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ResearchPaper: Senior Dental Students' Knowledge Towards Patients with Common Cardiovascular Diseases: A Questionnaire-Based Study

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ABSTRACT

Introduction: In light of the high incidence of cardiovascular diseases within the population and recognizing them as one of the most frequently encountered conditions in dental practice, the significance of effectively managing these medically compromised patients in dental settings has become increasingly crucial. Thus, this study aimed to assess the knowledge of senior dental students concerning patients afflicted with prevalent cardiovascular disorders.

Materials and Methods: In this analytical cross-sectional study with a total population sampling method, there were 64 senior dental students selected from Gilan University of Medical Sciences during 2021-2022. They completed a questionnaire with demographic information and 14 four-choice questions assessing knowledge towards Hypertension, Ischemic Heart Diseases, and Infective Endocarditis. Knowledge levels were categorized as poor, average, and good based on the statistical thirds. The significance level was set at $P<0.05$.

Results: The participants achieved an average score of 48.21 ± 16.88 (out of 100). There were statistically significant differences ($P<0.001$) in knowledge scores across disease categories, with the lowest average score for Ischemic Heart Diseases and the highest for Infective Endocarditis. Furthermore, the statistical analysis found no significant difference in knowledge scores based on gender and no statistically significant correlation between Grade Point Average (GPA) and knowledge scores ($P>0.05$).

Conclusion: The dental education curriculum could be modified to emphasize teaching common systemic diseases in clinical care, and improving the quantity and quality of education to create a positive outlook on the significance of acquiring knowledge in the field of cardiovascular disorders.

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1. Introduction

The cardiovascular system comprises the heart and blood vessels, and it can be affected by various diseases such as Hypertension, ischemic heart disease (IHD) including atherosclerosis and myocardial infarction, endocarditis, heart failure, and etc (1-3).

Identifying risk factors is crucial to diagnose and prevent heart diseases. The most common risk factors associated with cardiovascular diseases (CVDs) include smoking, lack of physical activity, poor diet and malnutrition, obesity, alcohol consuming, drug abuse, stress. High cholesterol, high blood pressure, and poor glucose control are another risk factors. Family history and certain medications can also compromise cardiovascular health (4, 5). The incidence of these risk factors increases with age and is associated with a poorer prognosis (6).

CVDs have emerged as the primary and most significant cause of non-communicable disease deaths globally, accounting for over 50% of cases. According to the World Health Organization (WHO), approximately 17.6 million people worldwide died from CVDs in 2012 (7, 8).

It is the leading cause of death in Asia and Europe (9, 10). CVD, which was once a fatal condition, has now become a chronic disease. These advancements have been so significant that the mortality rate among CVD patients is now comparable to that of the general population. As a result, there has been a rise in the number of patients with chronic CVDs, and the characteristics of current CVD survivors have changed. They are more likely to be older, frail, and have multiple coexisting health conditions (11).

As part of the healthcare system, dentists play a crucial role in screening undiagnosed patients and modifying treatment plans for medically compromised patients. This knowledge is particularly critical in managing medical emergencies in dental offices and addressing conditions such as cardiovascular diseases, which are commonly encountered in dental practice. Dentists must be aware of considerations for patients with conditions like ischemic heart disease, Hypertension, and valvular heart disease (12-17).

A 2023 cross-sectional study assessed the knowledge, attitudes, and performance of Iranian endodontists regarding patients with cardiovascular disorders. The results indicated that Iranian endodontists had a high level of knowledge, with favorable levels of knowledge (67.3%), attitude (57.4%), and performance (75.2%) (18).

This was in contrast to the results of a national survey in Saudi Arabia in 2021, which showed that 90.1% of general dentists desired more training and knowledge in managing cardiac patients (12).

This study aimed to assess the knowledge of senior dental students at Guilan University of Medical Sciences regarding the management of common cardiovascular disorders. The findings can inform the development of curriculum to enhance the knowledge of future general dentists in this critical area.

2. Materials and Methods

This cross-sectional study was conducted in the main and international dental faculties of Guilan University of Medical Sciences. Due to the small sample size, total population sampling was used to evaluate all senior dental students during 2021-2022.

