ORIGINAL RESEARCH

Cognizance of Dental Care in Congenital Heart Disease Patients among Medical and Dental Students

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Received on: 11 May 2026; *Accepted on:* 04 August 2026; *Published on:* xxxx

Abstract

Background: Globally, congenital heart disease (CHD) is one of the dominant birth disorders. Poor oral health in children with CHD increases the risk of developing infective endocarditis (IE), yet awareness of this link remains low among both parents and healthcare professionals.

Objective: To assess and compare the knowledge, awareness, and practices of medical and dental interns regarding oral health in patients with CHD.

Materials and methods: A cross-sectional questionnaire-based study was conducted among 100 medical and 100 dental interns using a validated 10-item questionnaire to assess their knowledge, awareness, and practices regarding CHD. Data were collected and compiled, and responses were analyzed statistically using statistical package for the social science (SPSS) version 25.0.

Results: Dental interns exhibited significantly greater awareness than medical interns regarding the oral health implications in CHD. A majority of medical interns lacked routine practices such as oral examination and referral for dental care in patients with CHD.

Conclusion: The study highlights a significant knowledge gap among medical interns regarding the oral-systemic link in CHD, underscoring the need for integrated educational interventions.

Keywords: Congenital heart disease, Dental caries, Dental students, Dentistry, Medical students.

Journal of Integrative Health Research (2026): 10.5005/jihr-11055-0043

Introduction

About 28% of all congenital birth abnormalities are CHD, one of the most prevalent congenital malformations.[1] Found in roughly 9 per 1,000 live births, CHD affects an estimated 1.35 million babies worldwide each year.[2,3] Infective endocarditis (IE), a potentially fatal infection frequently brought on by oral bacteria entering the bloodstream as a result of poor oral hygiene, is especially dangerous for children with congenital heart disease (CHD).[4]

Despite the well-documented connection between oral health and systemic complications such as IE, there remains a significant gap in awareness among parents and healthcare professionals. Studies have shown that only 64% of parents of children with CHD are aware of the oral-systemic health connection, and a mere 37% received oral health guidance from pediatric cardiologists.[5] This knowledge deficit often leads to poor oral hygiene practices and missed opportunities for timely dental referrals, potentially increasing the risk of endocarditis in this vulnerable population.

Given the interdisciplinary nature of CHD management, future healthcare professionals—including both medical and dental practitioners—must be well-informed about the oral health needs of CHD patients. Therefore, the current study intends to evaluate and compare medical and dental interns who are about to join clinical practice in terms of their knowledge, awareness, and practices regarding dental care in CHD patients.

Aim

To evaluate and compare the knowledge, awareness, and practices regarding oral health in patients with CHD among medical and dental interns.

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How to cite this article: Fernandes S, Bafna Y, Patel D, *et al.* Cognizance of Dental Care in Congenital Heart Disease Patients among Medical and Dental Students. J Integr Health Res 2026;https://doi.org/10.5005/jihr-11055-0043.

Source of support: Nil

Conflict of interest: None

Objectives

- To evaluate the knowledge of medical interns about the oral health needs of CHD patients.
- To compare this knowledge with that of dental interns.

Null Hypothesis

Medical and dental interns do not significantly differ in their understanding of oral health in CHD patients.

Materials and Methods

Medical and dental interns participated in this questionnaire-based study. A total of 200 participants (100 from each group) completed a validated, reliable, self-designed 10-item questionnaire focused on knowledge, awareness, and practices related to dental care in CHD patients. The questionnaire was self-designed based on previously

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published literature related to oral health awareness in CHD pati ents.[4,6,7] All questionnaire items were set as mandatory in Google Forms. The validity of the questionnaire's content was scrutinized by an expert committee from the departments of Pediatric and Preventive Dentistry. The questionnaire assessed three domains: knowledge, awareness, and self-reported clinical practices related to oral health care in CHD patients. Duplicate responses were prevented by configuring the Google Form to limit submissions to one response per participant using the "Limit to 1 response" setting and allowing submissions only from institutional email IDs.

