



Impact of Two Pedagogical Techniques on Knowledge of Dental Implantology among Undergraduate Dental Students

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ABSTRACT

BACKGROUND: The curriculum on dental implants in the syllabus of dental students is not sufficient to increase the level of knowledge regarding dental implants with students seeing it as a deficient area. Hence this study aimed at evaluating the impact of two different pedagogical techniques on the teaching of dental implant among final year dental students at the University of Benin.

METHODS: This was a comparative study involving two consecutive classes of final year dental students of the University of Benin. The whole population of the two classes were taught dental implantology. The first class received only theory lectures while in addition to the theory lectures the second class received lecture supported videos. Data was collected by means of a questionnaire. The collected data were entered into a computer and analysed using IBM Statistical Package of Social Science (SPSS) version 21.0. Univariate and bivariate analyses were done. Independent sample t-test was used to test differences in mean between the classes and

paired sample t-test was used to test differences in mean within the group. Statistical significance was set at 5%.

RESULTS: A total of 48 final year dental students (24 from each class) gave consent to participate in this study. There was no statistically significant difference in the mean knowledge scores between both classes prior to commencement of the study. However, there was statistically significant difference in the mean knowledge scores after the pedagogical intervention between both classes. There was statistically significant difference in the mean knowledge scores pre and post pedagogical intervention within the two classes.

CONCLUSION: Both didactic theory lectures alone and a combination of didactic theory lectures with supporting videos are good pedagogical techniques in the teaching of dental implantology. However, didactic theory lectures with supporting videos is a more effective pedagogical technique.

Key words: Pedagogical, techniques, implantology.

INTRODUCTION

Dental implants have been established as a form of treatment for partially dentate and edentulous adults hence making it a contemporary integral and important

component of the practice of dentistry.¹ It is recklessly becoming a branch of learning² and research,³⁻⁵ in the field of dentistry with an increased advocacy for its implementation as part of the undergraduate dental





curriculum.^{1,6} Due to the complex and evolving nature of dental implantology, there is often times little opportunity for dentists to train in implantology during the undergraduate education.⁷

Pedagogy is the discipline that deals with the theory and practice of teaching and how these influence students learning.⁸ The commonly used pedagogy techniques are problem-based learning, lecture tutorials, peer review and video-based learning.⁹ The needs of most dental students would be satisfied through preclinical laboratory simulation or clinical instruction, case studies, listening to lectures, and exploring material through discussions and verbal explanations.¹⁰

Learning in any subject has been observed to be influenced by the interaction between the learner and the learning resources.^{11,12} Efficient transfer of information from the teacher to the student can be complicated by mismatches between teaching strategy and students' learning styles.¹⁰ With recent advances in technology and access to electronic material, educational methods must evolve to meet the demands of students and society.¹³

Dental implant teaching at the undergraduate level in Nigeria is still predominantly theoretical. Theoretical knowledge is the foundation to the teaching of implant dentistry at the undergraduate level.⁶ Students need a solid basic knowledge about the biological pre-requisites and clinical procedures leading to successful implant treatment as well as an understanding of the importance of including implants into the overall treatment

model.⁶

In order to meet dental schools' obligations to their students and the profession, there must be an attempt to integrate teaching, learning, and technology.¹⁴ One of the most serious challenges that dental educators face today is improving the learning environment and increasing the level of students' satisfaction with the curriculum.¹⁵ It is important that dental educators understand how students learn and use the appropriate teaching methods in order to improve the quality of learning experience.¹⁰ There has been emphasis on the need for pedagogical techniques in delivering a student-centred experience to ensure a detailed understanding of modern dental technologies.¹⁶ It is on this premise that this study was designed to determine the impact of 2 different pedagogical techniques on knowledge of dental implantology among undergraduate dental students

METHODS

This was a comparative study involving two classes of final year dental students of two consecutive academic sessions (2014-2015 - class I and 2015-2016 - class II) attending the University of Benin, Edo State, Nigeria. Written informed consent was sought from the study participants before the commencement of the study. In order to ensure confidentiality of respondents, no identifiers were used.

Giving the few students (25) admitted into the dental school of the University of Benin, all the final year students enrolled for the various academic sessions were recruited for this study. However, only those who gave their consent participated in the study



though the entire class who received the lecture modules, with a response rate of 96%. The two classes were taught dental implantology by the same faculty member this was without prejudice to the students' previous exposure to dental implants prior to offering a course that focus solely on implant dentistry. The first class received only theory lectures on the basic knowledge about the biological pre-requisites and clinical procedures leading to successful implant treatment and the importance of embedding implants into the overall treatment concept. In addition to the theory lectures the second class received lecture supported videos of Adin implant placement flap method obtained from www.onlinedentallearning.com and explicit dental implant placement with immediate temporary crown obtained from drscottmacleam.com

Prior to exposure to the different pedagogical techniques the students who gave consent to participate in the study were given individual codes as their form of identification. A self-administered questionnaire was used to collect data for the study. The questionnaire was a modification of the questionnaire used in a study by Aljohani and Alghamdi.¹⁷ The questionnaire was pre-tested on 10 fresh graduates from the dental school to determine the appropriateness of the questionnaire as a tool for collecting the required information. The fresh graduates were used as they had a fair understanding of dental implantology. The students were administered the questionnaire before and after the series of lectures. The students' code was the only identifier. This was necessary to enable the researcher identify the pre and post questionnaire for every

participant.

