Original Article

Oral Health Knowledge and Practices in Individuals with Chronic Systemic Conditions. A Cross Sectional Study

Syed Fareed Mohsin

ABSTRACT

Objective: To assess the oral health knowledge and practices among individuals with chronic systemic conditions.
Study Design: Observational / Cross-sectional study
Place and Duration of Study: This study was conducted at the Qassim University dental hospital over a period of seven months from Sep 2024 to April 2025.
Methods: A total of 297 participants with diagnosed chronic systemic conditions were recruited through convenience sampling. Data were collected via a structured electronic questionnaire covering demographics, medical history, oral health knowledge and practices, and perceived barriers. Descriptive statistics, Chi-square/Fisher's Exact Test, and Spearman's correlation were applied, with $p<0.05$ considered statistically significant.
Results: A total of 297 participants were included, with the majority aged over 60 years 108(36.4%) and predominantly male 209(70.4%). Diabetes 136(45.8%) and hypertension 111(37.4%) were the most common chronic conditions. A significant association was found between type of chronic illness and awareness of its impact on oral health ($p < 0.001$), with diabetic participants showing greater awareness. Similarly, self-reported medication-related oral health effects and receipt of oral health education were significantly associated with the type of condition ($p < 0.001$). Positive correlations were observed between oral health knowledge scores and practices like brushing, flossing, and dental visits, particularly among diabetic and hypertensive participants.
Conclusion: Oral health knowledge and practices differed significantly among individuals with chronic systemic conditions, with those having diabetes and other illnesses demonstrating better awareness and behaviors compared to hypertensive patients.

Key Words: Oral health, chronic diseases, diabetes, hypertension, knowledge, practices

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INTRODUCTION

Oral and systemic health are closely interconnected through a well-established bidirectional relationship[1,2]. Chronic conditions such as diabetes mellitus, cardiovascular disease, and hypertension are known to contribute to a range of oral health issues, including periodontal disease and tooth loss[1,3]. Furthermore, certain oral manifestations may serve as early signs of systemic illnesses, highlighting the integral role of oral health in maintaining overall health[3,4]. A growing body of research has consistently demonstrated associations between oral diseases and systemic disorders.

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Periodontal disease, in particular, has been linked to diabetes mellitus, metabolic syndrome, cardiovascular conditions, Alzheimer's disease, and negative pregnancy outcomes. The aging process, which is often accompanied by chronic illnesses, adds further complexity to the management of oral diseases.[3,4]

Oral diseases include a variety of preventable conditions such as dental caries and periodontal disease, both of which are closely linked to systemic health[5,6]. According to the World Health Organization (WHO), approximately 3.58 billion individuals were affected by oral diseases in 2016[5]. Over 100 systemic diseases and nearly 500 medications are known to produce oral manifestations, particularly among older adults[6]. This connection is further intensified by shared risk factors such as tobacco use, alcohol consumption, and obesity[5]. Inadequate awareness and limited understanding of the relationship between oral and systemic health have been associated with preventable hospital admissions (PPH), increased morbidity, and diminished quality of life[5]. Emphasizing preventive oral care through routine dental check-ups and good oral hygiene practices can play a vital role in improving quality of life and assisting in the control and prevention of chronic

illnesses, ultimately reducing their prevalence and related mortality[7-10].

The relationship between oral and systemic health, commonly referred to as the oral-systemic link, is well recognized. This connection is primarily mediated through shared inflammatory pathways, involving common markers such as pro-inflammatory cytokines (e.g., C-reactive protein, TNF-α, IL-1β, and IL-6), neutrophils, and white blood cells[6,11]. Systemic inflammation can exacerbate the development and progression of oral diseases, while oral pathogens entering the bloodstream may also trigger or worsen systemic inflammatory responses[6,12].

Evidence indicates that promoting oral health and implementing preventive strategies can help mitigate several shared risk factors linked to both oral and chronic systemic diseases. By improving patient awareness and education regarding the oral-systemic connection, healthcare providers can support individuals in managing their oral health as part of their overall well-being[13]. People living with chronic conditions such as diabetes, hypertension, and other long-term illnesses are at increased risk for oral health issues due to factors like systemic inflammation, immune dysfunction, and medication side effects. Despite this, oral health is frequently overlooked in the comprehensive care of these patients. Assessing their current knowledge and behaviour related to oral health is crucial for designing effective, condition-specific educational and preventive interventions. Therefore, the present study was conducted to evaluate oral health knowledge and practices among individuals with chronic systemic diseases.

