

# Knowledge, Attitude and Practice Regarding Caries Risk Assessment and Management in General Dentists- A Cross Sectional Survey

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## ABSTRACT

### BACKGROUND

It is widely accepted that caries risk assessment (CRA) is the basis for management of dental caries in patients. The CRA can contribute to identifying people at high dental caries risk. The aim of this study was to assess the knowledge, attitude and practice of general dentists in the city of Kerman about CRA.

### METHODS

The present descriptive cross-sectional study was conducted on 160 general dentists in the city of Kerman, Iran. Data collection tools consisted of demographic data and 10 questions of knowledge, 10 questions of practice, and 7 questions of attitude regarding the researcher-made CRA, whose validity and reliability have been measured previously. Data was analysed using SPSS software with ANOVA test at a significance level of 0.05.

### RESULTS

In this study, 55.6% were male. The mean age was 38.98±8.11 years. The mean knowledge, practice and attitude score was 6.79±1.46, 15.31±3.45 and 11.25±1.64 respectively. Female dentists had a significantly better practice. There was a statistically significant association between the positive response to participation in the courses of new methods of caries control with practice and attitude.

### CONCLUSIONS

The level of knowledge and practice of individuals was inadequate; but, their attitude was appropriate. The practice of people on the introduction and application of anti-caries agents such as fluoride varnish and ACP-CPP, was inadequate. The knowledge on white spot as a caries lesion was poor. Training courses are recommended on the identification of initial caries lesions and their management via anti-caries agents.

### KEY WORDS

Caries, Caries Risk Assessment, Knowledge, Attitude, Practice, Dentist

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## BACKGROUND

Dental caries is a dynamic and multifactorial process.<sup>(1)</sup> Occurrence of dental caries is affected by several factors including oral microflora, quantity and composition of saliva, and patient-related parameters including general health and lifestyle, such as the use of fluoride-containing toothpastes and diet.<sup>(2)</sup> Caries risk is defined as the probability of developing caries in the future. The incidence of the disease can be either primary (New caries lesions) or secondary (Progression of lesion or reactivation of caries lesions).<sup>(1)</sup> Caries risk assessment (CRA) is the cornerstone for the successful application of a minimum intervention dentistry philosophy in the management of dental caries. Patients, especially those with evidence of active caries at the time of visit, require the CRA to identify the factors that are most likely to progress in the disease process.<sup>(3)</sup> The CRA is one of the foundations for managing the caries of patients.<sup>(4)</sup> Riley et al. showed that the anti-caries agents were widely used in private dentistry, while the CRA was performed by a few dentistry.<sup>(5)</sup> In a study of Gaskin et al., 63.5% of subjects agreed with the CRA.<sup>(6)</sup>

In a study of Shah et al., 36% of dentists agreed with the use of restorative materials and CRA-based methods, and 15.5% also strongly agreed with CRA for all patients.<sup>(7)</sup> In a study by Rayapudi and Usha, 81% of participants agreed with CRA in patients.<sup>(8)</sup> In a study by Riley et al. about the use of CRA by dentists in children, 73% of dentists reported having CRAs for people aged 6 to 18 years.<sup>(9)</sup> In another study by Riley et al., 69% of dentists performed CRA for patients, and 57% of dentists who performed CRA had considered an individualized caries prevention programs for their patients.<sup>(10)</sup> Hurlbutt et al. showed that caries management by the CRA is an example of patient care that has the best practice rather than traditional therapies.<sup>(11)</sup>

The CRA is a conservative approach that can prevent waste of time, energy and finances. Assessing the management of the consequences of illness in certain time periods leads to less waste of dental tissues. People's knowledge of CRA in patients leads to more conservative treatment. Due to limited studies in this field and the absence of research in this regard in Kerman, this study was conducted to evaluate the level of knowledge, practice and attitude of general dentists in the city of Kerman about CRA.

