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From Oral Dysbiosis to Systemic Wellbeing: Exploring Patient Perceptions of the Oral Gut Connection in Periodontal Health

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A B S T R A C T

Periodontal health is not only associated with oral conditions but may also be related to systemic health through interactions between oral and gut microbiota. However, patients' understanding of the oral-gut connection remains insufficiently explored. This study aimed to explore periodontal patients' perceptions regarding the relationship between oral health, oral dysbiosis, and systemic wellbeing. A qualitative exploratory approach was employed involving 15 periodontal patients selected through purposive sampling. Data were collected through in-depth interviews and analyzed using thematic analysis. The findings identified themes related to limited patient understanding, experiences of periodontal disease, and the need for integrated health education. This study contributes to the development of patient-centered periodontal education approaches based on patient perspectives.

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INTRODUCTION

Periodontal health has increasingly been recognized as an integral component of overall health rather than merely a localized condition affecting the oral cavity. Periodontitis is a chronic inflammatory disease initiated by dysbiotic microbial communities and characterized by progressive destruction of tooth-supporting tissues. Clinically, chronic periodontitis requires comprehensive management approaches because disease progression may result in damage to periodontal supporting structures and functional impairment if not appropriately treated. Therefore, understanding periodontal disease characteristics and its management is essential to support prevention and long-term periodontal health maintenance (Andriani & Chairunnisa, 2019). Recent advances in microbiome research have shifted the understanding of periodontal disease from a simple bacterial infection model toward a complex ecological imbalance involving microbial–host interactions and immune dysregulation (Hajishengallis & Chavakis, 2021).

The concept of the oral–gut connection has become an emerging area of interest in microbiome science, suggesting that oral microorganisms and their metabolic products may interact with the gastrointestinal microbial ecosystem through continuous microbial transmission and immune-mediated pathways. Recent evidence indicates that oral dysbiosis associated with periodontal inflammation may contribute to alterations in gut microbial composition and systemic inflammatory responses, although the underlying mechanisms remain under investigation (Kitamoto et al., 2020; Tanwar et al., 2023). These findings have expanded the clinical perspective of periodontal health by emphasizing the potential relationship between oral microbial balance and systemic wellbeing.

Despite increasing scientific evidence regarding the biological mechanisms underlying the oral–gut connection, current research has predominantly focused on microbiological, immunological, and clinical outcomes. Previous studies have extensively investigated microbial composition, inflammatory biomarkers, and associations between periodontitis and systemic disorders, including metabolic and gastrointestinal diseases (Sanz et al., 2020; Tanwar et al., 2023). However, the human dimension of this emerging concept remains insufficiently explored, particularly regarding how patients understand, interpret, and respond to information about the relationship between oral health and systemic conditions.

Patient perception represents an essential yet underexplored component in periodontal healthcare because individual understanding influences preventive behavior, treatment adherence, and engagement with healthcare services. Previous qualitative research has demonstrated that patients with periodontal disease experience significant psychosocial impacts and that their perceptions of disease extend beyond clinical symptoms to influence daily functioning, emotional wellbeing, and healthcare decisions (Horne et al., 2020). However, existing patient-centered studies have mainly focused on the experiences of periodontal disease and treatment outcomes, while limited attention has been given to patients' understanding of emerging biomedical concepts such as oral microbiome imbalance and oral–gut interactions.

Furthermore, recent quantitative studies examining knowledge, attitudes, and practices among periodontal patients have identified gaps in disease awareness and self-management behaviors (Zhao et al., 2024). Nevertheless, questionnaire-based approaches provide limited insight into why patients develop certain beliefs, how previous experiences shape their understanding, and what factors influence their interpretation of oral–systemic health relationships. Therefore, a qualitative exploration is required to uncover the deeper meanings, perceptions, and experiences that shape patients' views regarding the connection between periodontal health and systemic wellbeing.

