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Turkish Dental Students' Perceptions and Awareness of Dental Implant Education: A Questionnaire Study

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Abstract

Objective. This study aimed to assess Turkish dental students' awareness of and attitudes toward dental implant therapy, as well as the effectiveness of dental implantology lecture from their point of view.

Materials and Methods. This study used a cross-sectional online survey. A total of 425 third-, fourth- and fifth-year dental students enrolled in Gazi University School of Dentistry during the 2020-2021 academic year were invited to participate in the survey anonymously and voluntarily. Following the descriptive part (age, gender, and education status), all the participants were asked 11 questions.

Results. Total of 415 questionnaires were analyzed. The 3rd-year students stated that they were "poorly" informed about dental implants (n=88, 64.7%), while the 4th- and 5th-year students were "moderately" infromed (n=78, 54.2% and n=60, 44.4%, respectively) ($p < 0.001$). All the students were believed that they needed to get more information during their undergraduate studies ($p < 0.01$). More than half of all students preferred to have PhD or speciality training after graduation ($p > 0.05$). Approximately 80% of all students believed that dentists should receive specialized training in order to practice implant dentistry ($p > 0.05$).

Conclusions. The results of this study show that some Turkish dental students find DI treatment a difficult operation and that they do not know enough about it. As a result, it is anticipated that improving the current curriculum will contribute to the course success and make dental students feel better prepared for dental implantology following graduation.

Keywords

Dental Education; Dental Implants; Implant Training; Undergraduate Education; Population Survey

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Introduction

Dental implants (DIs) are a widely used treatment model as an aesthetic and functional rehabilitation option for completely or partially edentulous patients [1–3]. The increase in the prevalence of DIs has been reported in many studies worldwide [4–6]. According to one study, which achieved a striking result, by 2026, the prevalence of DIs in the USA is projected to reach at least 23% [7]. Dentists have an essential role to play in this period when the DI trend is rapidly increasing, and they need to have sufficient knowledge to inform patients about DI [8]. Therefore, for dentists to provide the most appropriate treatment for the needs of an individual patient, lectures on dental implantology should be included in the undergraduate curriculum.

Today, the need for standardized and structured DI education to keep pace with the breakthrough in dental implantology has been recognised by a global consensus among clinicians, researchers, and educators. In the worldwide consensus meetings, they pointed out the importance of multidisciplinary, evidence-based DI education [9–11]. Universities are responsible for providing theoretical and practical trainings required for students to perform evidence-based practice [12]. The curriculum content should be prepared with this goal in mind. Therefore, it is essential for academic staff to be aware of how students evaluate the quality of education they receive and to change the curriculum, if necessary. In this way, their adopted system remains open to innovations and alive [13, 14].

Gazi University School of Dentistry (GUSD), Turkey, offers a five-year dental education program. During the initial two years, students at GUSD receive instruction in basic sciences, including anatomy, physiology, and microbiology. In the third year of study, students begin to learn about clinical sciences and start to observe cases in the clinic. During the final two years of study, students continue to

receive theoretical lectures in clinical sciences, as well as gain hands-on experience in the clinic under supervision.

Dental implantology is a multidisciplinary lecture having two credits out of 60 European Credit Transfer System (ECTS) credits in the 5th year of study and is delivered as a joint class by the Department of Oral and Maxillofacial Surgery, Prosthodontics Department and Periodontology Department at GUSD. The lecture aims to provide students with a comprehensive knowledge about the indications, contraindications, advantages and disadvantages, application, and alternatives of DIs. Students evaluate all the aspects of the DI zone, application, and maintenance. Comprehensive knowledge of peri-implant diseases in terms of mechanical, surgical, and antimicrobial treatment is obtained. Students gain knowledge about DI-supported prosthetic treatments. Moreover, lecture topics are DI types, materials, surface properties, peri-implant tissues, patient evaluation and selection, diagnostic methods, treatment plans, soft and hard tissue preparation, DI surgery, prosthetic approaches to DIs, and peri-implant diseases and treatments. Dental students learn about the practices by observing a specialist performing DI treatments; however, they do not participate in those practices. Clinical training in dental implantology is mainly taught in the postgraduate course. The lecture on dental implantology, which has a wide range of the spectrum, cannot be given in full detail due to the limitation of the undergraduate program duration. To learn more about DI applications within the current curriculum applied in most dental schools in Turkey, students need to improve themselves in the postgraduate course.