## METHODS

The present descriptive cross-sectional study was conducted on general dentists in the city of Kerman, Iran, in 2019. The sample size was 160, which was determined using the sample size formula-

$$n = \frac{z^2 * p(1-p)}{d^2}$$

$$p = 0.5, d = 0.08$$

$$z = 1.96,$$

Through 340 general dentists in Kerman city. Data collection tools consisted of demographic data (including age, gender, graduation year, workplace, mean working hours per

week, paediatric dentistry) and 27 questions for assessing knowledge, attitude and practice. The knowledge-related questions included 10 items about the knowledge of the CRA, whose method of answering was based on true and false options. Score 1 was attributed to the true answer and the 0 score to the false answer. Therefore, the score range 0-10. Ten practice-related questions were based on the 4-point Likert scale, including always, often, sometimes and never. Therefore, the score range 0-30. Seven attitude-related questions were based on a 3-point Likert scale ("Agree", "Disagree" and "Neither agree nor disagree") with scores of 2, 0 and 1, respectively. Therefore, the score range 0-14. A researcher made this questionnaire based on texts and articles, whose validity was examined after reviewing and applying the views of the professors and setting the comments. The validity and reliability of the entire questionnaire were 0.89 and 0.81, respectively. To do this, a trained senior in the dentist who was able to respond to the ambiguity referred to dentists. Following the explanation of study objectives and dentist's desire to respond, the questions were presented face to face to the dentist in their workplace and collected on the same day. The approximate response time was about 10 minutes. The questionnaires were unnamed and the participation in the project was voluntary. If the dentists were asking for the true answers, the questions were given to them. After collecting the completed questionnaires, the data were coded and entered into SPSS version 22, where they were analyzed using the descriptive statistics tools including mean, standard deviation, frequency, and percentage frequency and the analytical tests including chi-square test, two-sample t-test, and analysis of variance (ANOVA) and linear regression. The project proposal was approved by the Code of Ethics of IR.KMU.REC.1398.005 by the Ethics Committee of Kerman University of Medical Sciences.

## RESULTS

Our research unit consisted of 71 (44.4%) females and 89 (55.6%) males. The mean age of the subjects was 38.89±8.11, the mean working hours of the dentistry were 34.89±9.84 hours per week and the mean graduation year was 10.89±5.85 years.

Of the participants, 77 (48.1%) worked only in the office and 50 (31.3%) in both clinics and offices. The mean number of patients per week was between 20 and 30 in 81 (50.6%). In addition, 115 (71.9%) mentioned that they are doing work for children. In response to knowledge-related questions, 21.9% responded true answer to "Low socioeconomic status does not increase the caries risk" and 95.6% said the true answer to "reduced saliva flow increases caries risk" (Table 1). In the case of practice in the present study, 78.1% always advised using fluoride toothpaste, and 58.1% always performed periodic examinations for patients. The least practice was in prescribing probiotics, so that 73.8% never prescribed probiotics (Table 2). Concerning the attitude of people in this study, 94.4% believed that the CRA is an important part of dental work, and 3.4% of people agreed that the CRA has no effect on dental caries control (Table 3).

In addition, 152 (95%) people recommended each person a caries prevention program based on their specific condition (Figure 1). The mean knowledge score was 1.46±6.79 out of 10, the mean practice score was 3.45±15.31 out of 30, and the mean attitude score was 1.64±11.25 out of 14. Female dentists had a significantly better practice (p=0.056). There was a statistically significant association between the positive response to participation in the courses of new methods of caries control with practice (p=0.51) and attitude (p=0.041). Regression analysis showed that there was a statistically significant association between the years of employment with attitude. Those who were newer graduated had a better attitude. Knowledge and practice had a statistically significant association (Table 5).

Knowledge	True		False	
	No.	%	No.	%
Dental caries is a transmissible disease	81	50.6	78	49.4
A person with a history of carious lesions within the past 1 year is at a high risk for future dental caries activity	140	87.5	20	12.5
A person with a history of restorations within the past 3 years is at a low risk for future dental caries activity	37	23.1	123	76.9
White spot lesions are considered carious lesions	63	39.4	97	60.6
Radiographic approximal lesions are disease indicators	87	54.4	75	45.6
Low socioeconomic status does not increase an individual's risk for dental caries disease	35	21.9	125	78.1
Decreased saliva flow increases risk for dental caries	153	95.6	7	4.4
There is no evidence to support that twice a year or more applications of fluoride varnish to reduce risk of carious lesions in adults of high caries risk	36	22.5	124	77.5
Patients at moderate or high risk of dental caries need to be counselled about the role of sugary and starchy foods in increasing caries risk	156	97.5	4	2.5
Chlorhexidine is known to kill all caries pathogenic organisms	96	60.0	64	40.0

