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Effectiveness of a program on evidence-based dentistry in dental students

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Abstract:

INTRODUCTION: Evidence-based dentistry (EBD) is an approach to oral healthcare by combining the best scientific evidence and clinical diagnostics, clinical expertise of the dentist, and the patient's treatment needs and preferences. The aim of the present study is to evaluate the effectiveness of an education program on EBD offered in a community-dentistry course in improving knowledge and attitudes of students in this regard.

STUDY METHODS: By a quasi-experimental study design, 64 senior dental students of Islamic Azad University of Khorasgan recruited in a controlled trial. All of the students were randomized as intervention (32) and control (32) groups. A course-based educational program on EBD was randomly assigned to one group. Actual knowledge, self-assessed knowledge, and attitudes, before and after education, were measured in both groups. A questionnaire consisted of 40 items developed by the researcher was used after confirming its validity and reliability. The difference between mean scores at two timelines were measured and compared in three fields by paired *t*-test and independent *t*-test analysis via SPSS version 20 software.

RESULTS: While the mean scores of actual and self-assessed knowledge and attitude were not significantly different between two groups at the beginning of the program ($P > 0.05$), the mean scores of all fields in the intervention group were significantly more than those of the control group after education ($P < 0.001$). The effect size of intervention was 86%, 62%, and 57% in three fields, respectively. There was not a significant difference between mean scores of three fields in the control group, after the intervention.

CONCLUSION: Due to the poor knowledge and attitudes of students and improved knowledge and attitudes of the intervention group after education, the education program seems to be effective. Durability of educational impact and evaluating evidence-based performance can be studied in the future.

Keywords:

Attitude, dental student, evidence-based dentistry, knowledge

Introduction

Evidence-based dentistry (EBD) is attitude to oral health care with judicious combination of systematic assessments of documented scientific evidence, clinical experience of dentist regarding the patient's general and oral status, as well as preference and desires of the patient.[1] Applying the evidence-based practice (EBP) in dentistry seems poor. Not only clinicians have not changed their customs in clinical practices, but also dental schools follow the same traditional methods in teaching their students.[2] In a study conducted by Madhavji *et al*., the knowledge, attitudes, and barriers to EBD on more than a thousand of American orthodontists were examined. Most respondents expressed a low level of knowledge with positive attitudes.[3] The study of Khami *et al*. in 2012 in Iran showed that 80% of dental students reported low knowledge on EBD, and more than 85% of them knew a little about databases used in EBD.[4] On the other hand, some studies support the idea that the attitudes of medical students during their education can be changed by their teachers.[2] This subject was studied in a research aimed at assessing

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the impact of evidence-based medical curriculum on knowledge, attitude, behavior, and self-assessment skill of university students in Poland in 2012. In this cohort study, the success of the new modified curriculum was shown.[5] Like the other disciplines in medicine, EBP in dentistry has come into focus in many modern dental schools. According to the study by Sabounchi *et al*. in 2013, though the knowledge of the faculty members regarding the principles and practice of EBD is moderate in Iran, they have positive attitude and willingness to improve it.[2]

In recent years, modifications have been occurred in dental education with aims of educating dentists based on the needs of society, skills of critical thinking, and foundation of relating research projects. The benefits of these changes are to provide them with a deeper statement of the relationship between medical and dental sciences, the ability of planning and providing comprehensive oral health care and finally evidence-based clinical practices.[6] At present, many dental schools in the world seek to give students the opportunity for acquiring the skills necessary for EBD, by providing specific education programs.[7] Such skill expected from the students includes a five-step process including formulating a well-built clinical question, searching for the evidence, critically appraising the evidence, applying the result, and evaluating clinical practice according it.[8,9]

Based on this mission, in the new dental curriculum offered by the Ministry of Health and Medical Education of Iran, the content of EBD should be trained in the course of oral public health. This topic has been carried out for 2 years in Dental School of Khorasgan Azad University, and according to the academic principles, it needs to be evaluated. This study has been developed to assess the effectiveness of the EBD program educated in oral, public health course, in improving knowledge and attitudes of dental students.