A researcher-designed questionnaire was utilized to assess the knowledge in field of managing the patients with high blood pressure, Ischemic Heart Diseases, and Infective Endocarditis. The questionnaire included demographic information and 14 four-choice questions, consisting of five questions on Hypertension, five on ischemic heart disease, and four on Infective Endocarditis, respectively. The total score ranged from 0 to 14, as each correct answer was allocated one score. The level of knowledge was determined based on statistical thirds: under the title of poor knowledge (less than 33%), average knowledge (66-33%), and good knowledge (more than 66%) of the maximum score.

To evaluate the content validity of the questionnaire, the content validity ratio (CVR) and the content validity index (CVI) were calculated by using the opinions of 10 dental specialists, according to Lawshe's table and Waltz and Basel, respectivel (19, 20). In the assessment of the CVR for Hypertension, Ischemic Heart Diseases, and Infective Endocarditis, the scores were 0.68, 0.76, and 0.92, respectively. As the minimum acceptable content validity ratio is 0.62 for 10 experts according to Lawshe's table**,** these scores are deemed acceptable. The CVI index was determined to have a minimum value of 80% and a maximum of 100%. Questions with a CVI between 80 and 90% underwent partial review, while those above 90% remained unchanged.

To ensure internal consistency, the researchers employed the Richardson coefficient, achieving a value of 0.7 with a 14-question questionnaire after a pilot study involving 19 students. This finding indicates good internal consistency, supporting the validity of the questionnaire in assessing dental students' knowledge.

External reliability was evaluated using the test-retest

method and the ICC difference coefficient. The ICC difference coefficient for assessing students' knowledge in this study was 0.714, with a test-retest reliability coefficient of 74.4%. Considering these indicators, this questionnaire demonstrated a relatively high level of validity and reliability for measuring knowledge among the students under study.

The inclusion criteria comprised all senior dental students at Guilan University of Medical Sciences, irrespective of age and gender, possessing proficiency in the Persian language, and providing informed consent.

The exclusion criteria encompassed inadequate questionnaire completion, dental students in their first to fifth years, and discontent at any phase of the research.

In this investigation, a team member concurrently administered the questionnaires to senior dental students who expressed willingness to cooperate in this study, and retrieved them within a 10-minute timeframe.

Statistical analysis was performed using SPSS v26. An independent t-test was used to compare scores based on gender and education location, and Pearson's correlation coefficient was used to determine the correlation between GPA and cardiovascular knowledge. Results with P<0.05 were considered statistically significant.

3. Results

This study included a total of 64 senior dental students. The majority (67.2%) were male students. The average GPA before the internship was 15.29 ± 0.93.

Participants' knowledge scores ranged from 0 to 100, with an overall average score of 48.21 ± 16.88. Participants' knowledge scores ranged from 0 to 100, with an average score of 48.21 ± 16.88. Scores were lowest for Ischemic Heart Diseases and highest for Infective Endocarditis. These differences were statistically significant (P < 0.001) (Table 1).

According to *Table 1*, Table 2_IHD: Ischemic Heart Disease. IE: Infective Endocarditis. CVDs: Cardiovascular Diseases

and Diagram 1, a significant portion of students demonstrated poor knowledge, particularly in ischemic heart disease (73%) and Hypertension (53%). Conversely, only approximately 7.8% of participants achieved good knowledge scores. With a 95% confidence interval, this translates to a range of 16.3% to 0.3% of the general population potentially achieving good scores.

Table 1. Statistical indicators of the standardized score of the senior dental students' knowledge towards patients with cardiovascular disorders

Standardized Knowledge Scores	Mean	Standard Deviation	Minimum	Maximum	95% Confidence Interval	
					Lower Limit	Upper Limit
Hypertension (0-100)	49.38	21.67	20.00	100.00	43.96	54.79
IHD (0-100)	33.44	23.65	0.00	100.00	27.53	39.35
IE (0-100)	65.23	26.58	0.00	100.00	58.59	71.87
Total (0-100)	48.21	16.88	14.29	85.71	44.00	52.43
P value			P<0.001			

IHD: Ischemic Heart Disease. IE: Infective Endocarditis. CVDs: Cardiovascular Diseases

