Knowledge, Attitude and Self-Reported Practice of Senior Dental Students in Relation to Caries Risk Assessment

Pakdaman Afsaneh[1], Seyedjavadi Seyed Fatemeh[2], Kharrazifard Mohammad Javad[3]

[1]Assistant Professor, Department of Community Oral Health, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran. [2]Dentist, Department of Community Oral Health, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran. [3]Post-graduate student of Epidemiology, Dental Research Center, Tehran University of Medical Sciences, Tehran, Iran.

Abstract

Aim: To investigate knowledge, attitude and self-reported practice of senior dental students regarding caries risk assessment.

Methods: A cross-sectional survey was conducted in the capital city of Tehran in 2012 on senior dental students using a self-administered questionnaire (CVI=0.89). Knowledge of the preferred time interval and caries risk factors, attitude towards Caries Risk Assessment (CRA) and management of carious lesions in low- and high-risk scenarios were assessed. The linear regression model was used in order to adjust the effect of background variables.

Results: 179 students in 4 universities (response rate = 91.3%), 65.5% female with the mean age of 23.9 ± 1.3 responded. In the knowledge section, 70% reported that caries history in the previous 9-12 months should be considered for CRA;96% correctly chose tooth morphology and only 61% chose white spot lesion for assessing caries risk. More than 90% of students had a positive attitude towards CRA in children; however, there was a lack of confidence in performing CRA in nearly 40%. In low-risk scenario, for lesions penetrated just into DEJ in proximal and occlusal surfaces, 62% and 29% decided to restore, respectively. In high-risk scenario for enamel lesions in proximal and occlusal surfaces, 38% and 20%, respectively decided to place restorations. Linear regression model showed that older students (p=0.02) and those without previous degree (p=0.03) were more likely to utilize CRA. Those with higher level of knowledge had better attitude towards CRA (r=0.2, p=0.001) and better management (r=0.15, p=0.04).

Conclusion: It is concluded that senior dental students despite general knowledge and positive attitudes towards caries risk assessment, tend to invasively manage non-cavitated lesions in enamel and DEJ.

Key Words: Dental caries, Risk assessment, Non-invasive management, Dental students

Introduction

By definition, caries risk is the probability of developing new caries or progression of existing lesions. Assessing risk is recommended when some individuals are highly susceptible to caries despite a number of caries free subjects [1]. It is also recommended to use principles of Caries Risk Assessment (CRA) where resources can be directed to high-risk groups [2].

Many studies have been carried out to detect risk indicators of dental caries to determine high-risk individuals. Caries history in addition to high titers of cariogenic bacteria, poor oral hygiene, unusual tooth morphology, many multi-surface restorations, chemotherapy or radiation therapy, irregular dental care, cariogenic diet, active orthodontic treatment, and presence of exposed root surface are recommended to be considered in assessing caries risk [3]. It is also recommended that the quantity and quality of saliva including flow rate and buffer capacity, in addition to socioeconomic status, be assessed in order to define caries risk [4,5]. Still, past caries history is the best predictor of future caries development [5].

Integrating the principles of risk-based management of caries in clinical education has been recommended and is part of the undergraduate curriculum in recent years [6]. According to the survey on dental schools, thirty-four out of forty-two responding US dental schools have had a formal caries risk education program for undergraduate students [7]. According to Caries Management by Risk Assessment (CAMBRA) protocol, risk-based management of dental caries is now recommended in order to ensure delivering prevention and enhancing remineralization of non-cavitated lesions and delaying unnecessary restoration. In addition, non-surgical management of enamel lesions especially in low-risk subjects is recommended [8,9].

In a previous study by Calderon et al. assessing students' understanding of CRA it was shown that senior dental students correctly answered 70% of the knowledge-based questions on CRA; this figure was 50% among first year dental students and 95% of the fourth-year students evaluated themselves as confident to assess adult patients' caries risk only 68% in assessing child caries risk [10]. The study of Pakdaman et al. on risk-based management of caries following implementation of an evidence-based protocol on risk-based management (Caries Management System) showed that senior dental students have a tendency towards restoring radiolucency extending just beyond the DEJ (62%) for high-risk patients [11]. The local study of Ghasemi et al. reported that there was a strong tendency among Iranian dentists to restore enamel lesions in proximal surfaces [12].

Given the importance of prevention and risk-based management of dental caries and scarce information on the performance of senior dental students on caries risk assessment of patients in order to deliver prevention and non-invasive management of non-cavitated lesions, this study has been conducted. The purpose of the present study was to evaluate the knowledge, attitude, and intended practice of dental students regarding caries risk assessment.