METHODS

This cross-sectional observational study was conducted at Qassim University Dental Hospital over a period of seven months from Sep 2024 to April 2025. The ethical approval was obtained from the Ethical Review Committee of Qassim University with the reference # 24-06-02. The required sample size was calculated using Epi Info software, assuming a 50% incidence rate, a 5% margin of error, and a 95% confidence level, yielding a minimum required sample of 370 participants [13]. However, due to time and resource constraints, a total of 297 participants were included in the final analysis. Participants were recruited through convenience sampling from patients visiting the dental hospital during the study period. The inclusion criteria comprised individuals who were attending the dental hospital and had a diagnosed chronic systemic condition. Exclusion criteria included individuals with undiagnosed chronic systemic conditions and those who were unable to comprehend or complete the questionnaire due to language barriers or cognitive impairments.

Informed consent was obtained from all participants prior to data collection. Data were collected using a structured electronic questionnaire administered to eligible participants. The questionnaire was divided into several sections, including demographic characteristics such as age, gender, education level, and income; medical history detailing the type of chronic systemic condition, duration since diagnosis, and treatment regimen; oral health knowledge, which assessed awareness of oral hygiene practices, dental care routines, and the impact of chronic diseases on oral health; oral health practices including frequency of tooth brushing, flossing, dental visits, and use of oral hygiene products; and perceived barriers to maintaining good oral health.

The data was analyzed using SPSS software Version 22.0. Descriptive statistics were used to summarize the demographic characteristics of the participants, including age, gender, education level, type and duration of chronic systemic conditions. Associations between chronic systemic conditions and oral health knowledge variables were assessed using the Chi-square test and Fisher's Exact Test where appropriate. Spearman's correlation was applied to examine the relationship between oral health knowledge scores and oral health practices (brushing frequency, dental visits, flossing, and toothbrush replacement) within each chronic illness group. A p value of <0.05 was considered as statistically significant.

RESULTS

Table No.1: Demographic Characteristics of the Participants (n=297).

Variables		n(%)
Age group (Years)	18-30	16(5.4%)
	31-45	69(23.2%)
	46-60	104(35.0%)
	Over 60	108(36.4%)
Gender	Male	209(70.4%)
	Female	88(29.6%)
Education level	High school	160(53.9%)
	College	17(5.7%)
	Bachelor	96(32.7%)
	Master degree	23(7.7%)
Chronic systemic condition	Hypertension	111(37.4%)
	Diabetes	136(45.8%)
	Others(hypothyroidism, blood disorders, neurological problems)	50(16.8%)
Duration of systemic condition diagnosis	< 1 year	58(19.5%)
	1-5 years	124(41.8%)
	>5 year	115(38.7%)

A total of 297 participants were included in the study. The majority of participants were aged over 60 years 108(36.4%), followed by 46–60 years 104(35.0%), 31–

45 years 69(23.2%), and 18–30 years 16(5.4%). Males comprised a larger proportion of the sample 209(70.4%) compared to females 88(29.6%). Regarding educational background, more than half of the participants had completed high school 160(53.9%), while 96(32.7%) held a bachelor's degree. Among the chronic systemic conditions reported, diabetes was the most prevalent 136(45.8%), followed by hypertension 111(37.4%), and other conditions such as hypothyroidism, blood disorders, and neurological issues 50(16.8%). In terms of the duration since diagnosis of the systemic condition, 124(41.8%) of participants had been diagnosed within the past 1–5 years, 115(38.7%) for over 5 years, and 58(19.5%) were diagnosed less than a year ago, as presented in Table 1.

Table No.2: Association between Chronic Systemic Conditions and Oral Health Knowledge.

Variables	Chronic systemic conditions			
	Diabetes n(%)	Hypertension n(%)	Others n(%)	p-value
Can chronic diseases affect oral health?				
Yes	46(33.8%)	25(22.5%)	17(34.0%)	<0.001
No	7(5.1%)	60(54.1%)	6(12.0%)	
Not sure	83(61.0%)	26(23.4%)	27(54.0%)	
Have you noticed any impact of your medications on your oral health, such as dry mouth or changes in gum health?				
Yes	51(37.5%)	9(8.1%)	29(58.0%)	<0.001
No	85(62.5%)	102(91.9%)	21(42.0%)	
Have you ever received oral health education specific to your chronic systemic condition(s)?				
Yes	40(29.4%)	0(0.0%)	0(0.0%)	<0.001[a]
No	96(70.6%)	111(100.0%)	50(100.0%)	

Chi-square test
Fisher's Exact Test [a]

Table No.3: Correlation between Oral Health Practices and Knowledge score by Chronic Illness Group.