This study **aimed** to assess Turkish dental students' awareness of and attitudes toward DI therapy, as well as the effectiveness of the lecture on dental ımplantology from their point of view.

Materials and Methods

Study Design

This study used a cross-sectional survey. The survey was hosted on the "SoSciSurvey" online platform and shared online between November 01, 2020, and January 01, 2021. Before publishing the survey on the Internet, an invitation was sent to students who made up the target sample for this study via email. Similarly, a link to the survey was emailed to participants.

Study Population

A total of 425 third-year, fourth-year and fifth-year dental students enrolled in GUSD during the 2020-2021 academic year were invited to participate in this survey anonymously and voluntarily.

Data Collection

Following the descriptive part (age, gender, and education status), participants were asked 11 questions. It was stated that respondents should select only one answer choice. The present survey was adapted from versions previously applied to different populations for a similar purpose [15, 16].

Statistical Analysis

Statistical analyses were performed using IBM SPSS for Windows Version 21.0 package program (IBM Corp. released in 2012, SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp). The minimum sample size of this study was determined as 402 participants, with a 5% margin of error and a 95% confidence interval. Numerical variables were summarised with mean ± standard deviation (Mean ± SD). Categorical variables were presented as numbers and percentages. Differences in categorical variables among independent groups were investigated with the Chi-Square test. The significance level was set as $p < 0.05$.

Results

A total of 415 questionnaires were included in the analysis, yielding a response rate of 97.65%. The study sample was divided into three groups according to the year of study: the 3rd year of study (32.8%), the 4th year of study (34.7%), and the 5th year of study (32.5%). Of the total sample, 268 (64.6%) participants were females, and 147 (35.4%) participants were males, with a mean age of 22.70 ± 1.59 years (Table 1).

The questionnaire used in this study included 11 questions. According to its results, all three groups of students perceived DI treatments as more difficult than other dental procedures ($p < 0.05$). However, as students' knowledge of dental implantology increased, there was a decrease in the percentage of those who viewed DI treatments as difficult, from approximately 53% for 3rd- and 4th-year students to 46.7% for 5th-year students (Fig. 1). Additionally, female students were more likely to perceive DI treatments as difficult in all three groups (Table 2).

Most 3rd-year students (93.4%) thought they did not have enough information about dental implantology. In addition, more than half of the 4th- and 5th-year students (63.2% and 57.8%, respectively) believed that they could not get enough information about dental implantology ($p < 0.001$) (Table 2).

Table 1. Average age and gender distribution of participants.

	Third-year students		Fourth-year students		Fifth-year students		Overall	
	Age (Mean±SD)		Age (Mean±SD)		Age (Mean±SD)		Age (Mean±SD)	
	21.35±0.89		22.88±1.24		23.86±1.44		22.70±1.59	
Gender (n, %)	Female	Male	Female	Male	Female	Male	Female	Male
	90 (66.2)	46 (33.8)	88 (61.1)	56 (38.9)	90 (66.7)	45 (33.3)	268 (64.6)	147 (35.4)
Total	136 (32.8)		144 (34.7)		135 (32.5)		415	

Table 2. Participants and answers to the survey.