Corresponding author: Afsaneh Pakdaman, DDS, MPH, PhD, Community Oral Health Department, School of Dentistry, Tehran University of Medical Sciences, P.O. Box 1439955991, Tehran, Iran; Tel. +98-21-8801 5960; Fax: +98-21-8801 5961; e-mail: pakdaman@sina.tums.ac.ir

Materials and Methods

Design and data collection

A cross-sectional survey was conducted in 2012 on senior dental students. Total sampling method was used and all dental schools in the capital city of Tehran were listed. Data was collected using a self-administered validated questionnaire. Final-year dental students were approached in the class by the principle researcher and the aim of the survey was explained. Data was collected anonymously after obtaining proper research and ethical protocols from the Tehran University of Medical Sciences Ethics Committee.

Questionnaire

The questionnaire in Farsi language was used for collecting data. The questionnaire comprises three sections:

1) Knowledge regarding the preferred interval for past dental caries or recurrent caries and risk factors [3,5,9,13,14] in True/False format. In order to avoid guessing "I do not know" item was included

2) Attitudes towards CRA consisting of 6-items in 5-point Lickert scale from "strongly agree" to "strongly disagree"

3) Two patient scenarios (low- and high-risk adult) in which students were asked to choose the preferred restorative treatment [15,16].

Content and face validity of the questionnaire was evaluated by 5 experts; 2 specialists (PhD) in community oral health, 2 specialists in restorative dentistry (MDSc), and one statistic advisor. The questionnaire items were edited according to expert panel comment. The mean value for the content validity Index (CVI) for questions' relevance and clarity was 0.89 which was in the acceptable range [17]. For the purpose of assessing reliability of the questionnaire test re-test was carried out on 10 senior dental students within a week and minimum agreement was 0.7 received for all questions.

Statistical analysis

Descriptive statistics including percentage and the mean score was reported. For the knowledge section the correct answer was scored "1" vs. "0"; and in the attitude section the answers were scored from completely disagree as "1" to completely agree as "5". In the third part self-reported practice was assessed using a weighted score; diagnosis of caries risk (10 point), risk-based management of proximal and occlusal lesions (correct vs. incorrect answers scored 1 vs. 0) in high- and low-risk scenario. For high-risk diagnosed patient restoring proximal and occlusal lesions in the outer third of dentine and over; stage C (DEJ), stage D (outer half of dentine), stage E (inner half of dentine) and for low-risk diagnosed patient restoring lesions in the inner third of dentine and over; stage D (outer half of dentine), stage E (inner half of dentine) considered proper management [13]. The sum score of each domain as knowledge, attitude as well as proper management of proximal and occlusal surfaces (40 point) was calculated and entered in the linear regression model to control the effect of demographic variables.

Results

The study population comprised of 179 respondents (response rate = 91.33%). Of all 110 subjects (65.5%) were female and the rest were male (34.5%). Demographic characteristics of the study subjects were presented in *(Table 1)*. In the knowledge section, 69% and 72% of the students respectively believed that having a new caries lesion or recurrent caries in the previous 9-12 months should be considered for assessing caries risk. More than 90% of the students considered xerostomia, tooth morphology, and consumption of fermentable carbohydrates as the main risk factors that should be assessed for caries risk assessment of adult subjects in addition to caries history *(Table 2)*. On the other hand only 61.2% responded that white spot lesion should be considered for CRA. In the attitude section 96.1% believed that for children under 12 years-old CRA is important and 64.2% believed they have the ability to perform CRA according to their university training *(Figure 1)*.

For low-risk scenario, 62% offered restorative treatment for proximal lesions penetrated just into DEJ and 29% for occlusal lesions with the same depth *(Figure 2)*. For high-risk patient, 38% and 20.1% of the students decided to restore inner enamel lesions for proximal and occlusal lesions, respectively *(Figure 3)*. Linear regression model used to adjust the effect of socio-economic and background variables (age, gender, university, previous university degree, previous workshop on CRA) on the level of knowledge, attitude and self-reported management. The analysis showed that older students and those without previous degree had better attitude towards caries risk assessment *(Table 3)*. No significant association was found between knowledge also self-reported management and the background variables.

The level of knowledge was significantly associated with attitude (Pearson r=0.2, p=0.001) and also correct management (r=0.15, p=0.04).

Discussion

Our study showed that senior dental students had an acceptable level of knowledge and positive attitude towards caries risk assessment but there was a tendency towards restoring enamel lesions especially in the high-risk patient scenario. The preferred interval for assessing caries risk status was having new or recurrent caries lesion in the last 9 to 12 months. In general older students and those without a previous degree had positive attitudes towards CRA.