Based on this research gap, the present study aims to explore patients' perceptions and experiences regarding the oral–gut connection within the context of periodontal health. Specifically, this study seeks to understand how periodontal patients conceptualize the relationship between oral health and systemic wellbeing, how their experiences with periodontal conditions influence their health beliefs, and what factors contribute to their awareness or misunderstanding of oral–systemic interactions. By focusing on patient narratives, this research provides a complementary perspective to existing biological and clinical investigations.

This study contributes theoretically by extending oral–gut connection research beyond microbiological mechanisms toward a patient-centered understanding of health perception and behavior. Practically, the findings may support the development of more effective periodontal health education strategies that integrate oral and systemic health perspectives. Understanding patients' perceptions may assist dental professionals in designing communication approaches that improve awareness, encourage preventive behaviors, and promote a more holistic model of periodontal care.

LITERATURE REVIEW

Oral Dysbiosis as a Conceptual Framework in Periodontal Disease Development

The understanding of periodontal disease has shifted from a pathogen-specific infection model toward an ecological disease model involving microbial community imbalance and host susceptibility. The concept of oral dysbiosis describes a state in which microbial equilibrium within the oral ecosystem is disrupted, resulting in functional changes that promote inflammation and tissue damage. Recent microbiome studies have demonstrated that periodontal destruction is not caused by a single microorganism but by complex interactions among microbial communities, environmental factors, and host immune responses (Lamont et al., 2020). This ecological perspective provides an important theoretical foundation for understanding periodontal disease as a consequence of disturbed microbial homeostasis.

Furthermore, periodontal disease progression is also associated with the activity of subgingival microorganisms that contribute to alterations in the periodontal environment. The biological activity of periodontal-associated bacteria highlights the importance of understanding microbial communities and their interactions in the development of periodontal inflammation. Therefore,

investigation of microbial characteristics within the periodontal ecosystem provides additional insight into the mechanisms underlying oral dysbiosis and periodontal disease progression (Isnaini et al., 2024).

The dysbiosis framework further explains that microbial communities associated with periodontal disease may manipulate host immune responses, leading to persistent inflammation and progressive periodontal tissue destruction. Curtis et al. (2020) emphasized that periodontal pathogens should be understood within the context of microbial communities rather than as isolated organisms because disease progression depends on ecological changes within the oral environment. Therefore, oral dysbiosis represents not only a biological process but also an important concept for communicating periodontal disease risk and prevention. However, most studies remain focused on microbial mechanisms, while patient interpretation of this concept remains insufficiently understood.

The Oral–Gut Axis: Linking Oral Microbiota with Systemic Health

The relationship between oral microbiota and gastrointestinal health has gained increasing attention through the emerging concept of the oral–gut axis. This concept proposes that microorganisms originating from the oral cavity may influence intestinal microbial composition through repeated microbial transmission, particularly under conditions of oral microbial imbalance. The oral cavity and gastrointestinal tract represent interconnected microbial environments where disturbances in one ecosystem may affect microbial stability in another (Dziarski & Gupta, 2021).

Recent evidence indicates that oral microorganisms associated with periodontal inflammation may contribute to systemic immune activation and inflammatory regulation beyond the oral cavity. Studies investigating microbiome interactions have suggested that oral-derived microorganisms may influence intestinal homeostasis and inflammatory conditions through microbial migration and immune modulation (Kitamoto et al., 2022). These findings have expanded periodontal research by introducing the possibility that maintaining oral microbial balance may contribute to broader health outcomes. Nevertheless, current research primarily evaluates biological pathways, whereas the social and behavioral dimensions of this concept remain less explored.

Periodontal Health Through the Perspective of Patient-Centered Healthcare

Patient-centered healthcare emphasizes that effective disease management requires understanding not only biological conditions but also patients' experiences, beliefs, and interpretations of illness. Within periodontal care, patient perception influences motivation for preventive behavior, acceptance of treatment recommendations, and long-term disease management. The way patients understand periodontal disease may determine whether they consider oral health maintenance as a routine preventive practice or merely a response to symptoms.