Table 2. Knowledge level of senior dental students (%)

		No.	Percentage	95% Confidence Interval	
				Lower Limit	Lower Limit
State of Knowledge Towards Hypertension	Poor Knowledge	34	53.1%	41.0%	65.0%
	Average Knowledge	20	31.3%	20.9%	43.2%
	Good Knowledge	10	15.6%	8.3%	25.9%
	Total	64	100	0	0
State of Knowledge Towards IHD	Poor Knowledge	47	73.4%	61.8%	83.1%
	Average Knowledge	15	23.4%	14.4%	34.8%
	Good Knowledge	2	3.1%	0.7%	9.6%
	Total	64	100	0	0
State of Knowledge Towards IE	Poor Knowledge	10	15.6%	8.3%	25.9%
	Average Knowledge	38	59.4%	47.1%	70.8%
	Good Knowledge	16	25.0%	15.7%	36.5%
	Total	64	100	0	0
State of Knowledge Towards Common CVDs	Poor Knowledge	31	48.4%	36.5%	60.5%
	Average knowledge	28	43.8%	32.1%	56.0%
	Good knowledge	5	7.8%	3.0%	16.3%
	Total	64	100	0	0

IHD: Ischemic Heart Disease. IE: Infective Endocarditis. CVDs: Cardiovascular Diseases

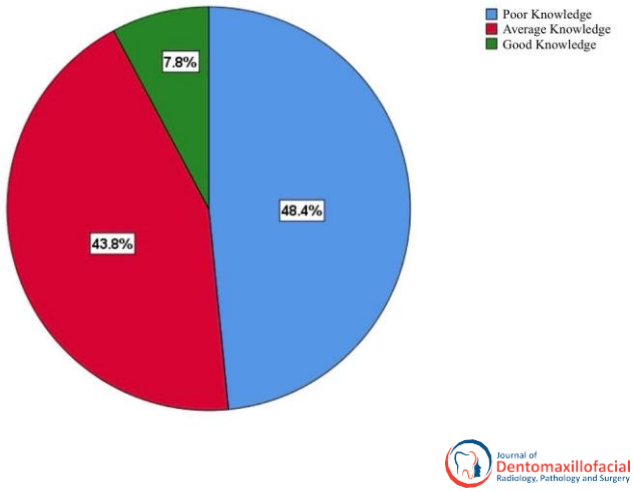

Diagram 1. Overall Level of Knowledge towards Managing Patients with Common Cardiovascular Diseases

Statistical analysis revealed no significant difference in knowledge scores based on gender. Additionally, no statistically significant correlation was found between GPA and knowledge scores ($P > 0.05$).

4. Discussion

Our study revealed that over 80% of senior dental students exhibited competency in selecting appropriate antibiotic types and dosages for Infective Endocarditis prophylaxis, contraindicating elective treatments for patients with uncontrolled hypertension, and applying general management principles for hypertensive patients. However, their knowledge peaked when it came to managing patients with Infective Endocarditis (Table 2).

In the case of IE, these results are consistent with Jamshidi et al. 's study (21), which evaluated general dental practitioners' knowledge about prophylactic antibiotic prescriptions for bacterial endocarditis in Hamadan in 2012. In their study, general dental practitioners had a 62.4% perception of cardiac diseases, a 64.9% knowledge of dental procedures requiring prophylaxis, and a 42.1% understanding of endocarditis prophylaxis regimens. Their overall knowledge was 56.1%, which was considered satisfactory.

Notwithstanding, Jordanian dentists have shown shortcomings in their knowledge and practice of IE (22). Similarly, Shati (23) reported that dentists in Southwestern Saudi Arabia have suboptimal knowledge regarding the usage of antibiotics for preventing IE.

In our study, senior dental students showed greater knowledge in terms of Infective Endocarditis compared to other diseases assessed. However, there remains a significant need to educate students about managing cardiac issues.

A higher understanding of IE might be linked to increased access to AHA guidelines over the past decade, as well as a greater knowledge of the indiscriminate use of antibiotics, which raises the risk of antimicrobial resistance, a growing concern that must be addressed to avoid its progression (12, 22).