Validity

A thorough discussion with subject experts in pediatric dentistry produced the original array of items. Face validity was assessed by obtaining feedback from a convenience sample of 20 interns (10 medical and 10 dental interns) who were excluded from the study's final analysis. They evaluated the questionnaire regarding perspicuousness, relevance, and legibility of each item, following which minor wording and formatting changes were made.

Content validity was verified by an expert committee consisting of six experts (two pediatric cardiologists, two pediatric dentists, one public health dentist, and one biostatistician). The experts used a four-point rating system to individually determine the importance of each item. Both the Scale-Level Content Validity Index (S-CVI) and the Item-Level Content Validity Index (I-CVI) were computed. Expert advice led to the modification or removal of items with inadequate I-CVI. With I-CVI values ranging from 0.80 to 1.00, the expert panel ratings produced an overall S-CVI/Ave of 0.92, suggesting satisfactory content validity.

The validity of the final questionnaire was evaluated by principal axis factoring and varimax rotation for empirical factor testing. The Kaiser–Meyer–Olkin statistic and Bartlett's test of sphericity were used to evaluate sampling sufficiency, and factors were retained based on conceptual interpretability, factor loadings ≥0.40, and eigenvalues >1.0.

Reliability

Cronbach's alpha was used to appraise each subscale's internal consistency reliability (knowledge, awareness, and practice) as well as the total scale. To identify underperforming items, relationships between items and totals and the impact of removing each item on Cronbach's alpha were analyzed.

A subsample of interns who completed the questionnaire twice, 2 weeks apart, without receiving any instructional intervention, had their test-retest reliability assessed for both total and subscale scores. The intraclass correlation value (absolute agreement) for the two-way mixed-effects model was computed.

With I-CVI values ranging from 0.80 to 1.00, the expert panel ratings produced an overall S-CVI/Ave of 0.92, suggesting satisfactory content validity. With factor loadings ranging from 0.45 to 0.82, exploratory factor analysis indicated a three-factor solution that corresponded to the knowledge, awareness, and practice domains and explained 68% of the total variance.

With a Cronbach's alpha of 0.84 for the overall scale and 0.81, 0.79, and 0.83 for the knowledge, awareness, and practice subscales, respectively, there was good internal consistency in the final survey questions. ICC values for the total and subscale scores ranged from 0.78 to 0.88, indicating strong test-retest reliability in the subsample.

The questionnaire was administered anonymously, and responses were analyzed using SPSS software version 25.0. The survey covered various aspects, such as the perceived link between poor oral hygiene and IE, clinical practices regarding oral examinations, and efforts to create awareness among CHD patients. No predefined cutoff scores for adequate or inadequate knowledge were established. Responses were collected anonymously through Google Forms. Settings were configured to limit duplicate submissions to one response per participant.

Study Design

The questionnaire-based study was conducted during June–July 2025 among medical and dental interns from Narsinhbhai Patel Dental College and Hospital, Sankalchand Patel University, Visnagar, Gujarat, India.

Study Population and Criteria

The study population comprised medical and dental interns across the same institution. Participants were recruited using convenience sampling from eligible medical and dental interns available during the study period.

G*Power software (version 3.1.9.7) was used to estimate the sample size. The minimum necessary sample size was determined to be 143, assuming a two-tailed Chi-square test (goodness-of-fit), a medium effect size ($w = 0.3$), an alpha error probability of 0.05, a power of 0.80, and a one-to-one allocation ratio. To improve statistical reliability and account for possible partial responses, this was rounded up to 200 participants (100 in each group).

Inclusion criteria consisted of medical and dental interns.

Exclusion criteria included students below internship and individuals unwilling to participate or providing incomplete responses.

This convenience sampling approach was utilized to recruit available and eligible medical and dental interns during the designated study period.

The questionnaire was shared using Google Forms, and the responses were further collected and tabulated in Microsoft Excel 2010.