Recent studies have demonstrated that limited awareness of periodontal disease remains a challenge because many individuals underestimate the significance of gingival inflammation and do not recognize periodontal disease as a chronic condition requiring continuous management (Borgnakke, 2021). Furthermore, patients' health beliefs are shaped by personal experiences, social

environments, and communication with healthcare providers. Therefore, investigating patient perception provides important information for developing effective oral health promotion strategies.

Previous Research on Oral-Systemic Health Awareness and Periodontal Experiences

Previous investigations have provided substantial evidence regarding the association between periodontal disease and systemic conditions. Research has explored links between periodontal inflammation and metabolic disorders, cardiovascular diseases, and inflammatory conditions, demonstrating that periodontal health should be considered within a broader healthcare framework (Huck et al., 2021). However, these studies primarily used clinical measurements and epidemiological approaches, providing limited insight into patients' understanding of these relationships.

Studies focusing on patient experiences have highlighted that individuals with periodontal disease often experience challenges related to awareness, symptom recognition, and healthcare-seeking behavior. Qualitative approaches have shown that patients frequently interpret periodontal symptoms based on personal experiences rather than scientific understanding, which may contribute to delayed preventive actions (Nanninga et al., 2022). Although these studies provide valuable insight into patient experiences, they have not specifically examined how patients perceive emerging concepts related to oral microbiome imbalance and oral–gut interactions.

In addition, recent research on health literacy has emphasized that understanding complex biomedical concepts requires effective communication between healthcare professionals and patients. Oral-systemic health relationships represent a scientifically complex topic that may not be easily understood without appropriate educational approaches (Horowitz & Kleinman, 2021). Therefore, exploring patients' perceptions regarding the oral–gut connection may reveal specific educational needs and communication barriers within periodontal healthcare.

METHODOLOGY

Research Design and Approach

This study employed a qualitative exploratory research design to investigate periodontal patients' perceptions regarding the oral–gut connection in the context of periodontal health. A qualitative approach was selected because this study aimed to understand individual experiences, interpretations, and meanings constructed by patients regarding the relationship between oral health and systemic wellbeing. Rather than examining numerical associations between variables, this approach focuses on exploring how individuals perceive and describe a particular phenomenon within their social and health context.

The exploratory design was considered appropriate because patients' understanding of oral dysbiosis and the oral–gut connection represents an emerging area that has been predominantly investigated from biological and clinical perspectives. Through qualitative exploration, this study seeks to identify patterns of perception, experiences, and informational needs related to

periodontal health. The phenomenon analyzed in this research was the patient interpretation of the relationship between periodontal conditions, oral microbial imbalance, and systemic well-being.

Participants and Sampling Technique

The study participants consisted of adult patients with periodontal conditions who received dental care in Yogyakarta, Indonesia. Participants were selected using purposive sampling, in which individuals are intentionally chosen based on specific characteristics relevant to the research objectives. This sampling strategy enables researchers to obtain information-rich cases that can provide a deeper understanding of the phenomenon being studied (Creswell & Poth, 2024).

A total of 15 participants were included in this study. The number of participants was determined based on the principle of information saturation, where additional interviews no longer generated new categories or meaningful insights. In qualitative research, sample adequacy is determined by the depth and quality of information obtained rather than statistical representation.

The inclusion criteria consisted of participants who met the following requirements: (1) aged 18 years or older; (2) diagnosed with periodontal conditions; (3) had experience undergoing periodontal examination or treatment; (4) able to communicate their experiences clearly; and (5) willing to participate voluntarily. Participants who were unable to complete the interview process were excluded.

Data Collection and Research Instrument

Data were collected through semi-structured in-depth interviews. This technique was selected because it provides flexibility for participants to describe their experiences while allowing researchers to maintain consistency across interview sessions. Semi-structured interviews are commonly applied in qualitative health research to explore perceptions, beliefs, and personal experiences related to health phenomena (Merriam & Tisdell, 2024).

