RESEARCH ARTICLE

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Awareness and Performance of Dentists Regarding Cardio-Vascular Diseases: A Report from Southeastern Iran

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Abstract:

Introduction: Undoubtedly, managing patients with cardiovascular disease poses a significant challenge for dentists. It is imperative for dental practitioners to possess a comprehensive understanding and adhere to specific guidelines when treating such individuals.

Objective: This study aimed to assess the awareness and performance of dentists concerning cardiovascular diseases.

Materials and Methods: This cross-sectional, analytical study involved the participation of 150 dentists from Kerman, Iran. An online questionnaire related to questions concerning cardiovascular diseases was used for data collection. The responses were collected electronically and entered into the SPSS software for analysis.

Results: Findings revealed a gender distribution of 46% male and 54% female, with an average participant age of 32.57 ± 8.44 years. The overall average awareness score of the study, standing at 51.58, did not show a statistically significant difference among the groups (p-value:0.0837). Conversely, the average performance score, totaling 38.38, showed a statistically significant difference among the three groups (P-value=0.028). Female participants notably displayed a markedly higher awareness score compared to their male counterparts. Age and work experience did not demonstrate any significant relationship with the variables examined in this study. The Pearson correlation coefficient between awareness and performance scores among the examined samples stood at r=0.164, implying a positive and significant correlation (p-value=0.045).

Conclusion: The findings from our study suggest that the awareness and performance levels of dentists in Kerman, Iran, pertaining to cardiovascular diseases, are deemed acceptable and desirable. However, it is prudent to advocate for ongoing attention and continuous training in this domain.

Keywords: Awareness, Performance, Dentists, Cardio-vascular disease, Diseases, Gender distribution.

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1. INTRODUCTION

With the rapid advancements in medical knowledge facilitating the diagnosis and treatment of various diseases and the consequent rise in life expectancy, our society is witnessing a considerable increase in the population of elderly individuals and those with diverse medical conditions. This demographic shift presents a spectrum of unique medical needs, ranging from routine care to specialized dental procedures [1]. According to an Iranian study, approximately one in every three patients visiting dental offices presented with underlying medical issues. Among these, the most significant conditions reported include cardiovascular, respiratory, and neurological ailments [2].

Furthermore, research has indicated that cardiovascular diseases are among the most prevalent medical conditions encountered by dentists in their clinical practice [3]. Conversely, dental procedures, administration of local anesthetics, and the stress induced by dental work can potentially lead to diverse symptoms, exacerbate existing conditions, and, on occasion, precipitate medical emergencies [4]. Simultaneously, specific conditions, such as underlying ischemic disease, a history of hypertension, valvular and congenital heart disease, as well as a history of arrhythmias, present as special circumstances that may lead to complications during or after dental procedures. These complications can range from hypertensive crises and chest pain to instances of endocarditis [5].

Generally, it can be asserted that cardiovascular diseases stand out as the foremost medical conditions prompting dentists to refer patients and, at times, necessitating the delay or cancellation of dental procedures. This underscores the critical importance of possessing the requisite knowledge about heart diseases, as well as the proficiency to manage cardiovascular emergencies among dentists. Consequently, dentists must demonstrate the ability to swiftly and effectively diagnose medical conditions, implement preventive measures, and provide prompt and effective treatment when required [2].

Hence, the absence of awareness among dentists regarding the timely and optimal management of cardiac emergencies, along with preventive measures, may result in treatment delays and, in some instances, lead to irreversible complications [6]. While therapeutic and preventive guidelines for these scenarios are available from different resources and online platforms, assessing the awareness and competence of dentists in this area remains crucial. Conducting evaluations can inform the implementation of effective measures, such as seminars or training courses, aimed at enhancing the proficiency and knowledge of dentists in managing cardiovascular-related situations [7].

The primary objective in managing patients with cardiovascular disease during dental procedures is to ensure that any hemodynamic alterations made during treatment are well tolerated within the cardiovascular capacity of the patient. This goal is best accomplished through diligent monitoring of vital signs before commencement and by minimizing fluctuations in these signs during treatment [7, 8].