The questionnaire consisted of three (3) sections. The first section elicited information on gender, history of previous exposure to dental implant and dental specialties where such exposure was obtained. The second section assessed participants' perception of the adequacy of their training thus far on dental implants while the third section assessed the participants' knowledge and awareness of dental implants, covering relationship between implants and tooth, familiarity with different implant systems, designs and sizes as well as effect of smoking, diabetes, periodontal disease, advanced carious lesion and osteoporosis on implant placement. Knowledge of immediate implant was also assessed.

Section three had a total of 19 questions with 12 questions assessing knowledge of dental implants. Each correctly answered question was allotted a score of 1 while incorrectly answered questions were allotted a score of zero. The total of all correct answers was taken to be the knowledge score with the highest possible score being 12 and the lowest 0. For the purpose of analysis, the total score was graded as follows: 12-8 good knowledge, 4-7 fair knowledge and 0-3 poor knowledge.

All data collected were entered into a computer and analysed using IBM Statistical Package of Social Science (SPSS) version 21.0. Univariate and bivariate analyses were done. Independent sample t-test was used to test differences in mean between the classes and paired sample t-test was used to test differences in mean within the classes. A

multiple linear regression model was done to explore and identify significant predictors of the knowledge score. Statistical significance was set at 5%. Results were presented as frequencies, percentages, tables and figures.

RESULTS

A total of 48 students (24 from each class) gave consent to participate in this study. There was male preponderance in both classes (Fig 1).

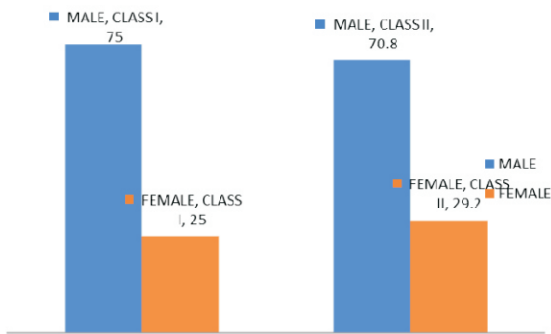


Figure 1: Gender distribution by class of the participants

Both classes had previous exposure to dental implantology before the commencement of this study, with class I reporting 16 (66.7%) and class II 19 (79.2%) with exposure from multiple specialties accounting for only a few participants in both classes (Table 1).

Table 1: Pre-exposure to dental implantology in both classes

Exposure	Class I n (%)	Class II n (%)
Previous exposure	16 (66.7)	19 (79.2)
No previous exposure	8 (33.3)	5 (20.8)
Total	24 (100.0)	24 (100.0)
Exposure from multiple specialties	3 (18.7)	3 (15.8)
Exposure from single specialty	13 (81.3)	16 (84.2)
Total	16 (100.0)	19 (100.0)

Both classes felt they had not had enough exposure and training with regards to dental implantology prior to commencement of this study. Following the pedagogical intervention, only 4 (16.7%) of class I felt they had adequate exposure however, they all still felt their training was inadequate. Whereas among those in class II, 10 (41.7%) felt they had adequate exposure following the pedagogical intervention and 2 (8.3%) felt their training was adequate.

There was greater awareness in both classes following the various pedagogical interventions as depicted in table 2.

Table 2: Awareness of both classes about dental implant systems, designs and sizes before and after the pedagogical techniques

Awareness in the class about different dental implant	Class I				Total n (%)
	Before intervention		Post intervention		
	Yes n (%)	No n (%)	Yes n (%)	No n (%)	
Systems	7 (29.2)	17 (70.8)	18 (79.2)	5 (20.8)	24 (100.0)
Designs	6 (25.0)	18 (75.0)	16 (66.7)	8 (33.3)	24 (100.0)
Sizes	14 (58.3)	10 (41.7)	20 (83.3)	4 (16.7)	24 (100.0)
	Class II				
Systems	17 (70.8)	7 (29.2)	20 (83.3)	4 (16.7)	24 (100.0)
Designs	15 (62.5)	9 (37.5)	19 (79.2)	5 (20.8)	24 (100.0)
Sizes	18 (75.0)	6 (25.0)	17 (70.8)	7 (29.2)	24 (100.0)

Table 3 shows that there was statistically significant difference in the mean knowledge score pre and post pedagogical intervention within class I (p=0.002). There was also statistically significant difference in the mean knowledge scores pre and post pedagogical intervention within class II (p=0.0001).