The interview guide was developed based on the research objectives and relevant concepts regarding periodontal health, oral dysbiosis, oral–gut connection, and patient-centered healthcare. The interview questions explored five main areas: patients' understanding of periodontal disease, awareness of oral–systemic relationships, perceptions regarding oral–gut interactions, experiences during periodontal care, and educational needs related to oral health.

Each interview was conducted individually in a comfortable environment and lasted approximately 30–45 minutes. Interviews were recorded with participant consent and transcribed verbatim for further analysis. Participant identities were anonymized using research codes to maintain confidentiality.

Research Procedure

The research procedure consisted of several sequential stages. The initial stage involved identifying the research problem through a literature review related to periodontal health, oral microbiome, systemic health relationships, and patient perception. The second stage involved designing the qualitative framework, preparing interview questions, and obtaining ethical approval before participant recruitment.

The third stage involved selecting participants according to predetermined inclusion criteria and conducting informed consent procedures. Data collection was performed through individual interviews until information saturation was reached. The fourth stage involved transcription, organization, and preparation of interview data for analysis.

The final stages involved qualitative data analysis, interpretation of emerging themes, and comparison of findings with existing theoretical perspectives. The research process was conducted systematically to ensure transparency and consistency throughout the study.

Data Analysis

The collected interview data were analyzed using thematic analysis. This analytical approach was selected because it allows researchers to identify, organize, and interpret meaningful patterns within qualitative data. Thematic analysis provides a structured process for examining participants' experiences while maintaining flexibility in developing themes from empirical findings (Braun & Clarke, 2022).

The analysis consisted of several stages, including data familiarization, initial coding, theme development, theme review, theme definition, and interpretation. During the coding process, meaningful statements from participants were identified and categorized based on similarities in content. Related codes were subsequently grouped into broader themes representing patients' perceptions and experiences.

The final analysis focused on identifying major themes related to patients' understanding of the oral–gut connection, interpretations of periodontal disease, experiences influencing health beliefs, and perceived needs for integrated oral health education. The quality of qualitative findings was maintained through systematic documentation of the research process and consistency between collected data and interpretation.

RESULTS AND DISCUSSION

Thematic analysis of semi-structured interviews with 15 periodontal patients conducted between June and July 2026 identified five major themes reflecting patients' perceptions and experiences regarding the oral–gut connection in periodontal health. The themes included: (1) periodontal disease as an underestimated oral health condition, (2) limited awareness of oral dysbiosis and the oral–gut connection concept, (3) personal experiences as a foundation for periodontal health awareness, (4) healthcare professionals as a primary source of oral-systemic health information, and (5) the need for integrated oral-systemic health education. These themes demonstrate that patients' understanding of the relationship between oral health and systemic wellbeing is shaped by personal experiences, previous exposure to health information, and communication with healthcare providers.

Periodontal Disease as an Underestimated Oral Health Condition

The first theme revealed that many participants initially perceived periodontal disease as a minor oral problem rather than a chronic condition requiring continuous attention. Participants commonly associated periodontal

problems with visible symptoms such as bleeding gums, tooth mobility, bad breath, and pain, while the underlying inflammatory process was rarely recognized. Several participants reported that they only sought dental care when symptoms became uncomfortable or interfered with daily activities. This perception was found across participants with different backgrounds and previous dental experiences. The findings indicate that periodontal disease was generally understood based on immediate symptoms rather than long-term health consequences.

One participant explained: "*I used to think that bleeding gums were just a normal problem. As long as my teeth could still be used for eating, I thought there was nothing serious. I only realized that gum health also needed attention after the dentist explained it to me.*" (Participant 4, June 2026). Another participant stated: "*I usually visit the dentist only when I feel pain. If my gums bleed easily or I have bad breath, I do not usually think that it requires an examination.*" (Participant 9, June 2026) A similar experience was described by another participant: "*Before, I did not really pay attention to my gum health because I thought the important thing was only preventing cavities.*" (Participant 13, July 2026).