Study Methods

This quasi-experimental study conducted in the study population consisted of senior dental students in the first semester of 2014, of Khorasgan Islamic Azad University. A group of 32 students randomly received EBD education in a community-dentistry course in the semester and were considered as the intervention group. Another group of students with the same size that did not receive EBD was the control group. Before beginning the study, a questionnaire consisting of 40 questions in three study fields developed and validated by researchers. The questionnaire consisted of three distinct parts of true knowledge containing 20 questions, self-assessment knowledge containing 10 questions, and attitude containing 10 questions. For this purpose, the items related to three fields were extracted from literature and based on the teaching content and the topics proposed by the department. They were on the topics of EBD definition and process, data banks, hierarchy of evidence, systematic review, bias, and validity. Then, the validity of the questionnaire was evaluated by five experts in the field of community, and based on the consensus of experts, a number of options were selected. The internal consistency of the questionnaire, according to Cronbach's alpha of true knowledge, attitude, and self-assessment knowledge questionnaires, was 0.72, 0.78, and 0.87, respectively. The reliability of questionnaires was investigated by test-re-test method. That, the questionnaires were filled out twice at an interval of 1 week by ten students of the target group and the correlation coefficients for the questionnaires of true knowledge, attitude, and self-assessment knowledge were 0.98, 0.99 and 0.98 respectively. At the beginning of September 2013, the pretest was conducted in both intervention and control groups. Therefore, the students were asked to fill out the questionnaire regarding self-assessment of the knowledge, true knowledge, and attitude toward EBD. To collect posttest data, followed by the community education course, the questionnaires were filled out again by the intervention group that had the evidence-based dental education and the control group that did not have the education. The educational interventions include theoretical and practical education in the form of teamwork in small groups and include the following: (1) An introduction to the history, importance, principles, and processes of EBD as lecture and slide show, (2) formulating questions and writing PICO in the form of theoretical education and practice in small groups, (3) team working on study designs and article's types including systematic review and their components and, (4) an introduction to online resources and search engines and practicing on accessible databases, (5) an introduction to critical appraisal methods based on checklists, (6) an introductory to hierarchy of evidence and finally summing up the results to reach the solution. Participants were not obliged required to mention their name and personal information and only if agreed to participate in the study, used their student code for follow-up. In the field of actual knowledge, the answers were scored as 1 or true and 0 or false. Self-assessed knowledge questionnaire was scored as, I do not know to I know completely (0–3). The attitude questionnaire was scored as completely disagree to strongly agree (0–4), and the willingness to use EBP was scored as an item of not using (0) to use consistently (10). Thus, the scores of actual knowledge, self-assessed knowledge, and attitude ranged from 0 to 20, 0 to 30, and 0 to 36 which were entered based on the score out of 100. SPSS 20 software (Armonk, NY: IBM Corp) was used for statistical analysis. The differences between mean scores

were compared before and after the intervention for each group in different fields. Paired *t*-test was used for comparison within groups, and independent *t*-test was used for comparison between the two groups, before and after the intervention. The size of effect was calculated by Cohen's d which is defined as the difference between two means divided by a pooled standard deviation for the data.[10] Generally, categorization of small (0.2), medium (0.5), and large (0.8) effect of an intervention is considered in interpreting the Cohen parameter.

Results

Regarding the response rate as 100%, before education in both intervention and control groups, 56 students (87%) did not know or know a little about the terminology of EBD. Furthermore, 46.9% (15 students) of the intervention group and 65.6% (32 students) of the control group did not know the databases used in EBD. Twenty-one persons in each group (65% of all) of the students were not informed about the Cochrane collaboration. After education, all the participants in the intervention group (32 persons, 100%) became familiar with EBD and using databases. Unawareness with the Cochrane collaboration dropped down to 9.4% (3 students) in the intervention group.

The students' improvement in aspects of knowledge and attitude is demonstrated at Figure 1.

The comparison of the student's scores in each field before and after education was performed by paired *t*-test within two groups, and the results are detailed in Table 1. As it can be obtained from this table, the mean difference of the score of actual knowledge in the intervention group before and after education was 38 while it was 30.4 regarding the self-assessed knowledge. The least increase was observed in the field of attitude with 8.9 of score difference out of 100.

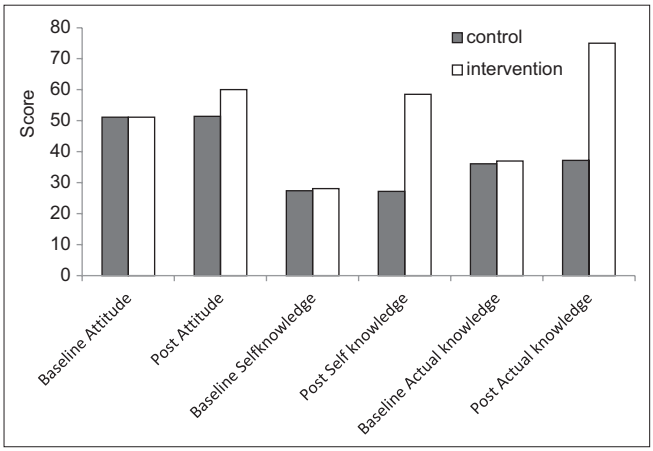

Figure 1: Illustration of increased competencies after the educational intervention about evidence-based dentistry

Table 2 demonstrated the magnitude of the change in both fields of knowledge and attitude by the educational intervention. Regarding the Cohen's thresholds, the size of effect was large (more than 0.8) at the field of actual knowledge, but there was a medium effect (more than 0.5) at self-assessed knowledge and attitude.

