

# Worldwide Predoctoral Dental Implant Curriculum Survey

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## Abstract:

**Objective:** Predoctoral dental implant education is included in dental school teaching curricula in most of the developed and some developing countries; however, it was not introduced into undergraduate curriculum of some countries and Iranian dental schools.

Our purpose was to investigate the status of the predoctoral dental implant education of dental schools in the world.

**Materials and Methods:** One hundred-thirty five dental schools were randomly selected representing 62 countries divided into two regions. The first region included North America and Europe, and the second region comprised of Asia, South America and Africa. A questionnaire including onset year, lecture hours, lectures available on the internet, required textbooks, department jurisdictions, the year of dental school the course was offered, clinical and laboratory courses, implant systems used surgically and in restorative phase, and type of restorations treated by predoctoral students was mailed electronically to the predoctoral implant dentistry directors.

**Results:** Ninety-two (68%) schools responded; of which 79 (86%) incorporated implant dentistry in their predoctoral teaching curricula, 39 (49%) offered surgical and prosthodontics courses in which students mainly observe. Of these 39 dental schools, 28 (71%) and 11 (29%) dental schools are from the first and second region, respectively.

**Conclusion:** A large percentage of responding schools included implant education in the predoctoral dental curriculum. Onset year of course, topics included in lecture series, lecture hours, faculty to student ratio and practical course vary among schools. Fifty percent of responding dental schools including Iranian dental schools do not have curriculum guidelines for predoctoral implant dentistry.

**Key Words:** Dentistry; Education; Dental Implants; Interdisciplinary Studies; Curriculum

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## INTRODUCTION

The purpose of dentistry is to respond to the patients' needs and desires, in other words to restore function, comfort, esthetics, speech, health and enhance the quality of life. Dental implants are alloplastic materials which are surgically inserted into residual alveolar bone primarily as a prosthetic foundation [1]. Implant dentistry, especially dental implant prosthodontics is unique which is capable to

achieve the mentioned goal with predictable success regardless of the atrophy, disease or injury of the stomatognathic system. Initially, implant licensing was limited to prosthodontists and oral surgeons and then periodontists; however, predictable outcomes, more patients' demands and willingness of general dentists for surgical training for restorative training soon resulted in a flexible approach to training. From the date of introducing dental implant

for the treatment of edentulous patients by Branemark, it approximately took two decades for dental implant to be introduced into the undergraduate dental curriculum [2] and after that the American College of Implantology presented curriculum guidelines for predoctoral implant dentistry in 1990 [3].

In 1974, 33% and in 1989, 73% of US dental schools had predoctoral dental implant programs [4-7]. Weintraub et al [7] reported that 86% of dental schools participating in their survey had implemented a predoctoral implant dentistry program and a similar level of interest was noted by Lim et al [8] in 2005. There have been additional publications comparing dental school education in Europe and the United States [7-10].

There has been some discussion about dental school education in the Middle East [11-13] and Africa [14]. There is also some discussion whether it is necessary for the predoctoral students to take an implant dentistry in developing countries [15,18].

There have not been any recently published surveys assessing the trends in predoctoral implant education in dental schools of the developed and developing countries. One of the research priorities in junction with the mentioned issues is to investigate the condition of dental implant education in the predoctoral curriculum. What are the reasons for training or not training this subject? Is dental implant training in the predoctoral level elective or mandatory? Therefore, the purpose of this survey was to determine the current status of implant dentistry course in predoctoral curriculum of dental schools in different countries around the world in 2008.

## MATERIALS AND METHODS

This descriptive survey was conducted by removable prosthodontics department of Islamic Azad Dental School in 2008. One-hundred thirty five dental schools from 223 dental schools were randomly selected provided by the Ministry of Science and Technology of Islamic Republics of Iran representing 73 developing and developed countries in the world. Between one and five dental schools per country and eleven dental schools from the United States were randomly selected and a questionnaire was electronically mailed to the dean of the selected dental schools. We requested the dean to forward the questionnaires to an individual in their schools who would be able to respond most accurately to the questions. Following the first correspondence, 34 dental schools responded; subsequently, the second and third correspondences were sent requesting their response emphasizing on the importance and impact of this evaluation on the modification of predoctoral curricular of removable prosthodontics department of our schools in the sphere of implant dentistry. Following these emails, 58 other schools responded which totally comprised 92 schools, representing 49 countries, yielding a response rate of 62%.

The survey contained seventeen questions including, having the dental implant program in the predoctoral implant dentistry curriculum or not, reason for the absence of a program, topics, lecture hours, availability on the internet, required or recommended and the name of the textbooks, the responsible department, clinical and laboratory course, observation of patients and laboratory work, students-to-faculty ratio,

**Table 1.** Reason for not having predoctoral implant dentistry curriculum in responding dental schools.

Reasons	Number of Responding Dental Schools
Inadequate curriculum time	12
Lack of financial resources	9
Place emphasis on postdoctoral program	11
Lack of qualified faculty	9

prosthodontics faculty teaching predoctoral implant dentistry course, implant systems used, type of restorations treated by predoctoral students and whether predoctoral students actually treat implant patients. The design of questions was similar to some previous surveys which were conducted in North America and European dental schools [6,13] and were approved by six faculty members from two other Tehran dental schools.