Furthermore, obtaining a detailed medical history concerning underlying diseases and medications significantly aids in timely disease diagnosis and appropriate patient referrals. These scenarios represent common encounters for dentists during patient treatment. Additionally, preventive measures are crucial for heart patients to avert potential complications. It is noteworthy that oral and dental diseases themselves can act as risk factors for heart conditions, underscoring the critical importance and sensitivity of this relationship.

The level of knowledge and performance among dentists regarding heart diseases varies, influenced by factors, such as time since graduation, work experience, specialization status, and engagement in academic and non-academic activities. Previous studies indicate differences in awareness and performance among newly graduated young dentists, general dentists, and specialist dentists. Typically, awareness and performance are highest at the time of graduation [9] and typically decline with increasing age and work experience [10]. Engagement as a specialist dentist and faculty member typically enhances the level of knowledge and performance among dentists regarding heart diseases [11]. It is crucial to acknowledge that, thus far, no study has simultaneously examined these three groups. The advantage of conducting a concurrent examination of these groups lies in the opportunity it presents for implementing targeted interventions aimed at enhancing awareness and performance regarding cardiovascular diseases within each group.

Hence, the current study was undertaken to assess the awareness and performance levels of newly graduated, general and specialist dentists in Kerman, Iran, concerning cardiovascular diseases, with a focus on the necessary awareness for managing cardiac patients and the requisite performance in emergency cases.

2. MATERIALS AND METHODS

This analytical, cross-sectional study was conducted in Kerman, Iran, in 2023. The study population consisted of newly graduated dentists, general dentists, and specialist dentists selected *via* a simple random sampling method.

Electronic questionnaires were formulated using the Pors-line platform, an Iranian online survey tool (accessible at https://porsline.ir). Subsequently, the questionnaire links were sent to the selected sample subjects through the online interface of the platform.

The eligibility criteria for participation in the study required individuals to be either newly graduated from dentistry school, general dentists, or dental specialists based in Kerman, Iran, and to have provided informed consent. In instances where a respondent answered less than 70 percent of the questions, a replacement respondent was sought (Supplementary material).

The initial section of the questionnaire comprised demographic details, encompassing information, such as

age, gender, educational background, and professional work experience.

The subsequent sections of the questionnaire were designed to assess the awareness and performance of dentists, drawing upon methodologies established in prior studies [11-13]. The content validity of the questionnaire was evaluated through the qualitative content validity method, which involved an assessment by three cardiologists and three dentists. Their feedback and sug-gested corrections were incorporated, leading to the approval of the questionnaire. Additionally, the questionnaire's reliability was verified using the internal consistency method, yielding a Cronbach's alpha coefficient of 0.77.

The questionnaire used a 5-point Likert scale for measurement, comprising options, such as 'strongly agree,' 'agree,' 'neutral,' 'disagree,' and 'strongly dis-agree,' scored from 5 to 1, respectively.

In the performance section, respondents were presented with five options, each assigned a numerical value from 1 to 5. From the total of ten questions in this section, each individual's performance score was calculated within the range of 10 to 50.

Ultimately, participants' performance was categorized into three groups based on the following classification:

Performance scores between 10 and 25: Unfavorable performance

Performance scores between 26 and 35: Acceptable performance

Performance scores between 36 and 50: Optimal performance

The section concerning awareness level consisted of 15 questions, each offering five options, and each option was designated a numerical value from 1 to 5.

Out of a total of fifteen questions, each individual's awareness score ranged from 15 to 75. Participants' awareness was categorized into three groups based on the following criteria:

Awareness score between 15-25: Unfavorable awareness

Awareness score between 26-50: Acceptable knowledge

Awareness score between 51-75: Good awareness

2.1. Statistical Analysis

Upon collecting the completed questionnaires from the sampled participants, the data underwent coding and entry into SPSS 23. Descriptive statistics, including mean, standard deviation, frequency, and percentage, were employed and presented in tables and graphs. Prior to data analysis, the normal distribution of data was assessed using Kolmogorov-Smirnov test. For normally distributed data, t-tests and ANOVA were utilized. To evaluate the relationship between awareness and performance scores, the Pearson correlation coefficient test was employed. A significance level of 0.05 was considered.