Discussion

With regard to social changes, informed patient, rapidly advanced techniques and the explosion of information, decision-making has become more complicated for clinicians. Meanwhile, EBP in dentistry has the advantages of effective and more affordable planning for either providers or policy-makers. Students of general dentistry are the most appropriate group to fulfill the skills required for EBP by passing EBD courses.[3,11] Based on the present study, with the improved scores in the fields of knowledge and attitude in the intervention group, evidence-based dental education program offered in the community-dentistry course of Islamic Azad University was successful and effective.

Poor knowledge at baseline assessment in both groups of senior students was also found in the studies conducted by Sabounchi *et al*.,[2] Khami *et al*. at in students of Tehran University,[4] Taghavi *et al*. in Residents of Mashhad University,[12] Iqbal and Glenny in dentists,[13] Joseph *et al*. in dentists of Malaysia,[14] and Madhavji *et al*.[3] In these studies, the importance of evidence-based dental education in general education course has been emphasized.

Since, there was no significant difference between mean scores of all fields in the control group before and after education, the impact of other potential factors such as educational interventions of other departments or the students' self-studies has been denied.

Appropriate randomization was confirmed by absence of significant difference between mean scores of four fields at baseline between two groups.

The present educational intervention showed a relatively large effect on the aspect of knowledge while the self-assessed knowledge and attitude increased mildly this is in consistent with Coomarasamy's finding. In a systematic study, he stated that one-step educational programs can be effective in improving knowledge of EBP, but not in improving the attitude and behavior.[15] Accordingly, it is recommended that educational programs on EBD should begin in earlier semesters and students practice it in other department as clinically integrated programs to increase and institutionalize their skills.[16]

Table 1: Comparison between mean scores of actual knowledge, self-assessed knowledge, and attitude toward EBD before and after education in the intervention (*n*=32) and control (*n*=32) groups

Field (range)	Time	Mean±SD		*t* (independent)	*P* value between groups
		Intervention group	Control group		
Actual knowledge	Before education	37.03±14.4	36.1±11	0.086	0.77
	After education	75±6.5	37.2±10.6	295.7	0.0001
t (paired)		−14.3	−1.5		
P value within groups		<0.001	0.2		
Self-assessed knowledge	Before education	28.1±17.4	27.4±14.5	0.033	0.86
	After education	58.5±21.1	27.2±18	40.7	0.0001
t (paired)		−8.2	0.23		
P value within groups		<0.001	0.8		
Attitude	Before education	51.1±7.75	50.7±5.7	0.034	0.85
	After education	60±9.8	51.4±9.3	12.67	0.001
t (paired)		−4.4	−0.5		
P value within groups		<0.001	0.61		
Willingness to use EBD	Before education	3.7±2.4	3.6±1.8	0.087	0.77
	After education	7±1.7	3.9±1.6	53.9	0.0001
t (paired)		−8	−3		
P value within groups		<0.001	0.16		

EBD=Evidence-based dentistry, SD=Standard deviation

Table 2: Effect size of the educational intervention regarding three fields of actual knowledge, self-assessed knowledge, and attitude toward EBD

Field	Parameter	Intervention group	Control group
Actual knowledge	Effect size	0.86	0.05
	Cohen d	3.4	0.09
Self-assessed knowledge	Effect size	0.62	0
	Cohen d	1.6	0
Attitude	Effect size	0.57	0.02
	Cohen d	1.4	0.04
Willingness to use EBD	Effect size	0.62	0.09
	Cohen d	1.6	0.18

EBD=Evidence-based dentistry

This evaluation project has several strengths including a high responding rate and no loss to follow-up and also the knowledge assessment by two perspectives. Since, the measurement of actual knowledge can be varied based on different questionnaire developers as well as learning content, somehow comparing the results with other interventions is limited. In the end, it is recommended that the other dimensions of educational intervention process such as education program quality, hardware and software of the program, and the viewpoints of the learners will be evaluated. The assessment of sustainability and performance of the program after graduation also can improve the quality of education and its content more effectively.

Conclusion

This study showed the effectiveness of a theoretical and interactive educational program on the EBD, which is presented at the Azad University of Khorasgan, Dental School. This intervention showed large effect at the field of actual knowledge and a medium effect at self-assessed knowledge and attitude among the dental students. Due to the poor baseline knowledge and attitude among senior dental students and its improvement after the educational intervention, the study indicated that EBD education has been effective in community course. Clinically integrated educational program initiated earlier proposed.

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Conflicts of interest

There are no conflicts of interest.

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