must spend considerable effort in educating their students to meet these continuing complete denture needs of patients.⁴ In addition, they must evaluate their predoctoral prosthodontic programs continually to make them more relevant to clinical practice characteristics and to ensure that the dental health needs of the population are properly reflected in the curriculum.⁵,⁶

In 2002, the American Dental Association stated that expansion of oral and craniofacial science, changes in disease patterns, and advances in dental materials coupled with technological advances are competing with the traditional elements of dental education for curriculum time.⁷ Population characteristics, edentulous rates, and changes of curriculum in dental schools have been popular subjects for many years.⁸ Surveys are recommended in assessing the efficacy of prosthodontic curricula.⁹ Even though several studies⁵,⁹-¹⁴ have discussed the prosthodontic curriculum of dental schools in various locations, no study had been performed in Turkey. Therefore, the aims of our study were to assess the current trends, new techniques, and materials used in predoctoral complete denture curricula in dental schools in Turkey and to compare the results with other countries.
Materials and Methods

A questionnaire was developed with twenty-two multiple-choice questions, based on the questionnaire used by Petropoulos and Rashedi, along with some changes and additional items. (Contact the corresponding author for a copy of the questionnaire.) The questionnaire was translated into Turkish by a translator with a high level of English translation skills and was evaluated for appropriate dental terminology by two prosthodontists who had more than ten years of clinical and academic experience. The questionnaire was then pilot-tested by three faculty members in the Department of Prosthodontics, Faculty of Dentistry, Yeditepe University. They approved the questionnaire, and it was determined that all questions were understood.

The questionnaire was then sent by e-mail to the directors of the prosthodontic departments of the well-established dental schools in Turkey. Of the thirty-eight dental schools, seventeen offer dental education for more than five years (official duration of dental education in Turkey) and have the established educational system. The initial e-mailing was followed up about two weeks later by a second e-mailing and telephone calls to those who had still not replied. It was stated at the beginning of the questionnaire that all data collected would be kept strictly confidential and the anonymity of the participant schools was ensured. The study received approval from the Yeditepe University Institutional Review Board.

Results

All the dental schools responded to the questionnaire for a response rate of 100 percent. The following are the collected responses to each question.

For question 1 (What kind of artificial teeth do you have in your clinics for your students?), Table 1 summarizes the answers. Question 2 (What material do you teach for use in making a preliminary impression for complete dentures?) found that irreversible hydrocolloid impression material is used for preliminary impressions for complete dentures in all schools (100 percent). Question 3 (What material do you teach for use in border molding of the final impression trays for complete dentures?) found that impression compound remains popular in border molding of the final impression trays for complete dentures and it is used in all schools (100 percent). For question 4 (what material do you teach for use in making a final impression for complete dentures?), all schools (100 percent) reported still using zinc oxide eugenol impression material in making a final impression for complete dentures. One school (6 percent) reported that it uses both zinc oxide eugenol and elastomeric impression materials. For question 5 (In the fabrication of complete dentures, what type of articulator are students being taught to mount final casts on?), ten schools (59 percent) stated that they use simple hinge type articulator with lateral movement capacity. Three schools (18 percent) use simple hinge type articulator without lateral movement capacity, and four schools (23.5 percent) use a semi-adjustable articulator. To question 6 (What material are you teaching for use in fabrication of record bases?), respondents from two schools (12 percent) indicated that they use shellac, while twelve schools (70.5 percent) use cold curing acrylic resin and five schools (29 percent) use visible light curing acrylic resin.