No	Question	Answer	Third-year students			Fourth-year students			Fifth-year students			p value
			Female n (%)	Male n (%)	Overall n (%)	Female n (%)	Male n (%)	Overall n (%)	Female n (%)	Male n (%)	Overall n (%)	
1	How difficult do you find dental implant treatments compared to other dental procedures?	Very easy	0	1 (2.2)	1 (0.7)	0	3 (5.4)	3 (2.1)	0	3 (6.7)	3 (2.2)	p<0.05
		Moderate	26 (28.9)	8 (17.4)	34 (25)	23 (26.1)	26 (46.4)	49 (34)	33 (36.7)	23 (51.1)	56 (41.5)	
		Difficult	46 (51.1)	27 (58.7)	73 (53.7)	52 (59.1)	24 (42.9)	76 (52.8)	47 (52.2)	16 (35.6)	63 (46.7)	
		Very difficult	13 (14.4)	9 (19.6)	22 (16.2)	12 (13.6)	3 (5.4)	15 (10.4)	9 (10.0)	2 (4.4)	11 (8.1)	
		No answer	5 (5.6)	1 (2.2)	6 (4.4)	1 (1.1)	0	1 (0.7)	1 (1.1)	1 (2.2)	2 (1.5)	
2	Do you think you have enough information on dental implants that are part of the syllabus?	Yes	4 (4.4)	5 (10.9)	9 (6.6)	32 (36.4)	21 (37.5)	53 (36.8)	41 (45.6)	16 (35.6)	57 (42.2)	p<0.001
		No	86 (95.6)	41 (89.1)	127 (93.4)	56 (63.6)	35 (62.5)	91 (63.2)	49 (54.4)	29 (64.4)	78 (57.8)	
3	How well do you think you have been informed on dental implants during your dentistry education?	Very well	0	0	0	4 (4.5)	4 (7.1)	8 (5.6)	4 (4.4)	4 (8.9)	8 (5.9)	p<0.001
		Well	1 (1.1)	2 (4.3)	3 (2.2)	22 (25.0)	12 (21.4)	34 (23.6)	33 (36.7)	10 (22.2)	43 (31.9)	
		Moderately	18 (20.0)	12 (26.1)	30 (22.1)	51 (58.0)	27 (48.2)	78 (54.2)	42 (46.7)	18 (40.0)	60 (44.4)	
		Poorly	60 (66.7)	28 (60.9)	88 (64.7)	11 (12.5)	13 (23.2)	24 (16.7)	11 (12.2)	13 (28.9)	24 (17.8)	
		Not at all	11 (12.2)	4 (8.7)	15 (11.0)	0	0	0	0	0	0	
4	What do you think is the most important advantage of implant-supported treatments compared to other prosthetic treatments?	More esthetic	16 (17.8)	7 (15.2)	23 (16.9)	11 (12.5)	8 (14.3)	19 (13.2)	7 (7.8)	6 (13.3)	13 (9.6)	p<0.001
		More conservative	12 (13.3)	7 (15.2)	19 (14.0)	34 (38.6)	24 (42.9)	58 (40.3)	63 (70.0)	29 (64.4)	92 (68.1)	
		Longer lasting	59 (65.6)	30 (65.2)	89 (65.4)	41 (46.6)	21 (37.5)	62 (43.1)	17 (18.9)	8 (17.8)	25 (18.5)	
		No extra advantages	1 (1.1)	0	1 (0.7)	0	2 (3.6)	2 (1.4)	0	0	0	
		No answer	2 (2.2)	2 (4.3)	4 (2.9)	2 (2.3)	1 (1.8)	3 (2.1)	3 (3.3)	2 (4.4)	5 (3.7)	
5	What DI survival rate do you inform your patients about?	2-5 years	0	1 (2.2)	1 (0.7)	0	2 (3.6)	2 (1.4)	5 (5.6)	1 (2.2)	6 (4.4)	p<0.001
		5-10 years	16 (17.8)	5 (10.9)	21 (15.4)	32 (36.4)	23 (41.1)	55 (38.2)	33 (36.7)	25 (55.6)	58 (43.0)	
		10-20 years	28 (31.1)	13 (28.3)	41 (30.1)	28 (31.8)	12 (21.4)	40 (27.8)	16 (17.8)	8 (17.8)	24 (17.8)	
		Lifelong	20 (22.2)	13 (28.3)	33 (24.3)	8 (9.1)	5 (8.9)	13 (9)	0	0	0	
		No answer	26 (28.9)	14 (30.4)	40 (29.4)	20 (22.7)	14 (25.0)	34 (23.6)	36 (40.0)	11 (24.4)	47 (34.8)	
6	What do you think is the most important factor in implant success?	Case selection	46 (51.1)	20 (43.5)	66 (48.5)	53 (60.2)	35 (62.5)	88 (61.1)	66 (73.3)	28 (62.2)	94 (69.6)	p<0.05