Our study has revealed a lack of knowledge (less than 30%) in prescribing antianxiety and anesthesia drugs, as well as managing drug interactions for ischemic heart disease and hypertensive patients. Dentists need to minimize treatment-related stress, particularly for hypertensive patients, by establishing a good rapport and encouraging patients to express their concerns. Managing stress in hypertensive patients is crucial for reducing changes and catecholamine release, and low-stress appointments and pre-medication can help prevent blood pressure increases (24, 25).

Boghari's study(26) in 2018 showed that about 62.4% of dentists had a sphygmomanometer in their clinic, and 79.5% believed that treating patients with high blood pressure carries risks. However, only 13.3% measure the blood pressure of all patients before treatment, with 63.3% doing so only if the patient reports a problem. However, only 54.3% of dentists routinely used local anesthetics without epinephrine, which can be a consideration for patients with high blood pressure due to its potential vasoconstrictive effects. If a patient's blood pressure is 180/100 mmHg, 78.1% of dentists would urgently refer the patient and avoid elective dental treatments.

In assessing senior dental students' general knowledge

of treating patients with common cardiovascular disorders, it was noted that a significant percentage exhibited poor understanding, particularly for ischemic heart disease (73%) and high blood pressure (53%). The level of inadequate knowledge was found to be very high, based on the gathered data (Table 2).

Concordant with our findings, a 2022 survey done by Al-Mohaissen et al.(12) purposed to evaluate dentists' knowledge, perception, and practice, to manage cardiac patients. Regarding knowledge about cardiac conditions, 72% of dentists achieved an overall knowledge score <55%; however, their Infective Endocarditis scores were better. Dentists perceived cardiac patients as difficult to manage but wished to learn more about optimal management.

A comparative study was conducted in 2006 by Gill and Scully (27) to evaluate the knowledge and attitudes of medical and dental interns educating at University of Witwatersrand, Johannesburg, South Africa, regarding medical issues associated with dentistry, including Ischemic Heart Diseases, bleeding disorders, and viral diseases such as hepatitis or HIV. The study found that 63% of dental students had an average knowledge score, 37% had a good score, and none scored excellent or poor. In contrast, approximately 90% of medical students demonstrated poor knowledge of medical problems related to dentistry.

Cardiovascular diseases cause half of all deaths and account for 79% of non-communicable disease deaths in Iran. Furthermore, over 76% of the overall disease burden and the main contributor to catastrophic health expenses in Iran are associated with these diseases (28).

Patients with a history of systemic disease, including respiratory, cardiovascular, and convulsive conditions, account for 37.2% of dental referrals. These patients are at higher risk of accidents and emergencies during treatment, posing challenges for dentists. Appropriate modifications in treatment are crucial to prevent accidents, emphasizing the importance of dentists' knowledge and skill in managing such cases (29, 30).

Therefore, integrating comprehensive knowledge of CVDs into the dental education curriculum is essential. Additionally, retraining plans for graduated dentists should be in place to update guidelines and remind them of necessary procedures.

5. Conclusion

This study investigated the knowledge of senior dental students concerning prevalent cardiovascular diseases. The results identified a notable knowledge gap, particularly for ischemic heart disease and Hypertension. Although a well-established link exists between healthcare provider knowledge and patient outcomes in medicine [reference needed], further research is required to quantify the specific influence of dental students' knowledge of cardiovascular diseases on patient care within dentistry.

These findings nonetheless suggest potential benefits from incorporating a stronger emphasis on common systemic diseases, especially cardiovascular conditions, into dental education curricula. Enhancing the quality and quantity of education in this area could equip future dentists with the necessary knowledge and confidence to more effectively manage patients with these frequently encountered comorbidities. This aligns with the growing recognition of the importance of integrating systemic disease management into dental education to optimize patient care delivery.

Ethical Considerations

Compliance with ethical guidelines

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None.

Authors' contributions

Mohammad Samami: Conceptualization, Methodology, Writing - Review & Editing Matin Mardani: Resources, Investigation, Visualization Javad Kia: Data curation, Writing - Original Draft Elhaam Jafari: Project administration, Supervision, Funding acquisition

Conflict of Interests

The authors declare no conflict of interest.

Availability of data and material

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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