## RESULTS

Of the 92 dental schools that responded to the questionnaire, 79 (86%) indicated that they have a predoctoral implant dentistry curriculum. Of these, 35 (44%) were from North America and Europe; and 44 (56%) were from Asia, Africa and South America. The remaining 13 (14%) schools did not have such a curriculum. Of these, four (31%) schools were from North America and Europe, and nine (69%) were from Asia, Africa and South America.

The reasons for lack of predoctoral implant curriculum are shown in Table 1. More than one reason was generally mentioned by each school.

The faculty-to- student ratio for the implant dentistry course; 23 (29%) of the dental schools reported a ratio of 1:15, 21 (26.5%) reported a ratio of 1:15 to 1:10, 18 (23%) reported a ratio of 1:10 to 1:5 and 17 (21.5%) reported a ratio of 1:5.

The results for the year implant dentistry was first offered are summarized in Table 2. Twenty of the 35 responding schools from North America and Europe first offered predoctoral implant dentistry curriculum prior to 2000, four of the 44 responding schools from Asia,

Africa and South America first offered the similar curriculum prior to 2000.

The answers to “which department is responsible for implant education to the predoctoral students” is summarized in Table 3.

Table 4 summarizes the year of dental school that implant dentistry course is offered.

The presented course topics (core contents) are shown in Table 5.

Thirty one dental schools (39%) reported fewer than 10 lecture hours for their predoctoral implant dentistry course; 23 (29%) reported 11 to 20 hours; 12 (15%) reported 21 to 30 hours; 5 (6%) reported 31 to 40 hours; and 8 (10%) did not respond to this question.

Regarding lecture availability on the internet; 10 schools (13%) reported that their lectures are available on the internet whilst 62 schools (78%) reported that their lectures are not available on the internet and seven schools did not respond to this question.

Thirty one schools (39%) reported that they require textbook(s) for their implant course, 37 schools (47%) reported they do not require textbook(s) for their implant dentistry course and 11 schools (14%) did not respond to this question. Of the 31 schools that required a textbook, 11 (35%) used Mish’s “Dental Implant Prosthesis” and “Contemporary Implant Dentistry”, five (16%) used Spiekermann’s “Implantology”, three (9.6%) used Brånemark’s “Tissue Integrated Prosthesis Osseointegration in Implant Dentistry”, three (9.6%) used Worthington’s “Osseointegration in Dentistry”, two (6.5%) used Zarb’s “Prosthodontic Treatment for Edentulous Patient ” and seven (23%) used others textbooks.

Thirty nine (49%) dental schools reported that they involve predoctoral students in surgical

**Table 2.** Onset year of predoctoral implant dentistry course.

Year	Number of Responding Dental Schools	
	n	%
Prior to 2000	24	31
2000-present	55	69

**Table 3.** Department offering the predoctoral implant dentistry course.

Department	Number of Responding Dental Schools	
	n	%
Multidisciplinary	33	42
Removable prosthodontics	14	18
Oral surgery	12	15
Fixed prosthodontics	11	14
Periodontology	9	11

and prosthodontics clinical procedures mainly as an observer, in 11 schools (14%), predoctoral students surgically placed implants and in 26 (33%) out of the 79 dental schools, the students only restore implant cases. The most common restoration was the single tooth implant followed by implant-supported overdenture and implant-supported fixed partial denture.

Thirty two dental schools (40%) offered a laboratory course in conjunction with the predoctoral dental implant program.

The results to “which implant system(s) was utilized surgically and restoratively in the predoctoral program” are summarized in Table 6.

## DISCUSSION

In three decades, dentistry has changed tremendously due to the incorporation of dental implant in increasing the options of dental treatment and patient satisfaction, and it has changed the perspective of dental therapy with respect to the long term successful outcomes. Implant dentistry has become a vital part of prosthodontics for partially and completely edentulous patients and hence education of postgraduate and also undergraduate students in the world. The survey showed that the number of dental schools in the world teaching the predoctoral implant dentistry curricula has

increased. This number of dental schools which offer lectures has doubled from 2000 to the present time. However, most of these dental schools are in Asia, South America and Africa. The majority of schools in North America and Europe started offering the course before 2000 [4-9]. These studies were conducted primarily in developed countries with the similar socio-economic level; however, the aim of this study was to survey the predoctoral implant course in different countries with various socio-economical levels. In some countries, although dental schools did not offer a separate predoctoral implant course, they incorporated implant-related lectures into prosthodontics, surgical and periodontal courses. This is a trend which was observed mostly in Iranian dental schools. The primary reasons for not having predoctoral implant dentistry curriculum in dental schools around the world are similar, as shown in Table I. It seems that these dental schools may face challenge in order to incorporate new dental curricula into the existing program. It should be mentioned that to overcome this challenge these dental schools may profit from other dental schools that have implemented predoctoral implant dentistry curriculum for their students' education, because there is some evidence that has emphasized on the fact that dental students