3. RESULTS

In our study, participation comprised 50 (33.3%) newly graduated dentists, 50 (33.3%) general dentists, and 50 (33.3%) specialist dentists. Among the participants, 69 (46%) were male, and 81 (54%) were female. The average age of the participants was 32.57 ± 8.44 years, with ages ranging from 24 to 65. The average work experience among participants was 6.42 ± 7.24 years, ranging from zero (for newly graduated individuals) to a maximum of 35 years (Table 1).

Table 1. Basic information of the study participants.

Gender (Number)	Working Status	Frequency (Percent)
Male (69)	Newly graduated dentists	25 (16.67)
	General Dentist	19 (12.68)
	Specialist dentist	25 (16.67)
Female (81)	Newly graduated dentists	25 (16.67)
	General Dentist	31 (20.64)
	Specialist dentist	25 (16.67)

Note: Mean working experience: 6.42 years.
Mean age: 32.57 years.

Our study revealed that the average awareness scores were 51.72 among newly graduated dentists, 51.32 among general dentists, and 51.70 among specialists. The total average awareness score was 51.58. The score was not different among the three studied groups (p-value=0.837).

Furthermore, the average performance scores were 39.22 among newly graduated dentists, 37.78 among general dentists, and 38.14 among specialists. The overall average performance score was 38.38. ANOVA analysis indicated a significant difference among the three studied groups (P=0.028). Post hoc Tukey tests revealed significant differences between newly graduated dentists and general dentists (P=0.010) and between newly graduated dentists and specialists (P=0.053), while no significant difference was observed between specialists and general dentists (P=0.517).

Overall, the total awareness score was 68%, and the total performance score was 76%. All three groups, newly graduated dentists, general dentists, and specialists, demonstrated acceptable levels of both awareness and performance (Tables 2 and 3).

Additionally, the study revealed that the average awareness score was 50.82 among men and 52.22 among women, with a statistically significant difference (P=0.023). Conversely, the average performance score was 38.36 among men and 38.39 among women, showing no statistically significant difference (P=0.944). The total scores for awareness and performance were 51.58 and 38.38, respectively.

Analyzing the results by age groups, we indicated that the average awareness score for the 23-33 age group was 51.80, and the performance score was 38.51. For the 33-43 age group, the average awareness score was 51.39, and the performance score was 38.43. The average awareness score for the 43-53 age group was 51.78, the performance score was 37.57, and the average awareness

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(Table 6) contd.....

-	-	Group	Number	Mean	Standard Deviation	P-value
Performance	Working Experience	0-10	114	38.49	2.96	0.246
		10-20	28	37.92	2.24	
		20-30	6	37.33	1.86	
		>30	2	41.50	2.12	

Upon examining the results based on working experience, the average awareness score among individuals with 0-10 years of experience was 51.42, and the performance score was 38.49. Conversely, for those with 10-20 years of experience, the average awareness score was 52.78, and the performance score was 37.92; for 20-30 years of working experience, the average awareness score was 50.46, and the performance score was 37.33, and for >30 working experience, the average awareness score was 44 and performance score was 41.50. In summary, the total scores for awareness and performance were 51.58 and 38.38, respectively. Analysis of variance revealed a significant statistical difference between awareness scores and working experience (p=0.048). LSD post hoc testing indicated that the disparity was primarily attributable to individuals with over 30 years of working experience compared to those with 0-10 and 10-20 years of experience (Table **4**).

The Pearson correlation coefficient between the awareness score and the performance score in the examined samples was calculated as 0.164 (P: 0.045). This implies a direct relationship between the level of awareness and performance, suggesting that as awareness increases, performance improves. Additionally, higher performance levels correspond to increased awareness, indicating a mutually reinforcing relationship between the two.

4. DISCUSSION

One of the paramount challenges for dentists lies in effectively managing patients with heart disease. Hence, our study aimed to assess the awareness and performance levels concerning heart disease among newly graduated, general, and specialist dentists. The findings revealed an acceptable overall awareness level, with an average score of 51.58 out of 75 points, equating to 68% proficiency. Interestingly, the awareness scores across all three groups, newly graduated dentists, general dentists, and specialists, were deemed acceptable, displaying no significant discrepancies between these groups.

