

Effectiveness of teaching dental implant science as a merged implant-related lectures on dental student's knowledge

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Abstract

The purpose of this study was to investigate the effectiveness of teaching dental implant science as a merged implant-related lectures with other curriculum items on undergraduate dental students' knowledge and practice, through study years.

The study was conducted using a random sampling with pretest self-administered, anonymous, multiple-choice questionnaire were administered to all study years from the first year to the final fifth year dental undergraduates students. Asking for student knowledge in implantology concepts and clinical knowledge.

Students understanding for the principle of dental implant increased with study year in which the college education represent the first source of information for all study year except for the first year. A small proportion (11%) of the final year students think that dental implant function life is less than two years.

The results of the clinical knowledge showed that only 55% of 5th-year study student have observed and assist in surgical placement of the implant. Only 73% of those student have their practical experience in their college.

Teaching dental implant science with different curriculum items does have effect in educating dental students, but it still much low and beyond the level that the graduated dentist must be. Also, it reflects a shortage in this teaching program that necessitates modernization of dental curricula, by adding dental implant as a separated study course, and to start its teaching program from the earlier study year to be then followed by clinical teaching similar to other subjects in dentistry.

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Introduction

Edentulism is a widely spread problem even with declining the prevalence and incidence of tooth loss.¹

The loss of teeth has an impact on patient health, cosmetic and emotion.² In order to solve these problems, different attempts have been done to replace lost teeth, with a bone- anchored tooth shape device that restores the function of lost dentition. Dental implants has been widely used in treating partially and completely

edentulous jaws which particularly increased with the acceptance of the concept of osseointegration³ and had been a fixed clinical treatment modalities due to its high success rate.⁴ As a result of this success rates and the certainty of the dental implants, their usage as an implant-supported prosthesis in oral rehabilitation of partially and edentulous patients is escalating year on year⁵ to reach about 1 million implants annually across the world,⁶ and has become a fundamental part of the treatment plan among across the world.⁷ This lead to increase the demand from dentists and patients to reach the highest level of treatment protocols.⁸

Currently, dental implantology has become a specialty in dentistry and considered as the most advanced science in the field of dentistry in the last five decades.⁹

Despite the growing availability of postgraduate continuing education courses in dental implantology, it is still important to have

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courses of implant dentistry in dental school curriculum.⁸ As it appears that such a dental implant curriculum education affect the practice habits.¹⁰

It has been emphasized in undergraduate programs that successful future dentists require wide array of a good oriented dental knowledge to enhance their professional responsibility and medical ethics to help their patients and improve their community.¹

The knowledge of all the available treatment options is essential to choose of the best treatment plan. Therefore, many dental schools across Europe and America obliged to introduce implant dentistry as a compulsory part of undergraduate curriculum at a different extent.^{11,12}

Students need a firm basic knowledge about biological and clinical knowledge, to be able to conduct successful implant treatment. Undergraduate teaching is vital in the successful management of implant retained restoration by general dental practitioners, which highlight importance of including implants into the overall curriculum and in clinical treatment concept.¹² In many countries, dental schools do not offer a separate dental implant course, and they merged implant-related lectures with other courses.¹³

Despite the remarkable number of dental implants being placed by general dentists, and the high number of dental schools that offer dental implant science as a merged implant-related lectures with other courses¹³, there is no previous study assessing the efficacy of teaching implant science with other courses.

The purpose of this study was to investigate the effectiveness of teaching program that teaches dental implant science with different curriculum items on undergraduate dental students' knowledge and practice, through study years.

Materials and methods

All dental colleges in Iraq are connected to the Ministry of Higher Education and Scientific Research in Iraq,¹⁴ and they relatively have the same dental curriculum that approved by the Ministry of Higher Education and Scientific Research in Iraq. The study was conducted in the college of dentistry at Al- Mustansiriyah University. Approval of the scientific committee of Oral Surgery and Periodontology Department has been obtained.

A total of 300 students were randomly selected, pretest self-administered, anonymous, multiple-choice questionnaire was administered randomly to all study years from the first year to the final fifth year dental undergraduates students (Participation in the study was voluntary). Asking for the personal (anonymous) background, the general knowledge in implantology concepts, what they have thought, the extent of exposure to oral implantology and some basic knowledge about dental implants. The students completed questioner as individuals and collected immediately.

The questionnaire comprised two sections: (a) general information about dental implants (b) clinical knowledge and experience they had before their graduation (just for fourth-year and fifth-year dental student study year student.

Statistical Analyses

Data were presented as a percentage of student response per each study year to the total numbers of students in the same study year. Statistical analyses were done using SPSS. Version 19 (statistical package for social sciences) and Microsoft Excel XP computer soft wares.