For question 7 (Which eccentric interocclusal records are you teaching your students in the construction of complete dentures?), thirteen schools (76 percent) reported that they do not teach any eccentric interocclusal records to their students in the construction of complete dentures. However, one school (6 percent) teaches only protrusive records; one school (6 percent) teaches only right and left lateral excursive records; and one school (6 percent) teaches protrusive records and right and left lateral excursive records. One school (6 percent) did not respond to this question. To question 8 (What do you use for posterior tooth form?), the majority of schools (70.5 percent) use only anatomic teeth; three schools (18 percent) use only semianatomic teeth; and two schools (12 percent) use both anatomic and semianatomic teeth. To question 9 (What technique is taught for positioning the mandible in centric relation position?), two schools (12 percent) said they teach positioning techniques that are performed by the clinician such as bimanual or thumb and finger manipulation. Four schools (23.5 percent) teach positioning techniques that are performed by the patients, such as tongue placed in posterior aspect of palate. Eleven schools (65 percent) use both techniques. To question 10 (What technique is currently being taught for establishing the occlusal vertical dimension?) eight schools (47 percent) stated that they teach extra-oral measurements, phonetics, and esthetics for establishing the occlusal vertical dimension. Four schools (23.5 percent) reported that they teach extra-
oral measurements and phonetics, and three schools (18 percent) teach only extra-oral measurements.

To question 11 (Are students treating patients who require tooth-supported overdentures?), only five schools (29.5 percent) reported treating patients who require tooth-supported overdentures. Twelve schools (70.5 percent) stated that they do not treat these patients. To question 12 (If “yes” for question 11, are precision attachments being used?), three schools (18 percent) reported that their students use precision attachments, and two schools (12 percent) reported that their students do not use precision attachments. Question 13 (Are students treating patients who require implant-retained overdentures?) found that students do not treat patients who require implant-retained overdentures in any of the schools (100 percent); instead, those patients are referred to postgraduate clinics of the faculties. To question 14 (What kind of overdenture attachments are used for students?), no schools (100 percent) currently use bar attachments, and only four schools (23.5 percent) use stud attachments.

To question 15 (How are complete dentures being processed?), all schools (100 percent) responded that they use heat-curing technique for complete denture processing. To question 16 (Are complete dentures returned to students after processing for occlusal equilibration and face-bow preservation?), sixteen schools (94 percent) reported that their students do not perform occlusal equilibration and face-bow preservation after processing of complete dentures. Only one school (6 percent) performed occlusal equilibration and face-bow preservation. To question 17 (Is there a set protocol for post-insertion adjustment visits of complete denture patients in the clinics?), nine schools (53 percent) reported having a set protocol for post-insertion adjustment visits of complete denture patients in the clinics; eight schools (47 percent) reported having no set protocol.

To question 18 (Is there a minimum number of complete denture arches that a student must complete in order to graduate?), sixteen schools (94 percent) reported that there are a minimum number of complete denture arches that a student must complete in order to graduate. Only one school (6 percent) stated that there is not a minimum number. Question 19 (Do immediate dentures count partially towards graduation requirements?) found that immediate dentures are not regarded as a partial denture in all schools (100 percent). To question 20 (Is there a quality control program for evaluation of edentulous patient case materials from students’ work submitted to or returned from the laboratory?), twelve schools (70.5 percent) stated that there is not a quality control program, and five schools (29.5 percent) stated that there is a quality control program. To question 21 (Is there an in-house laboratory that flasks complete dentures?), eleven schools (65 percent) reported having an in-house laboratory that flasks complete dentures, and six schools (35 percent) do not have an in-house laboratory. To question 22 (Do students flask their own complete dentures for their clinical cases?), nine schools (53 percent) stated that their students do not flask their own complete dentures. Six schools (35 percent) stated that their students flask their own complete dentures. One school (6 percent) reported that its students have to flask at least one set of complete dentures, and one school (6 percent) reported that its students have to flask their own complete dentures during their third year of education.