These statements indicate that participants primarily understood periodontal health through visible symptoms rather than preventive health awareness. The recurring perception that periodontal problems are not serious unless accompanied by pain suggests that periodontal disease remains underestimated among patients. This theme highlights the gap between clinical perspectives of periodontal disease and patients' everyday understanding. The findings provide an important foundation for developing communication strategies that explain periodontal inflammation in a more accessible manner.

Limited Awareness of Oral Dysbiosis and the Oral–Gut Connection Concept

The second theme reflected participants' limited familiarity with the concepts of oral dysbiosis and the oral–gut connection. Most participants reported that they had never previously heard these terms before participating in the study. Participants generally understood oral bacteria only in relation to dental caries, gum disease, or infection. The possibility that changes in oral microbial balance could influence broader health conditions was considered a new and unfamiliar concept. This theme represents a significant knowledge gap between advances in microbiome research and patients' understanding of oral-systemic relationships.

One participant shared: "*I only recently learned that bacteria in the mouth are not only related to teeth. Before this, I thought bacteria only caused cavities or gum problems.*" (Participant 2, June 2026). Another participant explained: "*The term oral dysbiosis is something I have never heard before. If there is a connection between the mouth and the gut, I think that is new information that many people do not know about.*" (Participant 7, June 2026). A participant further stated: "*I think this concept is important, but it needs to be explained in simple language because ordinary patients may find medical terms difficult to understand.*" (Participant 11, July 2026).

The findings demonstrate that participants had limited exposure to emerging microbiome-related concepts despite increasing scientific attention toward oral–gut interactions. Participants did not reject the concept but expressed the need for explanations that connect scientific knowledge with

everyday health experiences. This theme represents the central contribution of the study by revealing how patients interpret an emerging biomedical concept that has mostly been examined from biological perspectives. The findings emphasize the importance of translating complex microbiome science into understandable patient communication.

Personal Experiences as a Foundation for Periodontal Health Awareness

The third theme demonstrated that personal experiences with periodontal symptoms played an important role in shaping participants' awareness and attitudes toward oral health. Participants commonly described changes in their behavior after experiencing symptoms such as gum bleeding, swelling, tooth mobility, or discomfort during eating. Before experiencing periodontal problems, many participants reported that maintaining oral health was not considered a priority. However, direct experiences with periodontal conditions encouraged them to seek information and improve their oral care practices. This theme shows that personal experiences became an important pathway through which patients developed awareness of periodontal health.

One participant described: "*Before experiencing gum problems, I did not really think much about dental care. After my gums started bleeding frequently and my teeth felt uncomfortable, I began looking for information about how to maintain my oral health.*" (Participant 5, June 2026). Another participant stated: "*Experiencing pain made me more aware. If people have never experienced it themselves, they usually think dental problems are not something important.*" (Participant 10, July 2026). Another participant added: "*After receiving periodontal treatment, I became more careful about maintaining oral hygiene because I do not want the same problem to happen again.*" (Participant 14, July 2026).

These accounts indicate that health awareness was often developed through lived experiences rather than preventive knowledge alone. Participants tended to recognize the importance of periodontal health after experiencing discomfort or functional limitations. This theme demonstrates that personal experiences influence the formation of health beliefs and motivate behavioral changes. Understanding these experiences may help healthcare professionals design preventive strategies that address patients before severe periodontal problems occur.

Healthcare Professionals as a Primary Source of Oral-Systemic Health Information

The fourth theme highlighted the important role of dental professionals in shaping patients' understanding of periodontal health and its possible relationship with systemic wellbeing. Participants reported that most information regarding periodontal disease was obtained during dental consultations rather than from independent sources. Several participants explained that professional explanations changed their perception of oral health and increased their awareness of the importance of periodontal care. The clarity of communication influenced how patients interpreted their condition. This theme emphasizes the role of healthcare interactions in bridging scientific knowledge and patient understanding.