		Type of implant	1 (1.1)	0	1 (0.7)	0	1 (1.8)	1 (0.7)	1 (1.1)	2 (4.4)	3 (2.2)	
		Compliance of the patient with the postoperative recommendations	9 (10.0)	10 (21.7)	19 (14.0)	15 (17.0)	6 (10.7)	21 (14.6)	3 (3.3)	6 (13.3)	9 (6.7)	
		Surgical technique	16 (17.8)	7 (15.2)	23 (16.9)	10 (11.4)	5 (8.9)	15 (10.4)	10 (11.1)	4 (8.9)	14 (10.4)	
		Surgeon's experience	18 (20.0)	9 (19.6)	27 (19.9)	10 (11.4)	9 (16.1)	19 (13.2)	10 (11.1)	5 (11.1)	15 (11.1)	
7	Do you believe dental implants require more care compared to natural teeth?	No, hygiene needed is the same as for natural teeth	17 (18.9)	16 (34.8)	33 (24.3)	14 (15.9)	5 (8.9)	19 (13.2)	8 (8.9)	8 (17.8)	16 (11.9)	p<0.01
		No, they need less care than natural teeth.	2 (2.2)	1 (2.2)	3 (2.2)	0	1 (1.8)	1 (0.7)	2 (2.2)	1 (2.2)	3 (2.2)	
		Yes, they call for greater care than natural teeth.	42 (46.7)	16 (34.8)	58 (42.6)	58 (65.9)	41 (73.2)	99 (68.8)	61 (67.8)	25 (55.6)	86 (63.7)	
		This issue depends on patient factors such as periodontitis.	26 (28.9)	11 (23.9)	37 (27.2)	15 (17.0)	8 (14.3)	23 (16.0)	17 (18.9)	9 (20.0)	26 (19.3)	
		It depends on other reasons.	3 (3.3)	2 (4.3)	5 (3.7)	1 (1.1)	1 (1.8)	2 (1.4)	2 (2.2)	2 (4.4)	4 (3.0)	
8	Would you like to learn more about dental implants during your study?	Yes	85 (94.4)	46 (100)	131 (96.3)	78 (88.6)	47 (83.9)	125 (86.8)	84 (93.3)	45 (100)	129 (95.6)	p<0.01
		No	5 (5.6)	0	5 (3.7)	10 (11.4)	9 (16.1)	19 (13.2)	6 (6.7)	0	6 (4.4)	
9	What source do you prefer to learn about dental implantology from?	Seminars organised by the private sector	7 (7.8)	2 (4.3)	9 (6.6)	2 (2.3)	5 (8.9)	7 (4.9)	5 (5.6)	2 (4.4)	7 (5.2)	p>0.05
		Certificate courses organised by DI specialists	57 (63.3)	25 (54.3)	82 (60.3)	59 (67.0)	33 (58.9)	92 (63.9)	70 (77.8)	27 (60.0)	97 (71.9)	
		Specific books and journals	0	5 (10.9)	5 (3.7)	3 (3.4)	3 (5.4)	6 (4.2)	4 (4.4)	5 (11.1)	9 (6.7)	
		Advisors who can communicate with students	25 (27.8)	14 (30.4)	39 (28.7)	24 (27.3)	14 (25.0)	38 (26.4)	11 (12.2)	10 (22.2)	21 (15.6)	
		Specific online learning platforms	1 (1.1)	0	1 (0.7)	0	1 (1.8)	1 (0.7)	0	1 (2.2)	1 (0.7)	
10	What source will you use to receive training on implant-supported treatment procedures after graduation?	Seminars organised by the private sector	4 (4.4)	6 (13.0)	10 (7.4)	1 (1.1)	4 (7.1)	5 (3.5)	4 (4.4)	6 (13.3)	10 (7.4)	p>0.05
		Certificate courses organised by DI specialists	39 (43.3)	15 (32.6)	54 (39.7)	32 (36.4)	20 (35.7)	52 (36.1)	37 (41.1)	14 (31.1)	51 (37.8)	
		PhD or specialty training	45 (50.0)	25 (54.3)	70 (51.5)	55 (62.5)	32 (57.1)	87 (60.4)	49 (54.4)	25 (55.6)	74 (54.8)	
11	Do you think students should receive specialised training on dental implant treatment?	Yes	78 (86.7)	40 (87.0)	118 (86.8)	81 (92.0)	41 (73.2)	122 (84.7)	81 (90.0)	32 (71.1)	113 (83.7)	p>0.05
		No	12 (13.3)	6 (13.0)	18 (13.2)	7 (8.0)	15 (26.8)	22 (15.3)	9 (10.0)	13 (28.9)	22 (16.3)	