### Discussion

With such a high response rate (100 percent), the study is able to define established Turkish dental schools’ educational attitudes about complete dentures. The results of this investigation show that dental schools in Turkey have different predoctoral prosthodontic curricula on complete dentures although some materials and techniques are the same. All schools (100 percent) are in agreement with using impression materials for complete dentures: irreversible hydrocolloid for preliminary impressions, impression compound in border molding of the final impression trays, and zinc oxide eugenol in making

### Table 1. Type of artificial teeth used for complete dentures, by number and percentage of schools in study

<table>
<thead>
<tr>
<th>Type of Artificial Teeth</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ivoclar acrylic only</td>
<td>0</td>
</tr>
<tr>
<td>Ivoclar porcelain only</td>
<td>0</td>
</tr>
<tr>
<td>Vita acrylic only</td>
<td>1 (6%)</td>
</tr>
<tr>
<td>Vita porcelain only</td>
<td>0</td>
</tr>
<tr>
<td>Optodent acrylic only</td>
<td>4 (24%)</td>
</tr>
<tr>
<td>Optodent porcelain only</td>
<td>0</td>
</tr>
<tr>
<td>Optodent acrylic and other</td>
<td>1 (6%)</td>
</tr>
<tr>
<td>Ivoclar acrylic, Vita acrylic, Vita porcelain, and other</td>
<td>1 (6%)</td>
</tr>
<tr>
<td>Other</td>
<td>10 (58%)</td>
</tr>
</tbody>
</table>

Note: Other includes Eray, MajorDent, Megaplus, Yamachi, and NT Optima acrylic.
a final impression. Only one school (6 percent) used both zinc oxide eugenol and elastomeric impression materials for a final impression. These results are different from the study that found that 25 percent of schools use impression compound for preliminary impressions.\(^{15}\)

All schools (100 percent) used traditional heat-curing technique for complete denture processing, although visible light or microwave curing have been offered as alternative ways to improve the accuracy of fit of the removable dentures. These methods are simple and provide a more convenient laboratory technique.\(^{16}\) None of the schools educated their students about constructing implant-retained overdentures. The complexity, increased treatment time, or high cost of this treatment may be the reasons for this result. Furthermore, postgraduate programs may include this treatment modality that is taught to or performed by predoctoral students.

The type of artificial teeth used for complete dentures varied in the following order: Optodent acrylic (Bayer, Germany) only (23.5 percent), Vita acrylic (Bad Säckingen, Germany) only (6 percent), and other artificial teeth (58 percent) including Eray (Ankara, Turkey), Majordent (Moncalieri, Italy), Megaplus (Dentarum, Liechtenstein), Yamachi (Gamagori, Japan), and NT Optima acrylic (Antalya, Turkey). Acrylic material instead of porcelain seems to be the main choice of denture teeth, probably because of the simplicity of adjustments to acrylic teeth, the ease of grinding without any adverse effect on their adhesion to the acrylic base, and the ease of fabrication and polishing after adjustments.\(^{17}\) On the other hand, most dental schools (70.5 percent) in our study used only anatomic teeth, and this result was higher than in the study conducted in the United States by Petropoulos and Rashedi\(^9\) (7 percent).

Approximately half of the schools (59 percent) in our study used a simple hinge type articulator with lateral movements. However, only 23.5 percent used the semi-adjustable articulator. This result is lower than reported in U.S.\(^9\) (98 percent) and British dental schools (75 percent).\(^{15}\) Due to the high cost of the semi-adjustable articulator, financial difficulties may prevent using this necessary device in Turkish dental schools.

In our study, the majority of the schools (76 percent) did not teach eccentric interocclusal records, and only 5.8 percent of the schools taught both protrusive and lateral excursive records. These findings are very different from the results of the study by Petropoulos and Rashedi,\(^9\) which found that 85 percent of schools were teaching protrusive and lateral excursive records. The primary cause of such a result may be due to the increased number of both patients and students in Turkey compared to developed countries, thereby limiting time to make eccentric interocclusal records.