Knowledge scores	Diabetes		Hypertension		Others	
	(ρ)	p-value	(ρ)	p-value	(ρ)	p-value
Frequency of brushing (times/day)	0.222**	0.009	-0.060	0.535	0.818**	<0.001
Frequency of dental visits	0.686**	<0.001	0.815**	<0.001	0.991**	<0.001
Flossing frequency	0.708**	<0.001	0.750**	<0.001	0.548**	<0.001
How often should you replace your toothbrush?	0.581**	<0.001	0.128	0.181	0.176	0.222

Spearman's correlation

Table 2 presents the association between chronic systemic conditions and participants' awareness and experiences related to oral health. A statistically significant difference was observed among the three groups—diabetes, hypertension, and other systemic conditions—with regard to their perception of the impact of chronic diseases on oral health ($p < 0.001$). Among participants with diabetes, 46(33.8%) acknowledged that chronic diseases could affect oral health, whereas only 35(22.5%) of hypertensive participants and 17(34.0%) of those with other conditions shared this view. Notably, 60(54.1%) of participants with hypertension responded negatively to this question, and 83(61.0%) of diabetic participants were unsure. A significant association was also found between systemic condition type and self-reported medication-related oral health effects, such as dry mouth or changes in gum health ($p < 0.001$). More than half of the participants with other conditions, 29(58.0%) and 51(37.5%) of those with diabetes reported such effects, compared to only 9(8.1%) of hypertensive individuals. Furthermore, receiving oral health education tailored to one's systemic condition showed a highly significant association with the type of chronic illness ($p < 0.001$). While 40(29.4%) of diabetic participants had received oral health education, none of the participants in the hypertension or other condition groups reported receiving such education.

Table 3 presents the correlation between oral health practices and knowledge scores across the three chronic illness groups: diabetes, hypertension, and others. Among participants with diabetes, knowledge scores were positively and significantly correlated with frequency of brushing ($\rho = 0.222$, $p = 0.009$), frequency of dental visits ($\rho = 0.686$, $p < 0.001$), flossing frequency ($\rho = 0.708$, $p < 0.001$), and awareness of toothbrush replacement frequency ($\rho = 0.581$, $p < 0.001$). In the hypertension group, strong positive

correlations were observed between knowledge scores and both frequency of dental visits ($\rho = 0.815$, $p < 0.001$) and flossing ($\rho = 0.750$, $p < 0.001$), while no significant correlation was found with brushing frequency ($\rho = -0.060$, $p = 0.535$) or toothbrush replacement awareness ($\rho = 0.128$, $p = 0.181$). Among those with other systemic conditions, very strong positive correlations were noted between knowledge scores and brushing frequency ($\rho = 0.818$, $p < 0.001$), frequency of dental visits ($\rho = 0.991$, $p < 0.001$), and flossing frequency ($\rho = 0.548$, $p < 0.001$). However, no significant correlation was found between knowledge scores and toothbrush replacement awareness ($\rho = 0.176$, $p = 0.222$).

DISCUSSION

Recognizing the integral role of oral health in maintaining systemic well-being is crucial. The condition of the oral cavity not only mirrors but also influences overall health, emphasizing that comprehensive health cannot be achieved without adequate oral care[14]. Research has demonstrated that controlling oral inflammation, particularly from periodontal infections, can lead to a reduction in systemic inflammatory responses[15].

The present study aimed to assess oral health knowledge and practices among individuals with chronic systemic conditions, revealing notable variations between disease groups, particularly diabetes and hypertension. Diabetes mellitus emerged as the most prevalent chronic condition in the study, and diabetic participants demonstrated significantly greater awareness regarding the link between systemic disease and oral health compared to other groups. This aligns with existing literature, which consistently identifies diabetes as a major risk factor for periodontal disease due to its inflammatory and immunocompromised effects[16,17]. A recent systematic review also concluded with moderate certainty that patients with diabetes tend to have higher DMF (Decayed, Missing, and Filled teeth) scores[18], further supporting the present study's observation of increased oral health issues among diabetic individuals.