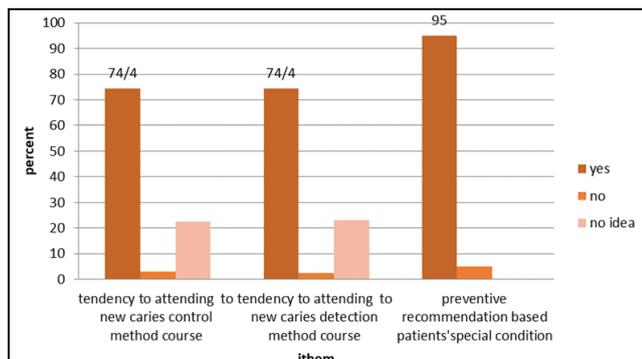
**Table 1. Dentists' Knowledge of Caries Risk Assessment**

Practice	Never		Occasionally		Often		Always	
	No.	%	No.	%	No.	%	No.	%
Fluoridated toothpaste	3	1.9	4	2.5	28	17.5	125	78.1
Low dose OTC fluoride rinse	10	6.3	33	20.6	57	35.6	60	37.5
Topical fluoride applications (varnishes/gels)	33	20.6	89	55.6	28	17.5	10	6.3
Amorphous calcium phosphate products	91	56.9	55	34.4	13	8.1	1	0.6
Antimicrobial rinse	16	10.0	96	60.0	47	28.4	1	0.6
Probiotics	118	73.8	27	16.9	14	9.4	-	-
Diet counseling	28	17.5	64	40.0	49	30.6	19	11.9
Individualized oral hygiene instructions	3	1.9	11	6.9	67	41.9	80	49.4
Individualized re-care/recall interval	0	0	8	5.0	59	36.9	93	58.1
Xylitol chewing gum	42	26.3	66	41.3	41	25.6	11	6.9

**Table 2. Dentists' Practice of Caries Risk Assessment**

Attitude	Agree		No Idea		Disagree	
	No.	%	No.	%	No.	%
Performing CRA is an integral part of dental practice	151	94.4	9	5.6	-	-
Caries management involves providing dental restorations	121	75.6	35	21.9	4	2.5
I have enough time to perform CRA on each patient	120	75.0	32	20.0	8	5.0
I am confident in my ability to explain CRA results to the patient	100	62.6	50	31.3	10	6.3
CRA is more effective in children below 5 years	28	17.5	85	53.1	29	18.1
CRA is more effective in 12-18 years age group	110	68.8	49	30.6	1	0.6
CRA is not effective in dental caries control	7	3.4	28	17.5	125	78.1

**Table 3. Dentists' Attitude about CRA**



**Figure 1. Dentists Response According to Tendency to Attending Courses and Preventive Recommendation**

Variables		Mean		p	
Knowledge	gender	men	6.65	1.48	0.160
		women	7.00	1.40	
	Tendency to attending to new caries control method course	no	6.25	0.95	0.488
		No idea	7.01	1.20	
		yes	6.76	1.52	0.768
		no	6.66	0.57	
Tendency to attending to new caries detection method course	No idea	6.96	1.33	0.662	
	yes	6.76	1.50		
Preventive recommendation based patients' special condition	yes	6.81	1.45	0.056*	
	no	6.50	1.64		
Practice	gender	men	14.83	3.66	0.051*
		women	15.94	3.00	
	Tendency to attending to new caries control method course	no	14.00	1.00	0.045*
		No idea	14.09	3.55	
		yes	15.71	3.38	0.482
		No	14.00	1.00	
Tendency to attending to new caries detection method course	No idea	14.17	3.55	0.045*	
	yes	15.73	3.44		
Preventive recommendation based patients' special condition	yes	15.37	3.49	0.482	
	No	14.42	2.82		
Attitude	Gender	men	11.14	1.61	0.431
		women	11.35	1.68	
	Tendency to attending to new caries control method course	No	9.25	1.50	0.041*
		No idea	11.17	1.74	
		yes	11.33	1.58	0.013*
		No	8.66	1.15	
Tendency to attending to new caries detection method course	No idea	11.05	1.68	0.06*	
	yes	11.37	1.59		
Preventive recommendation based patients' special condition	yes	11.32	1.61	0.06*	
	no	10.00	2.09		