Table 3: differences in mean within the classes

Classes	Mean at baseline	Mean after intervention	Difference in knowledge score	p-value within the classes
Class I	4.71±2.09	6.67±1.76	1.96±2.80	0.002
Class II	4.75±1.45	7.92±1.86	3.17±1.86	0.0001

Table 4 shows the difference in mean knowledge scores between the classes. There was no statistically significant difference in the mean knowledge scores between the two classes prior to commencement of the pedagogical intervention ($p=0.14$). However, there was statistically significant difference in the mean knowledge scores after the pedagogical intervention between both classes with the class who received both didactic lectures and supporting videos exhibiting better knowledge ($p=0.02$).

Table 4: differences in mean between the classes

Mean	Class I	Class II	p-value
Baseline	4.71±2.09	4.75±1.45	0.14
After intervention	6.67±1.76	7.92±1.86	0.02

Multiple linear regression model showed that there was no significant predictor of the knowledge score (Table 5).

Table 5: multiple linear regression model of determinants

Determinants	B (95%CI)	p-value
Class	-0.41 (-1.87 to 1.05)	0.58
Gender	-1.29 (2.96±0.38)	0.13
Previous exposure to dental implantology	-0.53(-3.08 to 2.03)	0.68
Number of lectures	-0.11 (-1.42 to 1.21)	0.87
Constant	4.79 (-0.82 to 1.21)	0.09

Note: Class I = 1, Class II = 2, Male = 1, Female = 2, previous exposure yes = 1 no = 2 $R^2 = 0.071$

DISCUSSION

Student learning experiences through a well-organized curriculum will directly affect clinical decision making.¹⁸ The method and medium of instruction if properly implemented is believed to greatly influence the quality of learning by students.¹⁹⁻²² The comparison of knowledge acquisition is believed to provide insight into the effect of different pedagogical techniques.²³

Although, both classes had previous exposure to dental implantology before the commencement of the study, the participants felt they had not had enough exposure and training with regards to dental implantology. This may be because this previous exposure may have been informal. Reports have shown that both formal and informal learning can be considered as beneficial in improving knowledge in a variety of health care fields.²⁴⁻²⁶ However, formal learning tends to have greater effect on improvement of knowledge, clinical skills and abilities.²⁷ This is further buttressed by the findings of this study in which following the pedagogical intervention there was improved perception of the subject matter.

The class who received multimodal learning style felt they had adequate exposure following the pedagogical intervention compared to the class who received a single learning style. This supports reports that multimodal learning styles are the preferred learning style among dental students.^{10,28-30}

The greater awareness observed in both classes following the various pedagogical interventions as well as the statistically significant difference in the mean knowledge score pre and post pedagogical intervention within both classes showed that both pedagogical techniques were effective. Didactic lectures are the most widely used pedagogical technique at all levels of education though effective but not more effective than other pedagogical techniques.³¹ This was affirmed by the findings of this study as didactic lectures alone were an effective technique but not more effective than a combination of didactic lectures and video aided lecturing. This study



lends credence to the observation that blended learning styles which combine e-learning with traditional face-to-face teaching improve learning outcomes in such areas as cephalometry,¹³ prosthetic dentistry,³² radiology³³ and pathology³⁴ among dental students.

A comparison of the mean knowledge score revealed a statistically significant difference in the mean knowledge scores after the pedagogical intervention between both classes. This finding demonstrates that a combination of didactic lectures and video-based learning was more effective than didactic lectures alone. This supports previous reports that video demonstration enhances the learning from a lecture with increased students' performance and is considered to be one of the most standardised modes of instruction.¹⁹ Furthermore, contemporary computer assisted learning programs used in medical education simulate patient scenarios either with text or by creating a virtual patient, using live video streaming and provide opportunities for patient assessment.^{35,36} Thus, it fosters the development of self-directed learning skills and also promotes the structuring of new, accessible knowledge in clinical context and the development of effective clinical reasoning skills.³⁵⁻³⁷

In a study by Deshpande et al.,³⁷ in which blended learning module for improving clinical decision-making skills of dental graduates was evaluated. It was demonstrated that the test scores improved significantly probably due to the fact that theoretical concepts regarding clinical decision-making taught in the learning module were reinforced after using

computer assisted learning software and observing and planning treatment for actual cases bringing clarity in thought process and promotion of the reasoning skills of the students.

CONCLUSION

Both didactic theory lectures alone and a combination of didactic theory lectures with supporting videos are good pedagogical techniques in the teaching of dental implantology. However, didactic theory lectures with supporting videos are a more effective pedagogical technique in the teaching of dental implantology.

RECOMMENDATION

It is recommended therefore, where hands on implant training and student competence in surgical placement of implants is not possible didactic theory lectures with supporting videos should be utilised in the undergraduate implant training for more effective results.

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