One participant explained: "*I do not usually read much about dental health. Most of the information I receive comes from the dentist during examinations and consultations.*" (Participant 3, July 2026). Another participant stated: "*When the dentist explained the relationship between gum conditions and overall health, I understood better why treatment and prevention were necessary.*" (Participant 6, July 2026). A participant added: "*I think dentists have an important role because patients tend to trust information when it comes directly from healthcare professionals.*" (Participant 15, July 2026).

The statements indicate that healthcare professionals function as important mediators in transforming complex scientific information into understandable knowledge. Participants' understanding was strongly influenced by the explanations provided during healthcare encounters. This theme suggests that education regarding the oral–gut connection should emphasize effective communication rather than merely delivering information. Healthcare providers therefore play an essential role in developing patient-centered periodontal care.

The Need for Integrated Oral-Systemic Health Education

The fifth theme identified participants' need for more comprehensive education connecting oral health with general health conditions. Participants reported that dental education commonly focuses on brushing techniques, cleaning procedures, and treatment instructions, while explanations regarding broader health relationships remain limited. They believed that understanding the wider implications of periodontal health could increase their motivation to maintain oral hygiene. Participants emphasized that health information should be delivered using simple language that can be understood by the general population. This theme demonstrates the importance of developing educational strategies that integrate scientific evidence with patients' informational needs.

One participant stated: "*I think dental education should not only explain how to brush teeth but also explain why oral health is important for the whole body.*" (Participant 1, July 2026). Another participant explained: "*If people know that gum problems may not only affect the mouth, they might become more concerned about prevention.*" (Participant 8, July 2026). Another participant added: "*Information about the relationship between oral health and the body should be explained in simple language, not only using medical terms.*" (Participant 12, July 2026)

This theme demonstrates that patients require educational approaches that extend beyond conventional oral hygiene instructions. Participants showed interest in understanding periodontal health within a broader systemic context when information was presented clearly. The findings indicate that patient-centered education should balance scientific accuracy with communication accessibility. This supports the development of integrated periodontal education strategies that bridge the gap between biomedical knowledge and patient understanding.

Table 1. Summary of Emergent Themes

Theme	Main Findings
Periodontal Disease as an Underestimated Oral Health Condition	Patients commonly perceive periodontal disease as a local oral problem
Limited Awareness of Oral Dysbiosis and Oral–Gut Connection	Patients have limited understanding of microbiome-related oral-systemic concepts
Personal Experiences as a Foundation for Awareness	Disease experiences influence changes in health beliefs and behavior
Healthcare Professionals as a Source of Knowledge	Dental professionals influence patients' understanding of oral-systemic relationships
Need for Integrated Oral-Systemic Health Education	Patients require accessible education connecting oral and systemic health

The findings of this study provide a new perspective on the oral–gut connection by demonstrating that patients' understanding of periodontal health is not solely determined by biomedical information but is constructed through personal experiences, health beliefs, and communication processes. Previous studies regarding the oral–gut axis have predominantly focused on biological mechanisms, including microbial migration, inflammatory pathways, and interactions between oral and intestinal microbiota. Recent evidence suggests that periodontal disease may influence systemic health through complex host–microbiome interactions; however, these investigations have mainly used microbiological, molecular, or clinical approaches rather than exploring patients' interpretations of the phenomenon (Coote et al., 2026). Therefore, the primary novelty of this study is the introduction of a patient-centered interpretation framework of the oral–gut connection, shifting the research focus from "how oral microorganisms affect the body" toward "how patients understand and respond to this emerging scientific concept." This perspective expands current periodontal research by highlighting the human dimension behind the biological relationship between oral and systemic health.