**Table 4. Correlation between Knowledge, Practice and Attitude of Participants According to Gender and Tendency to Attend New Caries Control and Diagnosis Method Course**

Variables	B	Beta	t	p Value	
Knowledge	age	-0.091	-0.420	-2.547	0.013
	Occupational years	0.080	0.300	1.822	0.072
	Doing paediatric dentistry	-0.655	-0.190	-1.862	0.066
	Practice	0.096	0.221	2.184	0.032
Practice	Knowledge	0.529	0.228	2.184	0.032
	age	0.109	0.442	2.628	0.010
Attitude	Occupational years	-0.158	-0.522	-3.105	0.003

**Table 5. Correlation between Demographic Variables with Knowledge, Attitude and Practice**

## DISCUSSION

According to current care standards, the individualized caries prevention and treatment programs should be performed for each patient.<sup>(12)</sup> The present study was aimed at assessing the level of knowledge, attitude and practice of dentists based on CRA and its management. In this study, 6.87% of people believed that "people with history of restoration in a past year are at high risk for future caries activity." Goswami et al.<sup>(13)</sup> stated that 88.7% of people had answered the true answer to this question. In the current study, only 39.4% of people considered white spot as caries lesions. In the study of Goswami et al., 49.8% of dentists considered white points as a caries lesion, which is more than the current study. The reason for this difference is that Goswami et al. also examined paediatric dentists.<sup>(13)</sup> The inability of dentists to detect this stage can prevent the offer of minimal invasion services with the aim of dental remineralization. Therefore, the knowledge of white spots and their management is essential.

In addition, 21.9% of the participants in this study responded true answer to "Low socioeconomic status increases the caries risk". In the study of Goswami et al.<sup>(13)</sup> 35.3% responded true answer. Goldfeld et al. showed that caries were higher in children with lower socioeconomic status.<sup>(14)</sup> Factors such as the socioeconomic status represent a few key indicators of the disease, such as the socioeconomic status, and risk factors such as microflora determines that the

person is at a low, moderate and high risk of caries, although most of the research has been carried out on children.<sup>(15)</sup> The CRA is more important in people who have inadequate socioeconomic status and further attention should be paid to this group of people. In the current study, 40.0% did not believe that "chlorhexidine would eliminate caries-causing microbes." The result is consistent with the study of Goswami et al., so that 35.6% of people gave the true answer.<sup>(13)</sup>

A systematic study of clinical trials showed that chlorhexidine was more effective in preventing caries and reducing *Streptococcus mutans* in children and adolescents than in placebo or in the absence of treatment. The authors recommended the need for high-quality research, especially on the effects of chlorhexidine on permanent and deciduous teeth and the use of other oral products containing chlorhexidine.<sup>(16)</sup>

In a study of Autio-Gold and Tomar, most dental students tended to use chlorhexidine to control caries.<sup>(17)</sup> In the current study, 73.8% of people never prescribed probiotics, which is almost consistent with the study of Goswami et al., in which 60.7% never prescribed probiotics.<sup>(13)</sup> Probiotics are microorganisms that are useful when they are administered in sufficient quantities.<sup>(18)</sup>

The mechanism of action of probiotics in the mouth is not well defined, but it has been associated with a decrease in CFUs of caries-causing pathogens.<sup>(19)</sup> In a systematic review regarding the effects of probiotics in published articles with a high impact factor, it was shown that probiotics had the ability to reduce *S. mutans* in saliva and plaque in the short term in two thirds of the articles.<sup>(20)</sup> Villavicencio et al. showed that administration of probiotics significantly reduced lactobacilli in preschool children.<sup>(21)</sup> In this study, 56.9% of participants never prescribed a casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) for their patients.

Goswami et al. showed that 25.5% of dentists never prescribed CPP-ACP, which is far less than the current study. The reason for this difference is that research units in their study included paediatric dentists.<sup>(13)</sup>

Asokan et al. in a systematic study showed that CPP-ACP had a positive effect on remineralization of white spot lesions.<sup>(22)</sup>

It was also shown that the CPP-ACP has a greater effect on enamel remineralization than other materials that have the potential for enamel remineralization.<sup>(23)</sup> Due to the positive effect of these materials on enamel remineralization, it seems that more focus should be put on the introduction and role of these products in order to publicize their application. In this study, nutritional counseling was given to patients as always only by 11.9% of cases and as sometimes by 40%. Studies show increased caries with sugar consumption.<sup>(24)</sup> Given the evidence of the effect of drinking and sweet foods on caries, further attention is recommended for the nutritional counseling to patients, including reduced consumption of sweets and sweet snacks.