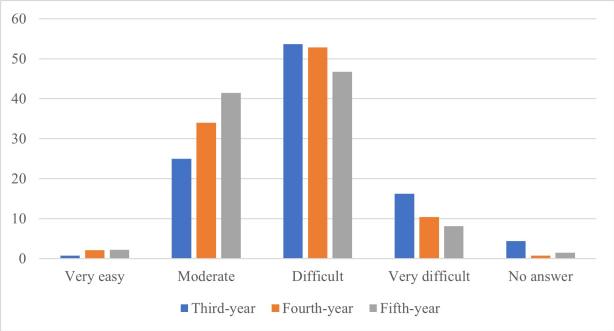

Figure 1. Percentage of students' responses to the question "How difficult do you find dental implant treatments compared to other dental procedures?"

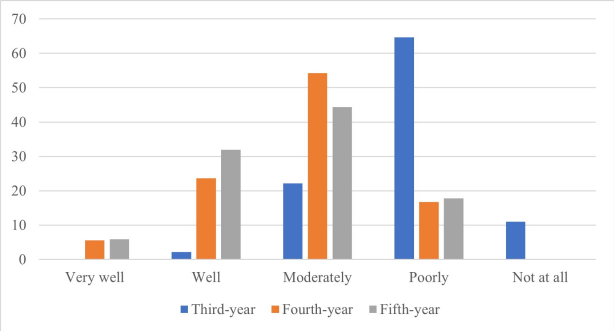

Figure 2. Percentage of students' responses to the question "How well do you think you have been informed on dental implants during your dentistry education?"

In the survey of students at various stages of their academic careers, 64.7% of 3rd-year students reported feeling "poorly" informed about the topic of DI, while 54.2% and 44.4% of 4th- and 5th-year students, respectively, reported feeling "moderately" informed about the topic (Fig. 2). A statistical analysis indicated a significant difference in the perceived levels of knowledge about DI among the different groups of students ($p < 0.001$) (Table 2).

Compared to other prosthetic treatments, the most important advantage of DIs was considered as "long-lasting result" by more than half of 3rd-year students (65.4%). Nearly half of the 4th-year students answered that the most important advantage of DIs was "long-lasting result" (43.1%), and the other nearly half answered that the most important advantage of DIs was "no need for tooth preparation" (40.3%). The most important advantage of DIs for 5th-year students was "no need for tooth preparation" (68.1%). There was a statistically significant difference among the awareness of the three groups ($p < 0.001$) (Table 2).

When they were asked about DI survival, 3rd-year students answered that it was "between 10 and 20 years", while 4th- and 5th-year students answered - "between 5 and 10 years" ($p < 0.001$). In addition, most students in all groups thought that the most crucial factor for DI success was "case selection" ($p < 0.05$). All students stated that DI-based rehabilitations required more care than natural teeth-supported restorations ($p < 0.01$) (Table 2).

All the students agreed that they needed to get more information during their undergraduate studies ($p < 0.01$). The source they preferred to learn more about DIs for all the students was courses organised by DI professionals ($p > 0.05$). More than half of all students preferred PhD or speciality training on DI-supported treatment procedures after graduation ($p > 0.05$). Approximately 80% of all the students believed that dentists should receive specialized training to practice implant dentistry ($p > 0.05$) (Table 2).

Discussion

DI treatment has been accepted as a vital part of dentistry and an alternative popular treatment method for completely/partially edentulous patients in recent years [17]. The use of DIs in the treatment of missing teeth has increased rapidly due to more than 90% of success in the last 5 years [18]. In addition, DIs have become an accessible treatment option for a wider group of patients following an increase in the number of dentists providing DI treatment and more information about dental implantology given through the media [19]. Patients can get information about DIs from various sources (friends, the Internet, television/radio, newspapers/magazines). However, dentists should be the first source where patients can receive more detailed and accurate information about DIs [20]. Therefore, whether they perform DI treatment or not, it is essential for all dentists to have sufficient knowledge of implantology to provide accurate information to patients.