Interestingly, the present study noted significant positive correlations between knowledge scores and oral hygiene behaviors (such as brushing, flossing, and dental visits) in diabetic participants, suggesting that increased awareness can translate into better practices when appropriate education is provided. In contrast, past studies have also revealed that people with diabetes generally demonstrate inadequate oral health knowledge and practices. A study by Poudel et al. reported that less than half of diabetic individuals brush twice daily and only a quarter floss regularly, with just over half visiting a dentist annually[17].

In the present study, hypertensive participants showed limited awareness of oral health implications, with the majority either unaware or unsure about the connection between their condition and oral health and none reporting any received oral health education. These results are consistent with findings from Rasouli-Ghahroudi et al., who assessed knowledge, attitude, and practice (KAP) among patients with cardiovascular disease. Their study reported moderate knowledge levels but poor practice, highlighting that awareness alone may not suffice to drive behavior change, especially in the absence of practical interventions or health system support[19]. The lack of significant correlation between knowledge scores and oral hygiene behaviors such as brushing and toothbrush replacement in the hypertensive group from the present study further supports this perception.

A significant finding of the present study was the poor awareness regarding the impact of systemic conditions on oral health. Only 33.8% of diabetic patients, 25(22.5%) of hypertensive individuals, and 17(34.0%) of those with other conditions believed that systemic diseases could affect oral health. These findings are consistent with Akl et al., who reported that less than 50% of patients with chronic conditions globally understood the oral-systemic link. This lack of awareness is further supported by other systematic reviews[13], particularly in diabetic and pregnant populations, which reported consistently poor knowledge scores. In the present study, the particularly high percentage of diabetic patients who were unsure about the oral health implications of their condition, 83(61.0%) may highlight inadequate communication between healthcare providers and patients, as previously noted in the literature[20-23].

Moreover, the present study identified a significant association between systemic illness type and medication-related oral effects, such as dry mouth and gum changes, with higher reporting among diabetic and other-condition groups. Medication-related oral health side effects, such as dry mouth and changes in gum health, were reported most commonly by patients with diabetes 51(37.5%) and other conditions 29(58.0%), whereas only 9(8.1%) of hypertensive participants acknowledged such issues. This lack of awareness could be due to the absence of condition-specific oral health education, an association that was clearly demonstrated in our study, where only 40(29.4%) of diabetic participants received any oral health education, and none among hypertensive or other-condition participants did. This finding reflects the systemic neglect of oral health in chronic disease management, corroborating earlier research attributing poor oral health literacy to limited interdisciplinary communication and systemic healthcare gaps[20,21].

Regarding oral health practices, the present study found that knowledge scores were significantly and positively correlated with better oral hygiene behaviors, particularly in the diabetes group. This includes

stronger correlations with brushing frequency, flossing, dental visits, and awareness of toothbrush replacement. Similar positive correlations were observed in the other systemic conditions group, though awareness about toothbrush replacement remained low. In hypertensive patients, the strongest associations were found between knowledge and flossing or dental visits, while brushing frequency showed no significant relationship. This variability may stem from differing health behaviors or beliefs associated with specific chronic conditions, as suggested by previous studies indicating that health-seeking behavior, particularly among males, tends to be lower[20,24].

This study had some limitations, including a smaller-than-required sample size, use of convenience sampling, and reliance on self-reported data, which may introduce bias. The cross-sectional design prevents causal interpretations, and the single-center setting limits generalization. Despite these limitations, the findings emphasize the need for integrating oral health education into chronic disease care, particularly for hypertensive patients. Future studies with larger, diverse samples and longitudinal designs are recommended to better understand the link between systemic conditions and oral health.

CONCLUSION

This study concluded a significant association between chronic systemic conditions and oral health knowledge and practices. Participants with diabetes and other chronic illnesses demonstrated better oral health awareness and more consistent hygiene practices compared to those with hypertension. Strong correlations between oral health knowledge and practices, particularly dental visits and flossing, underscore the importance of tailored oral health education as an integral part of chronic disease management.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Syed Fareed Mohsin
Drafting or Revising Critically:	Syed Fareed Mohsin
Final Approval of version:	The above author
Agreement to accountable for all aspects of work:	The above author

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