In this study, the dentists always recommended mouthwash and gel/fluoride varnish by 37.5% and 6.2%, respectively. In the study of Riley, the use of fluoride in office with 82% was the most commonly used method of preventing caries in children. The use of over the counter (OTC) fluoride was also higher, which is consistent with the current study.<sup>(25)</sup> For patients at high or severe risk for caries,

the importance of using sealants and fluoride varnish should be emphasized approximately 2-4 times a year.<sup>(26)</sup>

In a study by Yoder et al. in India, 91% of dentists always or usually prescribed fluoride for children with active caries.<sup>(27)</sup> In this study, 6.9% of people always prescribed xylitol-containing chewing gum for patients. In the study of Goswami et al., 4% of dentists often prescribed xylitol-containing chewing gum for their patients.<sup>(13)</sup> In a clinical trial on adolescents aged 14-15 years, it was shown that plaque and gingival bleeding were significantly decreased in people who used sugar-free chewing gum versus control subjects.<sup>(28)</sup>

Evidence supports the use of xylitol as an anti-caries treatment. It seems that xylitol-containing chewing gum is a good choice to stimulate saliva through the act of chewing.<sup>(29)</sup> Given the positive effects of sugar-free chewing gum, it seems that administration of this proper and useful ingredient in caries control by dentists is inappropriate and inadequate, and more attention should be paid to this. In this research, 94.4% of the people agreed that the CRA was part of the process of dental work. These results are consistent with the study of Goswami et al., with 94% of the subjects agreeing with the CRA.<sup>(13)</sup>

In this study, 75.6% of people agreed that CRA is one of the major issues in the management of caries in the choice of restorations. In the study of Goswami et al., 84.7% of people agreed as well.<sup>(13)</sup> The reason for this could be that the paediatric dentists also participated in the study of Goswami et al.

In this study, 75.0% of people mentioned that they had enough time to do the CRA. In the study of Goswami et al., 36.7% of the subjects had enough time for CRA.<sup>(13)</sup> In the current study, 95.0% of people recommended each patient for a caries prevention program based on their specific condition. In a study by Nagaraj et al.<sup>(30)</sup> 24.91% of individuals performed the CRA for each patient. The reason for these differences can be attributed to the type of study and the method of assessment. In the present study, 78.1% believed that the CRA was effective in controlling caries. Considering that 75.0% of people mentioned that they had enough time for CRA, it could be hoped that the CRA could be effective in reducing caries in Kerman. In this study, 74.4% of people tended to participate in training courses on new ways to control caries.

There was a statistically significant association between the positive response to participation in the courses of new methods of caries control with practice (0.051) and attitude ( $p=0.041$ ). Regarding the interest of individuals in this regard, inclusion of these courses in retraining programs and conferences is recommended.

In the present study, there was a marginally significant association between the attitude of dentists in Kerman and having a caries prevention program based on the specific condition of each patient. The first step in the CRA process is to consider the caries risk in each patient, which means that the probability of a new caries lesion during a particular period and the likelihood of a change in the size or activity of the existing lesions will be determined over time.<sup>(31,32)</sup>

Female dentists had a significantly better practice. The reason for this is that female dentists work more with children.

In the present study, knowledge has a direct and significant association with practice. Higher knowledge

shows better practice. Accordingly, it seems that conducting classes and courses focusing on the recognition of dental caries and the importance of CRA can lead to controlling the caries of individuals and identifying people at high caries risk. Newer graduates had a better attitude that could be due to learning new CRA content and familiarizing themselves with newer methods of caries control.

### CONCLUSIONS

Given the importance of CRA in identifying people with high caries risk, managing the initial caries lesions and reducing new caries, which are important objectives of CRA program, the knowledge and practice of individuals in this study were inadequate, but their attitude was appropriate. The practice of people, especially on the introduction and application of anti-caries agents such as fluoride varnish and ACP-CPP, was inadequate. The knowledge of participants was poor on white spot as a caries lesion. Training courses are recommended on the identification of initial caries lesions and their management via anti-caries agents.

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