Students' knowledge regarding caries risk factors was somehow ambiguous. Despite many studies suggesting that history of previous caries experience is a strong predictor of future caries [5,13,18,19]; only two-thirds of the students correctly chose untreated caries to be considered in assessing risk of adult patient. The majority considered xerostomia, tooth

Table 1. *Demographic characteristics of study objects.*

		Frequency	Percentage
Gender	Male	110	65.5
	Female	58	34.5
	Total	168	100
Previous degree	Yes	14	8.8
	no	146	91.3
	Total	160	100
History of attending CRA workshop	Yes	16	10.1
	no	143	89.9
	Total	159	100
Age (Years)	Mean 23.9 ± 1.3		
	Range: 23-30 years		

Table 2. *Frequency distribution of responses regarding risk factors in adult caries risk assessment.*

	Correct		Do not know		Total	
	N	%	n	%	n	%
A: History of new caries						
1) In the last 9-12 months	112	69.1	24	14.8	162	100
2) In the last 12-24 months	60	44.1	39	28.7	136	100
3) In the last 36 months & over	30	23.6	37	29.1	127	100
B: Recurrent caries						
1) In the last 9-12 months	117	72.2	23	14.2	162	100
2) In the last 12-24 months	66	49.3	40	29.9	134	100
3) In the last 36 months & over	29	22.5	43	33.3	129	100
Oral Health status						
Tooth morphology (deep fissure)	165	95.5	1	0.6	172	100
Xerostomia	169	95.5	3	1.7	177	100
Fermentable carbohydrates consumption	161	92.5	4	2.3	174	100
Using orthodontic appliances (fixed)	150	85.7	10	5.7	175	100
Low socioeconomic status	162	81.6	13	7.5	174	100
Use of acidic drinks*	94	78.3	10	8.3	120	100
Exposure to inadequate fluoride	116	72.5	9	5.6	160	100
Dentine radiolucency	120	69	17	9.8	174	100
Count of cariogenic bacteria	117	68.8	18	10.6	170	100
Visible dental plaque	112	66.7	12	7.1	168	100
Having Gastrointestinal disease*	105	64.4	26	16	163	100
Untreated caries (at least one tooth)	106	62.4	21	12.4	170	100
Presence of white spot lesion	101	61.2	16	9.7	165	100
Discoloured front teeth*	51	30.7	22	13.3	166	100

* negative answer was considered as correct

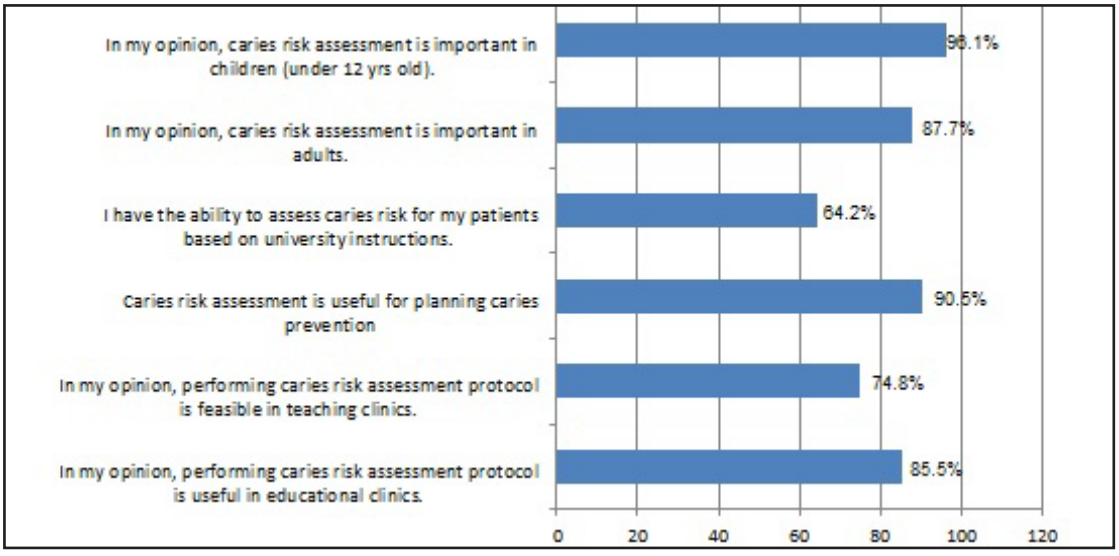

Figure 1. *Frequency distribution of responses on the attitude towards performing caries risk assessment (agree/strongly agree).*

morphology, and consumption of fermentable carbohydrates as factors that should be considered in caries risk assessment but only approximately half considered white spot lesions. This is similar to the finding of Fancisco et al. reporting on the level of knowledge of hygienists regarding CRA [20].