Nowadays, professional societies seek to create the postgraduate curriculum, but university-supported education often turns into informal, short-term, poorly structured, industry-initiated training programmes [21]. The educational value of industry-sponsored programs in implantology is questionable as in these programs, DI treatments can mostly be reduced to an easily accessible and simple procedure with the right technique [22]. In fact, the clinical reality is different from this situation [23]. To avoid this negative perception, some committees have recommended basic knowledge of implantology (i.e., healing and osseointegration, biomechanics and material properties, as well as prosthesis, surgical skills and procedures) to be formally included in the undergraduate program.

Many consensus meetings around the world emphasized the importance for dentists to receive multidisciplinary and evidence-based implantology education prior to performing DI practices [10, 21, 24]. Moreover, it is stated that dental implantology should be integrated into the undergraduate program at some levels [25–27].

According to the latest Health Statistics Yearbook (2020) published by the Republic of Turkey Ministry of Health in the 2020-2021 academic year, there were a total of 33,875 students enrolled in 79 dental schools in Turkey, and a total of 3, 859 students graduated [28]. In Turkey, as around the world, DIs have become an increasingly accepted treatment method. To keep up with the increasing demands and expectations of patients, various universities, dentists, and implant companies have started various efforts to inform dentists about this treatment method. However, dental

students should receive sufficient basic knowledge about dental implantology during their undergraduate studies. Therefore, it is thought that evaluating the effectiveness of implantology lectures from the students' viewpoints will help modify the present curriculum, and as a result, dental students may feel more prepared for dental implantology after graduation.

In the present surveyed population, the female population was almost twice as large as the male population. Around the world, women are increasingly finding a place for themselves in the dental field [16, 29]. There was a similar trend in the Turkish population that responded to this survey study. The results of our study displayed that 64.6% of all the dental students who participated were females.

Based on the results of this study, most of the students stated that they would prefer courses organised by DI professionals to learn more about this specific area. The least preferred options were seminars organised by the private sector, specific online learning platforms, and specific books/journals in parallel with other studies [15, 30]. Moreover, more than half of the participants in each group preferred PhD or speciality training to learn more about implant-supported treatment procedures following their graduation and believed that postgraduate specialization would contribute to their DI education. In addition, most participants agreed that dentists should receive further specialized training to practice implant dentistry. Nagpal *et al.* determined that dentists' experience, implant education received, and postgraduate specialization could affect the knowledge, attitudes, and practices of DIs [31]. They emphasized that lectures on implantology were an important factor in improving knowledge, providing a better attitude, and increasing DI practices. Moreover, some studies have shown that if dentists learn about DI treatments during their undergraduate studies, they are more likely to offer such treatments to their patients in the future [32, 33].

In this study, most participants found DI education they received insufficient and stated that they would like to learn more about it during their undergraduate studies. It may be necessary to consider this request and improve the existing curriculum. For this purpose, a comprehensive dental implantology curriculum can be prepared for students. Kihara *et al.* suggested supporting the dental implantology curriculum with more preclinical practices and clinical experience [34]. Similarly, Temmerman *et al.* investigated the students' perception of implant education consisting of didactic lessons, preclinical applications, and clinical experiences and reached a high student satisfaction level of 80% [35]. In another study, they compared pre-doctoral DI education in Canada and the United States [36]. In most Canadian institutions, the clinical DI curriculum included simulated exercises and supervised direct patient care in 90% of pre-doctoral programs. Although this may seem like a good idea, implementing a comprehensive pre-doctoral implant curriculum including clinical practice can be difficult for most dental schools due to the high cost of DI systems, insufficient pre-doctoral cases, and short program duration.

Through the present questionnaire, students' perception of the advantage of DI treatment was questioned as well. Third-year students perceived the longevity of DI treatment as its most important advantage compared to other prosthetic procedures. As the grade levels of students progressed, they agreed that DI treatments were more conservative than other prosthetic treatment options (since it did not require dental preparation). This result was similar to other studies conducted in India and Spain [15, 16]. Moreover, in a study of Ken *et al.*, it was emphasized that patients found DI treatment more conservative as well and often preferred it only for this reason [37].

Considering the responses of the participants about DI survival in this study, 3rd-year students believed that it was between 10 and 20 years, while 4th- and 5th-year students believed that it was between 5 and 10 years. In a study of Chaudhary *et al.*, 39.8% of the participants believed that DI survival was between 10 and 20 years, while Sánchez-Garcés *et al.* reported that over 60% of the participants believed that DI survival was between 10 and 20 years [15, 16]. DI survival is a critical subject for both the dentist and the patient; especially patients without a history of DI treatment may have higher expectations about implant survival, expecting over 20 years [37, 38]. Therefore, it is important for dental students to learn well enough about individual risk factors related to patients' medical condition and oral health status and to be able to inform patients to make them have more realistic expectations.