The average score of 38.38 out of 50 was favorable, and the total performance percentage was 76%. The level of performance score, like the awareness score, in all three groups of newly graduated dentists, general dentists, and specialists was at the optimal level.

The findings of this study indicate that the awareness and performance levels of both practicing dentists and newly graduated dentists in Kerman, Iran, are satisfactory, suggesting the effective training provided by the university in this domain. However, continuous education through journal clubs, attending seminars, and participating in webinars is imperative. Similar studies utilizing the same questionnaire have yielded relatively consistent results, emphasizing the significance of enhancing the awareness of heart diseases among dentists. In this regard, Khozaimeh F *et al*. conducted a study investigating the awareness and performance levels of newly graduated dentists in Isfahan, Iran, revealing an awareness level of 61% and an average performance level. Interestingly, these findings bear a resemblance to the outcomes observed in our study [14]. In a study examining the awareness and performance of endodontists in Iran, it was found that 75% exhibited optimal performance, while 67% demonstrated optimal awareness levels. Remarkably, these results align closely with the findings observed in our study [10].

MAAL-Mohaissn and colleagues conducted a study involving dentists in Saudi Arabia, revealing that 72% of dentists exhibited knowledge levels below 55% of the overall scores, which were considered average. Interestingly, the scores pertaining to anti-inflammatory prophylaxis for Endocarditis were notably higher. Additionally, the study delved into the rates of referral and collaboration with cardiologists [7].

An integral concern within heart-related dental care involves the accurate and appropriate prescription of antibiotics for bacterial endocarditis prophylaxis, a subject highlighted in the awareness section of our study. Endocarditis stands as a significant and potentially severe condition, yet to a certain extent, it can be preventable. Hence, adequate awareness in this domain and effective communication between dentists and cardiologists are imperative. P Lopez-Jornet and colleagues conducted a study in Spain focusing on the practice and knowledge of dentists, revealing a weakness in their performance when dealing with patients taking anticoagulants. However, it is important to note that, unlike our study, their research was limited specifically to anticoagulants and did not provide a comprehensive view of heart diseases [15].

Eskandari *et al*. conducted a study evaluating the awareness level of general dentists in Tabriz, Iran, regarding prophylaxis for Bacterial Endocarditis. Their findings indicated an awareness level of 59%, categorized as medium [16].

Sohailipour *et al.*, in a comparative study between Iranian and English dentists conducted in 2009, explored the knowledge and compliance of dentists regarding antibiotic prophylaxis for endocarditis. Their findings revealed weaker awareness and adherence to guidelines among Iranian dentists compared to their counterparts in England [17].

Several parallel studies on antibiotic prophylaxis for endocarditis have demonstrated a relatively high level of awareness among dentists, showcasing commendable awareness and adherence to guidelines [18, 19].

Collectively, the discussed studies indicate that the level of awareness among Iranian dentists concerning antibiotic prophylaxis for endocarditis is subpar, highlighting the pressing need for enhanced attention and further training in this domain. Additionally, proficient handling of emergencies and cardiovascular resuscitation within the dental setting is crucial, and it is reliant upon effective communication between dentists and cardiologists, along with adequate awareness of cardiac considerations prior to procedures. Although such events are rare in dentistry, understanding these aspects remains imperative. Notably, the questionnaire of our study included these specific aspects, and the results demonstrated an appropriate level of awareness and performance in these areas.

A study conducted by Kaveri *et al*. assessed the awareness of dentists in Shiraz, Iran, regarding cardiopulmonary resuscitation (CPR). Their findings revealed that 4% of participants had experienced resuscitation incidents in dental settings. Among them, 37% displayed correct knowledge, while 51% believed they could perform resuscitation [20].

Hashmipour *et al*. conducted a study examining the knowledge and performance levels of dentists in Kerman City regarding emergency cases within their offices. Among the 101 participants, 45% had experience dealing with emergency cases, with vasovagal syncope being the most prevalent. The knowledge score of the study averaged 5.8 out of 10, indicating a relatively acceptable level of knowledge [21].