In our study, students mostly chose 9 to12 months as the preferred interval for assessing caries history in adult subject. However, in the ADA Council on Scientific Affairs guidelines the history of caries in the last three years was recommended to be considered [3]. In fact students in teaching clinics are confronted with patients with high level of caries and therefore are reluctant to consider intervals longer than a year for caries risk assessment.

In our study the majority of the respondents believed that performing caries risk assessment protocol is useful in educational clinics yet only half of the respondents' declared that their ability is enough to perform CRA. This is due to the fact that in our undergraduate curriculum there is no specific topic related to CRA especially for adult subjects.

Our study shows that about one-third of students decided to restore enamel lesions in high-risk subjects. This is in contrast with general recommendations regarding remineralization of

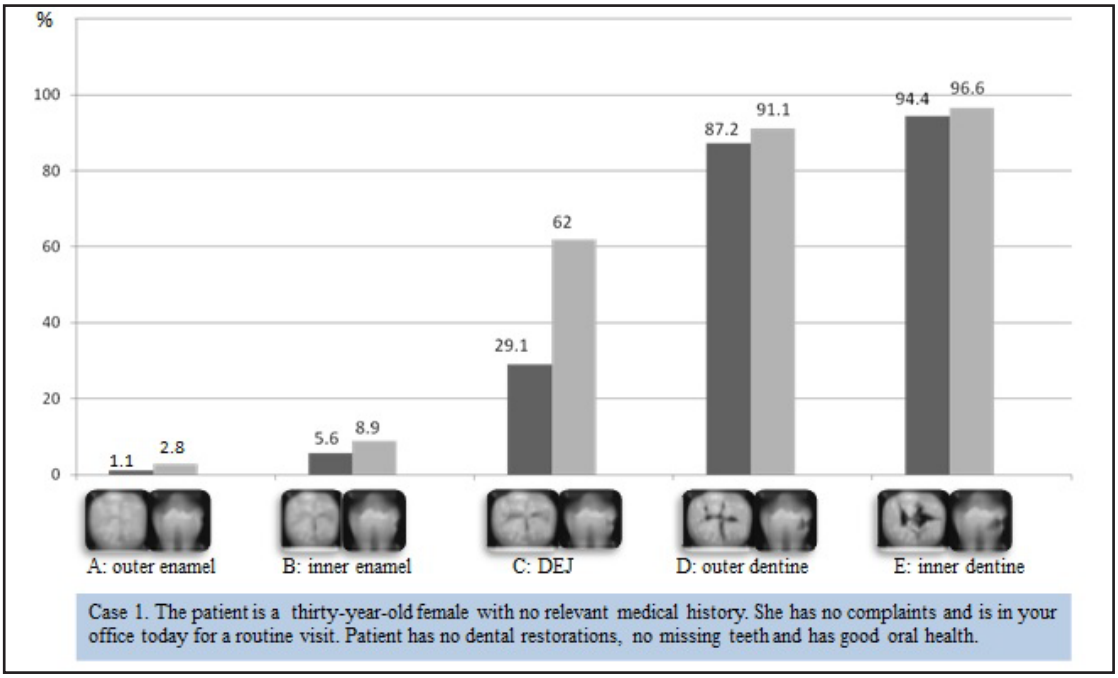

Figure 2. *Frequency distribution of responses to restorative treatment decision of proximal and occlusal lesions in low–risk patient scenario (%).*

Table 3*. Linear regression analysis of the effect of background variables on attitude towards CRA.*

	Unstandardized Coefficients		Standardized Coefficients		
	B	Standard Error	Beta	T	Sig.
(Constant)	8.362	4.253		1.966	0.051
Age	0.41	0.178	0.267	2.3	0.023
Gender	-0.177	0.38	-0.041	-0.466	0.642
Previous university degree	-1.834	0.867	-0.236	-2.114	0.036
Previous workshop on CRA	1.154	0.677	0.155	1.704	0.091
University	0.261	0.15	0.166	1.732	0.086