In this study, almost more than half of the participants believed that the most important factor for DI success was case selection, followed by surgeon experience. In similar studies, more than half of the participants believed that the most important factor for DI success was case selection as well [16, 30]. Case selection is very important for predicting DI osseointegration when deciding on DI treatment for rehabilitating the edentulous region [39]. Therefore, both clinical and radiological evaluations are required for each patient planning to have DI treatment; therefore, dental students should learn properly how to perform a detailed examination throughout their undergraduate studies.

This questionnaire indicated that nearly half of the participants described DI treatment as a "difficult" procedure and less than half of the participants indicated their level of knowledge as "moderate". The rest of the participants indicated "poor" level, as did previous reports from India, Nepal, and Spain [15, 16, 30]. Students' perception of DI procedure as difficult might be due to their lack of knowledge about this subject. Therefore, increasing the number of credits for implantology lectures and improving their content may be beneficial.

According to the results of this study, more than half of the participants believed that DIs required more oral care than natural teeth, as previously reported by Sharma *et al.* [25]. If patient compliance and proper oral hygiene cannot be achieved, inflammatory changes may develop in the soft tissues surrounding DIs. This severe problem can start with peri-implant diseases and lead to implant loss. Due to structural differences between DIs and natural teeth, there are disadvantages such as deeper probing depth, weaker connective tissue attachment, faster spread of in-

flammation, and reduced vascular supply in peri-implant soft tissue healing compared to natural teeth [40]. Thus, the dentist should pay more attention to maintaining soft tissue health around DIs than natural teeth, indicating that dental students should be aware of how vital periodontal health status is. In two different survey studies conducted in the United States and Australia on the subject, no standardization in the curriculum of peri-implant diseases was found [41, 42]. A standardized curriculum content for the didactic and clinical management of peri-implant diseases is recommended to be developed.

There are studies evaluating implant education with different learning techniques [43, 44]. In a study of Chaturvedi *et al.*, modified advanced teaching methodologies such as e-learning, small-group problem-based learning, and team-based learning were applied to teaching DI science [44]. Modified teaching methodologies in implantology have been shown to increase students' interest and knowledge. It has been pointed out that small-group problem-based learning is the most preferred method. It is recommended that dental implantology subjects start earlier in the undergraduate program and that the subjects be broadly divided throughout the study period.

According to the First European Consensus Workshop in Implant Dentistry University Education in 2009, for assessing knowledge and skills of implant dentistry in undergraduate education, the following four functions were recommended: (1) formative function (to complete and direct the learning process with feedback; to identify weaknesses or areas for improvement; to describe future learning objectives), (2) summative function (to ensure that students are well prepared to diagnose the plan and perform the necessary interventions on their own), (3) cognitive skills and attitudes (critical thinking, reflection and self-assessment ability), and (4) feedback from the learning environment (continuous feedback to teachers on the curriculum content) [26]. Throughout the curriculum, various assessment methods, reliable, valid, and consistent during DI education, are required to assess different levels of abilities.

Limitations

This study is focused on the implantology course curriculum at a specific university. Since only students enrolled in this training program could be invited to participate, this study is constrained by non-response bias. The resulting curiosity may not always be a reliable indicator of the real student participation as this study was done using a questionnaire.

Conclusions

The results of this study demonstrate that some Turkish dental students view DI treatment as a challenging procedure and believe they lack sufficient knowledge about it. Thus, some improvements to the current curriculum, including reviewing the relevant course form the student's perspective, are believed to help boost the success of the course and make dental students feel more prepared for dental implantology after graduation.

Ethical Statement

This study was approved by Gazi University, School of Dentistry, Clinical Research Ethics Committee. (Approval no.: GUDHKAEK.2020.22/5)

Informed Consent

Participants were provided with an introduction to the questionnaire and an electronic informed consent form prior to beginning the survey. In order to participate, each student had to provide their informed consent. No incentives were offered in exchange for completing the survey.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflict of Interest

The authors declare that they have no conflict of interest.

Financial Disclosure

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