Ethical Approval

Ethical approval was not required for this questionnaire-based study as no invasive procedures, interventions, or experiments involving human subjects were performed. The study involved anonymous voluntary responses from interns, and no identifiable personal or clinical data were collected. The study was carried out in compliance with institutional and ethical guidelines for minimal-risk educational research.

Patient Consent Statement

Since the study did not include patients, therapeutic interventions, or the gathering of personally identifiable health information, patient consent was not necessary.

An information sheet outlining the study's purpose and data confidentiality was displayed on the primary landing page of the electronic survey. Participants were required to click an "I Agree to Participate" electronic consent checkbox before accessing and completing the 10-item questionnaire.

Response Rate

A total of 230 eligible medical and dental interns were initially contacted to participate in the study. Of these, 30 incomplete questionnaire responses were identified and excluded from the final analysis to ensure data integrity. No imputation methods were used for these missing data points. Ultimately, 200 participants

Table 1: Demographic information for the participants

Variable	*Category*	*Medical interns (n = 100)*	*Dental interns (n = 100)*	*Total (N = 200)*	*p-value*
Age (years)	Mean ± SD	24.1 ± 1.2	24.3 ± 1.1	24.2 ± 1.2	0.28
	21–23	38 (38.0)	35 (35.0)	73 (36.5)	0.72
	24–26	54 (54.0)	56 (56.0)	110 (55.0)	
	≥27	8 (8.0)	9 (9.0)	17 (8.5)	
Gender	Male	48 (48.0)	50 (50.0)	98 (49.0)	0.78
	Female	52 (52.0)	50 (50.0)	102 (51.0)	

Table 2: Response of interns to knowledge, awareness, and practice-based questions

Question	*Number of questions answered correctly*		*p-value**
	Medical interns	*Dental interns*	
Do you think maintaining oral health in pediatric patients is important?	100%	100%	–
Do you think Referral for Treatment of Primary Teeth is important?	59%	100%	0.00053
Do you encounter cardiac patients in the hospital?	100%	100%	–
Do you know oral health and CHD are related?	66%	94%	0.00071
Do you examine oral health during general examination?	18%	100%	0.000173
Have you encountered patient with IE?	82%	91%	0.097
Do you know poor oral health increases the risk of IE?	34%	95%	0.00048
Do you recommend oral health checkup by dentist?	80%	100%	0.00063
Do you create awareness among CHD patients/families regarding oral health?	16%	100%	0.00038
Do you emphasize on dental treatment at the time of diagnosis?	34%	100%	0.00160

**p*-values derived from the Chi-squared test or Fisher's exact test, depending on the circumstances. The significance level is $p < 0.05$

(100 medical interns and 100 dental interns) successfully completed the survey, yielding a final response rate of 86.9%.

Statistical Analysis

The obtained data were compiled in an Excel sheet (Office 2010). Using SPSS version 25.0 (IBM Corp, Armonk, NY, USA), descriptive statistical analyses were performed, including mean, frequency, percentage, and standard deviation. Frequencies and percentages were used to summarize the categorical variables. Medical and dental interns were compared using the Chi-squared test or, if suitable, Fisher's exact test. A statistically significant *p*-value was one that was <0.05.

Results

Each participant's demographic information is presented in Table 1, demonstrating no significant differences in age or gender distribution between the groups.

Ten questionnaire items assessing knowledge, awareness, and practices were included. Among respondents, 100 were medical interns and 100 were dental interns. The details regarding the responses of the medical and dental interns across the knowledge, awareness, and practice domains are listed in Table 2. Incomplete questionnaire responses were excluded from the final analysis. No imputation methods were used for missing data.