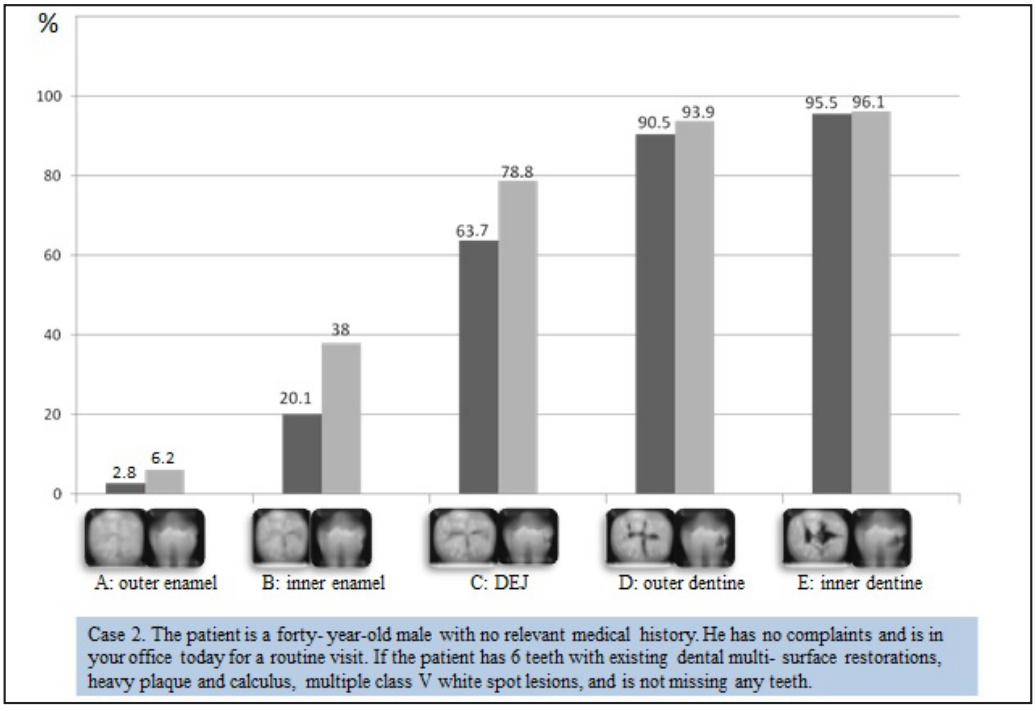

Figure 3*. Frequency distribution of responses to restorative treatment decision of proximal and occlusal lesions in high–risk patient scenario (%).*

non-cavitated lesions for smooth surfaces [8]. According to recent guidelines, non-invasive management of enamel lesions is recommended as these lesions are unlikely to be cavitated [8,13]. A local study also showed that general dentists prefer to restore enamel lesions [12]. The finding of the present study shows that for low-risk patient scenarios more than half of the students decide to restore proximal lesions just into DEJ. This is in contrast with the Australian study where the principal of

non-invasive management of caries has been taught [11]. It is recommended by Evans et al. that restoring proximal lesions in low-risk subjects can be postponed until it is fully in the outer third of dentine as it is more likely that the lesion is not cavitated [13]. For occlusal lesions there was less tendency towards restoring enamel lesions. It is also reported by the previous study [16] that only 20% of dentists prefer to restore enamel lesions in the occlusal surface.

In our study older students and those without previous degree had better attitude towards CRA. Although the age range of students were between 23 to 30 years, older students may have some background experiences with issues like recurrent caries and hence have positive attitudes towards assessing risk. There was no significant association between correct management of both cases and demographic factors like age and gender similar to the study of Tubert-Jeannin et al. [16] however, in the study of Gordan et al. [15] male dentists were more likely to restore enamel lesions.

In our study those with better knowledge had positive attitudes and better management. This highlights the fact that there is need to address caries risk assessment in the educational environment through workshops and practical sessions. At the time of survey there was no formal teaching of this topic in the undergraduate dental curriculum and hence this topic needs to be addressed.

The current study is a multi- center cross-sectional study in the capital city of Tehran where there are four main dental schools. Comparison between schools regarding restorative treatment threshold and knowledge of CRA was not possible. The response rate was high reflecting student cooperation. In general senior dental students are less responsive due to time constrains and work load. In our study a reliable and valid questionnaire was used in which a patient scenario was used to assess self-reported practice; however, the results related to restorative treatment for occlusal surface should be interpreted with caution as a schematic photograph was used.

Conclusion

Findings of this study indicate that the level of knowledge and attitudes towards caries risk assessment among senior dental students is good. Older Students and those without previous university degree have a better attitude towards CRA. There is a tendency among senior dental students to restore enamel lesions. There is need to enhance evidence-based caries management protocols especially in teaching clinics. It is recommended to conduct similar surveys with supervising faculty members.

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