The correlation value considered: as low relation 0.3-0.5 value; medium relation, 0.5-0.7 value; and high relation 0.7-0.9 value.¹⁵

Results

A total of 300 questionnaires were analysed. Data were presented as a percentage with respect to total numbers of student in each study year. These percentages were calculated as a number of student specific answer to the total number of dental student in the same study year.

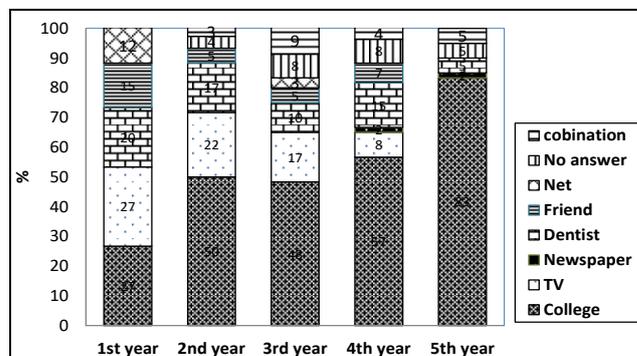


Figure 1. Distribution of percentage of dental students according to their first sources of information about dental implants. (n=300).

Students understanding for the principle of dental implant increase with progress in study year to be 98% in the final study year, with high correlation value to reach up to $R=0.99$. However, this correlation decrease to reach weak correlation ($R=0.2$), in case of student interest about dental implant subject (Fig 1). A small amount of teaching dental implant can be seen clearly in the first three years of study and even in the fourth year, to have taught about it just in their final year.

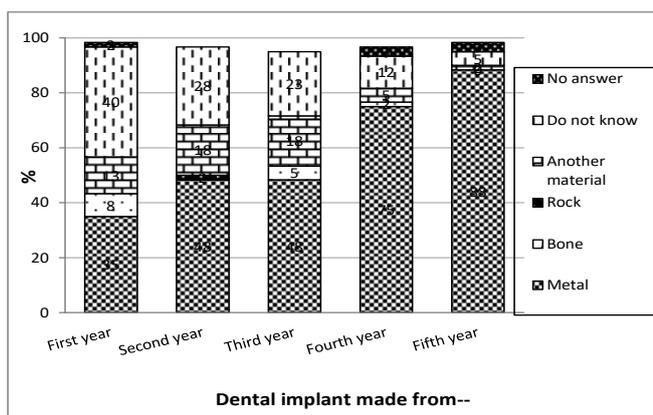


Figure 2. Distribution of percentage of dental students according to their conceptions about dental implant material type. (n=300).

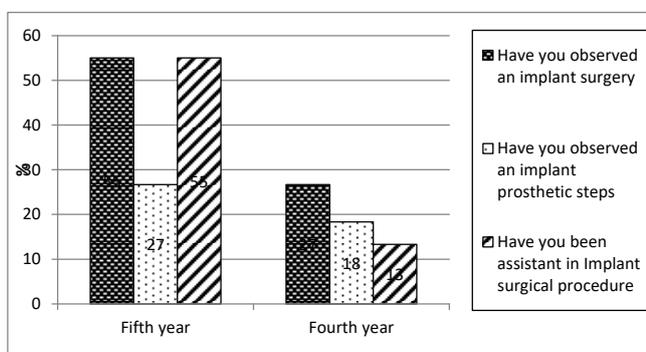


Figure 3. Distribution of percentage of dental students' response according to their attendance (observed) dental implant surgery, dental implant prosthetic steps, and participation as assistant. (n=120).

First sources of information about dental implants was the college with a high percentage in all study year and high correlation ($R=0.93$), except for the first year in which TV source of information was in similar percentage (27%) (Fig. 2). Same picture can be seen in figure 3 as there were a high negative correlation between students thinking that dental implant is a tooth

made from another person and study year ($R=0.95$) (fig 3) likewise with student answer the accurate answer that dental implant is made from metal and study year ($R=0.96$) (fig 3).

A high percentage of the final year students (45%) think that implant function life is less than ten years followed by 28% of those students think that its function life is less than 20 years. However, 11% of the fifth year student thought that the functioning life of dental implant is less than two years.

		1st year	2nd year	3rd year	4th year	5th year	Correlation
Do you understand the principle of dental implant	Yes	48% (n=29)	65% (n=39)	77% (n=46)	85% (n=51)	98% (n=59)	0.993
	No	50% (n=30)	35% (n=21)	23% (n=14)	15% (n=9)		-0.995
	No response	2% (n=1)				2% (n=1)	N/A
Are you interested about dental implant subject	Yes	87% (n=52)	77% (n=46)	78% (n=47)	80% (n=48)	88% (n=53)	0.154
	No	13% (n=8)	22% (n=13)	20% (n=12)	20% (n=12)	8% (n=5)	-0.322
	No response		2% (n=1)	2% (n=1)		3% (n=2)	N/A
Have you taught about dental implant	Yes	2% (n=1)	5% (n=3)	8% (n=5)	23% (n=14)	97% (n=58)	0.823
	No	98% (n=59)	92% (n=55)	92% (n=55)	77% (n=46)	3% (n=2)	-0.819
	No response		3% (n=2)				N/A
Dental implant is a tooth from another person	Yes	63% (n=5)	78% (n=2)	90% (n=3)		2% (n=1)	-0.829
	No	8% (n=38)	3% (n=47)	5% (n=54)	93% (n=56)	97% (n=58)	0.948
	No response	28% (n=17)	18% (n=11)	5% (n=3)	7% (n=4)	2% (n=1)	-0.928