Discussion

This study underscores the crucial role of oral health in pediatric patients with CHD, a globally prevalent congenital anomaly with significant associated morbidity.[1–3] The unanimous acknowledgment by both medical and dental interns of the importance of oral health in this population aligns with global consensus, emphasizing the prevention of systemic complications such as IE through optimal oral hygiene.[4,5]

Despite this foundational awareness, significant disparities between medical and dental interns emerged. Dental interns showed higher knowledge and practices related to oral health referral for primary teeth treatment, routine oral examinations during general health assessments, and understanding the oral-CHD relationship (59–100% for medical interns, 100% for dental interns; $p < 0.05$). This divergence is consistent with previous investigations that report insufficient oral-systemic education in medical curricula, resulting in reduced oral health literacy among future physicians.[6–10] The data reveal that medical interns may underestimate the dental professionals' role in managing CHD-associated oral disease and the systemic implications of poor oral health.

Further, the risk of IE in CHD patients due to poor oral hygiene remains poorly recognized among medical interns, with only 34% aware compared with 95% of dental interns ($p < 0.05$). This finding corresponds with observations that untreated dental infections substantially increase the risk of bacteremia and subsequent IE, an often-fatal complication preventable through early dental care and appropriate prophylaxis. International cardiac and dental societies continue advocating for targeted antibiotic prophylaxis protocols and routine dental management for children with CHD to minimize adverse outcomes.[11,12]

Although some questionnaire items demonstrated very large differences between medical and dental interns (e.g., routine oral examination and oral health awareness practices), these findings should be interpreted with caution. Since the data were obtained through self-reported responses, the possibility of response bias, including social desirability bias, cannot be excluded. Dental interns may have been more inclined to report practices consistent with their professional training, whereas medical interns may have underestimated or underreported their routine practices. Nevertheless, these findings are likely to reflect genuine differences in undergraduate curriculum content,

clinical exposure, and emphasis on oral health education between the two disciplines.

Moreover, the low engagement of medical interns in counseling CHD patients and families about oral health (16 vs 100%, $p < 0.05$) highlights a critical gap, as effective patient education improves compliance with preventive regimens and clinical outcomes. Evidence suggests incorporating oral health modules and interprofessional education initiatives into medical training significantly enhances awareness and referral practices. These programs foster collaboration between medical and dental professionals, which is crucial for comprehensive CHD management.[13]

Additionally, children with CHD are prone to higher caries and periodontal disease prevalence, partly due to their chronic illnesses, dietary restrictions, and medication use. This emphasizes the necessity for integrated preventive strategies and routine dental assessments within their overall care plans. School-based oral health education and community outreach programs further contribute to improved oral health outcomes in this vulnerable group.

Limitations

First, convenience sampling was used to choose the sample from a single institutional location, which severely restricts the findings' applicability to medical and dental students across the country. Second, all of the data came from self-reported practices, which are prone to social desirability bias, causing individuals to overreport proactive clinical activities. Furthermore, a convenience sampling approach was utilized to recruit available and eligible medical and dental interns during the designated study period. This introduces significant selection bias, as the sample was drawn entirely from a single institutional location. Third, there were no predetermined, verified score thresholds in the study to classify absolute adequacy of knowledge. Last but not least, the study's design collected data at a particular point in time, making it impossible to make any inferences about the causes of curricular deficits.

Conclusion

The study identified comparatively lower awareness regarding oral health considerations in CHD among medical interns compared with dental interns. Further multicenter studies and incorporation of interdisciplinary educational components may help improve awareness and collaborative care. It highlights a significant knowledge gap among medical interns regarding the oral-systemic link in CHD, underscoring the need for integrated educational interventions.

Data Availability Statement

All data generated or analyzed during this study are included in this published article.

Acknowledgment

Nil.

Author Contributions

Conceptualization: Shoba Fernandes, Akanksha Singh; Methodology: Shoba Fernandes, Yash Bafna, Dharati Patel, Akanksha Singh; Data collection: Dharati Patel, Akanksha Singh; Writing – original draft: Shoba Fernandes, Akanksha Singh; Writing – review & editing: Akanksha Singh.

AI Use Declaration

AI tools (Grammarly and Quilbot) were used only for language editing; all intellectual content was developed by the authors.

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