**Table 4.** Year of dental school in which predoctoral implant course is offered.

Year	Number of Responding Dental Schools	
	n	%
Third year only	8	10
Fourth year only	12	15
Fifth year only	31	39
Sixth year only	28	36

**Table 5.** Core contents presented in predoctoral implant dentistry course.

Course Topics	Number of Responding Dental Schools	
	n	%
Introduction only	32	41
Introduction, diagnosis and treatment planning	20	25
Introduction, diagnosis and treatment planning clinical procedures, maintenance and evaluation	19	24
No response	8	10

should have a background in implant dentistry which allows them to use this treatment option in their daily practice.

There is no meaningful difference for which department is main responsible for implant education to the predoctoral students and there is a trend towards multidisciplinary participations. One of the valuable and important results of this research was the fact that dental implant education in the predoctoral level is a multidisciplinary approach and there is not an independent implantology department.

The predoctoral dental implant course was offered to senior students in the world and similar results were drawn from other studies, in other words the prerequisites for dental implant education were subjects such as prosthodontics, maxillofacial surgery and periodontology.

The topics (core contents) presented in this course are different among dental schools, the core contents are more comprehensive in schools in which the onset year was prior to 2000. This was also true for the lecture hours for the predoctoral implant dentistry course. This is consistent with some other surveys [6-9].

The required textbooks used most widely were Mish's "Dental Implant Prosthesis" and Con-

temporary Implant Dentistry" and Spiekermann's "Implantology" in order from high to low. Mish's "Dental Implant Prosthesis" first edition, perhaps due to its step-by-step guidance, is the most popular textbook among different dental schools. However, Spiekermann's "Implantology" is more frequently used in European schools. This is consistent with Afsharzand et al's [10] survey.

Thirty-nine (49%) dental schools reported that they involve predoctoral students in surgical and prosthodontics clinical procedures, in which they are mainly observer.

Of 92 respondent dental schools from 135 world schools, 32 dental schools (40%) offered a preclinical laboratory course in their program. These schools were located in North America and Europe. These findings appear to be consistent with Seckinger et al [7] and Afsharzand et al's [10] surveys. It should be mentioned that those dental schools which already offered an implant course prior to 2000, are pioneers in the performance of implant related preclinical laboratory work by students. In this survey, only one dental school in Asia, South America and Africa had a preclinical course for dental students prior to 2000; however this has increased to six dental schools after 2000. Since the reason for not

**Table 6.** Implant system(s) utilized in predoctoral program.

Implant System	Number of Responding Dental Schools	
	n	%
ITI	10	25.0
Nobel Biocare	8	21.0
3i	5	13.0
Paragon	5	13.0
Astra Tech	3	7.5
Steri-Oss	1	2.5
Others systems	7	18.0

offering a preclinical course, was not asked in this study it is one of the limitations of this survey.

ITI (Straumann, Waldendurg, Switzerland) (in 25% of the instances) and Nobel Biocare (Yorba Linda, CA) (in 21% of the instances) implant systems were used most frequently, both in surgical and restorative phases of treatment. Weintraub et al [7] showed that Nobel Biocare was used most frequently in US dental schools. However, Afsharzand et al [10] presented that ITI and Nobel Biocare were used mostly in Europe. One probable reason may be that some implant manufacturers have agreed to provide implants, abutments, instruments and demonstration kits for hands-on applications free of charge to undergraduate dental schools. The companies should be complimented for their generosity and more importantly, for their strategic awareness of the future of dental implant therapy, especially in the developing countries for overcoming the challenges which are faced.

## CONCLUSION

A survey of 92 respondent dental schools from 135 world schools demonstrated that 79 (85%) dental schools include predoctoral implant dentistry in their educational program. This trend is rapidly increasing in Asia, South America and Africa. The percent of hands-on course is higher in North America and Europe than in Asia, South America and Africa. The course content, ratio of faculty to students, lecture hours, required textbooks and onset year of predoctoral implant curriculum, implant systems used both surgically and prosthetically are different among countries. There is not a separate implantology department rather than the departments of prosthodontics, oral surgery and periodontics frequently, assuming the administrative roles for predoctoral implant dentistry programs.

Few countries and Iranian dental schools do not have comprehensive curriculum guidelines

for implant dentistry. These countries face some challenge, for example lack of an adequately trained faculty, not enough time in an already overfilled dental school curriculum, and scarce financial resources. Today, many specialists have been trained; thus, it should not be an issue. Other challenge is unwillingness to modify the traditional aspects of dental school education curriculum in order to accommodate dental implant educational in predoctoral curriculum. The financial challenge can be addressed with the aid of implant manufacturers companies.

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