Table 1. Frequency distribution of undergraduates' dental students according to their answers to the questions regarding dental implant. (n = 300).

	< 2 year	< 10 year	< 20 year	> 20 year y	Do not know
First year	3 %	27%	28%	20%	22%
Second year	15%	23%	13%	40%	9%
Third year	3%	35%	23%	23%	15%
Fourth year	8%	33%	22%	15%	22%
Fifth year	12%	45%	28%	8%	7%

Table 2. Frequency distribution of undergraduates' dental students according to their estimation of the functional life of dental implant. (n=120).

The results of the second part of questioner were about clinical knowledge,

therefore it has been given for fourth and fifth year students who has been working in the clinics with close contact with patients and treatment plan, and it illustrated in table 1, 2, 3. It has been shown clearly that fifth year student are more competent with such a clinical knowledge.

Clinical knowledge & treatment plan Questions		Students answers in percentage			
		Yes	No	Do not know	No answer
Dental implant consist of : (body, abutment, restoration part)	5 th year	72% (n=43)	10% (n=6)	15% (n=9)	3% (n=2)
	4 th year	40% (n=24)	25% (n=15)	30% (n=18)	5% (n=3)
Peri-implantitis cause implant loss	5 th year	92% (n=55)	2% (n=1)	5% (n=3)	2% (n=1)
	4 th year	23% (n=14)	45% (n=27)	15% (n=9)	17% (n=10)
Persistent numbness after implant surgery need immediate implant removal	5 th year	32% (n=20)	52% (n=31)		15% (n=9)
	4 th year	32% (n=19)	40% (n=24)	10% (n=6)	18% (n=11)
Does the number of implants needed differ for different type of prosthesis?	5 th year	65% (n=39)	10% (n=6)	25% (n=15)	
	4 th year	60% (n=35)	2% (n=1)	32% (n=19)	7% (n=4)
Dental implants can be placed in infected area	5 th year	10% (n=6)	87% (n=52)	2% (n=1)	2% (n=1)
	4 th year	48% (n=29)	45% (n=27)	3% (n=2)	3% (n=2)
Fixed bridge is better than dental implant to restore missing tooth bounded by health intact teeth	5 th year	13% (n=8)	85% (n=51)	2% (n=1)	
	4 th year	15% (n=9)	78% (n=47)	7% (n=4)	

Table 3. Frequency distribution of undergraduates' dental students according to their answers to the clinical knowledge & treatment plan questions regarding dental implant. (just for fourth-year and fifth-year dental student study year). (n=120).

Only 55% of the fifth year study student have observed and assist in surgical placement of implant. Of those, 73% said they had their practical experience in their college, while the rest got their experience from privet courses or privet clinic or internet. However, for prosthetic work experience, a similar percentage was found in both college and privet clinic.

Discussion

This study testing the efficacy of teaching dental implant science with different curriculum items on undergraduate dental students' knowledge and practice, through study years.

Dental implant become one of the treatment options in dental clinics, and there is a growing demand for such a treatment from clinicians and patients.¹ Since the discovery of osseointegration, there was tremendous advancement in this science across the world.¹⁶

Dental implants is a relatively new component of dental education program¹⁷ and it

is now well accepted by dentists that they need more comprehensive knowledge in implantology as a treatment plan in dentistry, dentists should have the desirable knowledge and skills to handle the new treatment modality and to serve the patients with the best scientific treatment plan.¹² However, A recent reorganization of dental schools at the beginning of the 21st century to add dental implant as a requirement for undergraduate student, some create a new department.¹

In the first, it was important to explore students understanding for the principle of dental implant which showed escalation with progress in study year to be 98% in the final study year. This coincides with the curriculum of dental college as during the first four study year the student contact to implantology is just to the amount that Implantology related to the taught subjects and not even as a full lecture. But the real implantology science taught to the student in oral and maxillofacial surgery curriculum in the fifth year and also in prosthodontics subject and periodontics subject, this elucidate clearly why student understanding and interesting of dental implant subject reaches its maximum value in the final year. However, the first year dental student shows high percentage of interesting in dental implant subject nearly to reach the same value as fifth year student, this can be related to the increase the number and qualities of internet connection companies and widespread using of smartphone in Iraq country¹⁸ in and during their registration year, which is the time when the student being curious to choose his/her future direction and search through the internet about his future job¹⁹ in which dental implant subject is one of the highest subject to discuss in dentistry in the internet.