Another study, conducted in Mashhad, Iran, focused on emergencies and involved 48 participating dentists. The findings indicated that 54% possessed good knowledge, 32% had moderate knowledge, and 14% demonstrated poor knowledge levels in this domain [22].

Baduni *et al*. conducted a study in India that highlighted weak awareness levels among dentists regarding this matter, emphasizing the critical need for comprehensive training in this domain [23].

Overall, the findings across various studies suggest a relatively acceptable level of awareness among Iranian dentists concerning emergency procedures and management. However, given the paramount significance of this matter, continuous training and supplementation of information remain imperative.

The findings from our study indicated that the average awareness score among the studied groups (newly graduated dentists, general dentists, and specialists) did not exhibit significant differences. This suggests a consistent level of training and a shared desire among individuals to enhance their knowledge within their professional field. Furthermore, the performance score in the newly graduated dentist group surpassed that of the general and specialist dentist groups, with a statistically significant difference observed between newly graduated dentists and general dentists.

Moreover, our study revealed that the average scores for both awareness and performance did not significantly differ across various age groups. This suggests that increasing age did not necessarily correlate with heightened levels of awareness and performance in this context.

The study by Eskandari *et al*. also highlighted that as age and work experience increase, the awareness scores concerning antibiotic prophylaxis for bacterial endocarditis decrease [16].

Additionally, the study by Rozbahani *et al*. revealed that final semester and newly graduated dentists exhibited greater knowledge regarding the prescription of antibiotic prophylaxis for bacterial endocarditis compared to their older and more experienced counterparts [24].

Mirzaei *et al*. conducted a study in Bushehr, which showcased that younger dentists demonstrated more suitable drug administration protocols for antibiotic prophylaxis of bacterial endocarditis compared to their older counterparts [25]. Overall, the findings suggest that younger and newly graduated dentists tend to be more scientifically prepared, updated, and actively engaged with colleagues and medical-dental scientific environ-ments. Consequently, they exhibit better awareness and performance in managing heart diseases. This underscores the importance of ongoing retraining and continuous study of scientific sources, particularly for older dentists, to ensure they remain up-to-date in this critical domain.

The findings from the studies mentioned align closely with our study results. However, there are exceptions, such as the study conducted by Thanissorn and colleagues, which did not establish a relationship between age and the awareness levels of dentists regarding heart disease [26, 27].

Another notable finding from our study revealed that female dentists exhibited higher levels of knowledge about heart disease compared to their male counterparts, a result that resonates with the findings of Hashmipour *et al*. [21].

Contrary to our findings and those of Hashmipour *et al*., numerous other studies have failed to establish a significant relationship between gender and the level of knowledge among dentists regarding heart disease [10, 16, 22, 27].

Furthermore, our study revealed that the average awareness score did not correlate with working experience, whereas the performance score exhibited a relationship with work experience. This observation might be attributed to dentists striving to enhance their work performance over time, potentially aiming to mitigate potential side effects.

Overall, our study unveiled an acceptable and desirable level of awareness and performance among dentists in Kerman City regarding cardiovascular diseases. Notably, our comprehensive questionnaire, encompassing various aspects of heart diseases and considering different dental expertise levels, allows for comparison with studies conducted in other countries.

CONCLUSION

Overall, while the level of awareness and performance among dentists in Kerman, Iran, appears acceptable and desirable, there is a recommendation for more

comprehensive training initiatives within both the university curriculum and ongoing professional development. This could involve organizing seminars and webinars and fostering an exchange of scientific viewpoints between cardiologists and dentists to enrich their understanding of this field further.

ABBREVIATION

CPR = Cardiopulmonary Resuscitation

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study received approval from the Medical Ethics Committee of the Kerman University of Medical Sciences (IR.KMU.AH.REC.1402.078.).

HUMAN AND ANIMAL RIGHTS

No animals were used in this research. All procedures performed in studies involving human participants were in accordance with the ethical standards of institutional and/or research committee and with the 1975 Declaration of Helsinki, as revised in 2013.

CONSENT FOR PUBLICATION

Informed consent was obtained from all participants.

STANDARDS OF REPORTING

STROBE guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

The data and supportive information are available within the article.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

SUPPLEMENTARY MATERIAL

Supplementary material is available on the publisher's website along with the published article.

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