It appears that placing the tongue in the posterior aspect of the palate and bimanual and finger-thumb chin manipulation combinations are the most frequently taught technique (65 percent) for positioning the mandible in centric relation in the schools in our study. This finding is similar to the teaching method in the United States\(^9\) (68 percent). There are a variety of methods for positioning the mandible in centric relation, classified depending on whether the clinician guides the mandible, such as bimanual and finger-thumb chin manipulation or the patient uses his or her own actions, such as placing the tongue in the posterior aspect of the palate.\(^{18}\) Reproducibility is an important issue on determining centric relation, and bimanual and finger-thumb manipulation is considered reproducible.\(^{19,20}\)

Cold cured acrylic resin appears to be the most popular material in the fabrication of record bases (70.5 percent) among the schools in our study; however, 12 percent of the schools used shellac, and 29 percent used visible light curing acrylic resin. It can be stated that usage of cold cured acrylic is a favorable result as it is a contemporary and worldwide acknowledged methodology. On the other hand, visible light cured acrylic resin is a material that is easy to make, is strong, and has less polymerization shrinkage.\(^{21}\) It can be speculated that financial constraints of the dental schools may restrict the implementation of visible light cured acrylic products. Even so, the high percentage of cold cured acrylic resin usage is a positive result as it is believed to yield a successful outcome.

Forty-seven percent of schools in our study reported teaching the use of extraoral measurement, phonetics, and esthetics for establishing the occlusal vertical dimension, which is lower than reported in the United States\(^9\) (59 percent). Seventy percent of our schools stated that the students are not treating patients requiring tooth-supported overdentures. Schools in which the students are treating patients requiring tooth-supported overdentures (29.5 percent) did not use bar attachments, whereas 23.5 percent used stud attachments.

In our study, a large majority of the schools (94 percent) did not require students to perform occlusal equilibration and face-bow preservation after the
processing of complete dentures. This result is different from what is being taught (75 percent require occlusal equilibration and face-bow preservation) throughout the United States. Again, the increased number of both patients and students in Turkey and the limited time for these procedures may be the reason for this difference.

The majority of schools (94 percent) in our study have a minimum number of complete dentures for students to graduate, and the mean number was found to be eight. None of the schools regarded immediate dentures as a requirement for graduation, which is probably under the purview of postgraduate programs. Fifty-three percent of the schools did not flask their complete dentures, while 35 percent reported flasking their complete dentures. Sixty-five percent of the schools have an in-house laboratory, which is lower than reported in British dental schools (91 percent). It is a reality that a vast proportion of dental practitioners do not perform flasking procedure in clinical practice, presumably due to the crowded timetable as well as the assumption that a dental technician is more experienced and qualified in this specific laboratory procedure. On the other hand, acquisition of fundamental knowledge and training is definitely required prior to graduation in order to monitor the quality of the laboratory stages of complete dentures. It is our opinion that dental students must be required to perform the flasking procedure at least once during the clinical years to gain insight into the process and that this step for complete dentures should not completely be excluded from the clinical curriculum.

Only 29.5 percent of the schools in our study had a quality control program for evaluation of edentulous patient case materials from students’ work submitted to or returned from the laboratory. Sending students’ work with minor problems to the laboratory or accepting laboratory work with similar problems would cause a decrease in the quality of dentures, inconvenience for the patients, and significant loss of time and income for the practice. Therefore, a quality control program for evaluation of students’ work may be beneficial in order to improve the quality of prosthodontic procedures.

In our study, half of the schools (53 percent) reported having a set protocol for post-insertion adjustment visits in the clinics, which is lower than reported for the United States (100 percent). Patients with complete dentures generally experience an adjustment phase after denture insertion. Denture adjustments are mainly related to underlying hard and soft tissues, the ability of clinicians and technicians, and the adaptation capacity of patients. Post-insertion adjustment visits are necessary to ensure proper fit of the complete dentures to the residual ridge and soft tissues and occlusion. Therefore, it seems necessary that all dental schools in Turkey should develop a set protocol for post-insertion adjustment visits in their clinics.

Conclusions

Within the limitations of this study, it can be concluded that complete denture curricula in Turkish dental schools show variability although they include similar materials and techniques in their predoctoral teaching. Curriculum content may require reconsideration and modifications because of differences in the course for teaching complete denture construction. Modifications of some important aspects such as eccentric occlusal recordkeeping, occlusal equilibration and face-bow preservation after complete denture processing, and using the most appropriate articulator type should be reemphasized. A quality control program for evaluation of students’ work should be established to improve the quality of complete dentures.

REFERENCES