Surprisingly, when asking the student if the dental implant is a tooth from another person, 2% of the fifth grade student (which mean one student) answer with "yes" which indicate a big shortage in teaching program, having a student to reach fifth class and do not know what dental implant is. However, high percent of the first class student (63%) answer with "no" which relatively represent the community education as the first year fresher student has just come from different level communities and governorate as the education in Iraq is free of charge, and the student economy level not affects their choice of study.^{14,20}

Dental implants had a high percentage of success rate up to reach 97.0% after ten years of function.²¹ However, 45% of final year students think that the functioning life of dental implant is less than ten years, and about 11% think that it is less than two years (data not shown). This will have an impact on communities because the final year student will graduate within couple months and reflect their view to their patient primarily and to communities secondarily.²² This highlight the urgent and importance of changing the curriculum and increasing the education hours for dental implants. For example, in the USA 88% of the dental school conduct a hands-on training to undergraduate students,²³ and many of them allow their final year students to place a single implant and implants for overdenture.^{10,23,24,25}

The small amount of teaching dental implant for the first and second study years is normal as the curriculum deals normally with basic science, but the small percentage of information about dental implant that taught to third and fourth dental student (8%, 23% respectively) is not acceptable as the third year student start to taught many clinical science lectures and attend mini clinic while the fourth year student work in must clinical departments and need more teaching in dental implants than 23%.

It worth to say that dental implant is taught in many subjects like pathology, dental materials , surgery, prosthodontics, periodontology and other subjects. But in all these subjects they took it as a very superficial information that keeps repeating itself without organization between the departments. Hence it seems to be necessarily to establish a solid subject of implantology with curriculum that cover all implantology subjects to give the newly graduate dentist all the information they need in their practice life and all the update treatment plans that the world works with and not restrict them with the old fashion dental curriculum and old modalities of treatment plan. This was also highlighted by a study conducted in a neighbor country in which they suggested an urgent requirement to construct a well-structured dental implant curriculum that includes basic science and preclinical and clinical training at the undergraduate curriculum.²⁶

The results of this study show that college does have effect in teaching the dental student, but it did not reach the level that the graduated

dentist must be. As this study conducted in the last month of study so that must of the student (especially fifth and fourth class) have finished most of their clinical requirement to graduate. Also, it reflects a shortage in teaching this new subjects (dental implant) as dental implant subject is taught in just in a couple of lectures in oral surgery and prosthodontics curriculum. Despite some dental school also provide just lectures within the curriculum of another subjects⁸ but escalating demand for dental implants, necessitate the need for general dental practitioner to have sufficient knowledge about biological requirements and clinical surgical and prosthodontics clinical skills to place a successful implant in their clinics.²⁴ Adding to this, supplementary information that associated with implant treatment such as sedation during implant surgery,²⁷ using resonance frequency analyzer for evaluating osseointegration of dental implant²⁸ and even how to deal with a complex cases such as patient with sever bruxism²⁹ should be tough at least in a brief information. As a survey conducted in the nearby country (UAE and Iran) showed that dentist preferred to treat their patients with dental implants regardless of any variations or complex situations.³⁰

Adding to this, some research demonstrates the confident of the new dentist to incorporate implants in their treatment plan and use it in their practice when they had implant courses in their undergraduate teaching program.^{23,25} This clearly highlight the importance of teaching undergraduate student full knowledge starting from basic information of materials, osseointegration healing, biomechanical followed by surgical and prosthetic techniques, to be able to diagnose clinical cases and in advising patients about the appropriateness of each treatment plan.^{12,16,23}

Conclusions

It can be concluded that the teaching dental implant with other curriculum items does have effect in teaching the dental student, but it still much low and beyond the level that the graduated dentist must be. Also, it reflects a shortage in teaching program of this new subjects which necessitate modernization of dental curricula by adding dental implant subject. Simultaneously with creating sufficient and

standardized exposure and involvement of students to clinical work of dental implant subject through including it in the clinical requirement of dental college.

Within the tremendous advancing in technology that represented in dentistry by dental implants, it showed clearly that dental implant subject should have its position between the dental curriculum, by adding it as a separated study course and to start its teaching program from the earlier study year to study all the basics of implant dentistry, to be then followed by clinical teaching involving a prerequisite requirement to ensure that all student to have practise in this subject and to able to practise it in their clinic with confidence similar to other subjects in dentistry. However, further research should be conducted to compare the efficiency of the new dental implant teaching program with other countries dental colleges that had been included dental implant subject in their curriculum for a longer time, and to calibrate student's level.

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Declaration of Interest

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