The finding that participants perceived periodontal disease as a localized oral problem can be explained through the concept of illness representation **theory**, which states that individuals construct their understanding of illness based on symptoms, previous experiences, perceived causes, and expected consequences (Leventhal et al., 2016). In this study, patients mainly interpreted periodontal disease through visible signs such as gum bleeding, pain, and tooth mobility, indicating that their illness perception was dominated by immediate experiences rather than underlying inflammatory mechanisms. Similar findings were reported in the qualitative systematic review by Furquim et al. (2025), which identified that periodontal patients commonly had limited knowledge regarding disease progression and often understood periodontitis based on

symptoms and treatment experiences. However, that review primarily synthesized patients' general perceptions of periodontitis and treatment experiences, whereas the current study extends this understanding by specifically examining how patients interpret periodontal disease within the emerging context of oral–gut interactions. This difference demonstrates that patient perception research needs to move beyond conventional periodontal symptoms toward understanding how patients process new biomedical information.

The limited awareness of oral dysbiosis and oral–gut connection found in this study reflects challenges associated with **health literacy**, particularly the ability of individuals to access, understand, and apply complex health information. Oral dysbiosis represents an advanced microbiome concept that requires an understanding of microbial balance, inflammation, and systemic interactions, which may not be easily understood without appropriate communication strategies. Previous microbiome studies have demonstrated that periodontal disease involves ecological changes within microbial communities rather than the activity of a single pathogen, supporting the importance of explaining periodontal disease through a broader biological framework (Lamont et al., 2020). Nevertheless, previous investigations have primarily examined the mechanisms of dysbiosis rather than how patients perceive or interpret this concept. The present study contributes a new dimension by showing that patients are not necessarily resistant to scientific explanations; instead, they require appropriate translation of complex concepts into meaningful health information.

The role of personal experience in shaping periodontal awareness identified in this study is consistent with previous qualitative evidence showing that patients often modify their health behaviors after experiencing symptoms or functional impacts of disease. Furquim et al. (2025) reported that qualitative studies among periodontitis patients identified themes related to disease knowledge, treatment expectations, barriers, and the impact of periodontal conditions on daily life. However, previous studies primarily explored how periodontal disease affects patients' quality of life and treatment decisions, while the present study reveals how these experiences become a foundation for understanding broader oral-systemic relationships. This finding supports the assumption of patient-centered care theory, which emphasizes that healthcare interventions become more effective when they incorporate patients' values, experiences, and interpretations. Therefore, periodontal education should not only provide factual information but should also connect scientific explanations with patients' lived experiences.

The finding that dental professionals serve as the main source of oral-systemic health information emphasizes the importance of communication within patient-centered periodontal care. According to patient-centered care theory, effective healthcare requires collaboration between providers and patients through meaningful communication rather than one-directional information delivery (Epstein & Street, 2011). Previous studies on periodontal patients have shown that healthcare communication influences treatment

acceptance, motivation, and long-term disease management. Furthermore, recent research on the oral–gut axis has emphasized that translating biological evidence into clinical practice requires cooperation between dental and medical professionals because the concept involves multidisciplinary understanding (Tanwar et al., 2023). The present study extends this perspective by demonstrating that communication is not only important for treatment adherence but also essential for introducing emerging concepts such as oral dysbiosis and systemic wellbeing.

The final contribution of this study lies in its implication for future periodontal education and research. While previous studies have established biological evidence regarding the relationship between periodontal inflammation, microbiome imbalance, and systemic conditions, limited attention has been given to the patient's interpretation of these relationships. The novelty of this research is therefore positioned in bridging the gap between microbiome science and patient understanding, by demonstrating that the success of oral-systemic health integration depends not only on scientific discoveries but also on how knowledge is communicated and accepted by patients. Practically, these findings suggest that periodontal education should incorporate accessible explanations of oral–gut interactions to improve awareness and preventive behavior. This finding is consistent with previous community-based oral health education efforts, which demonstrated that structured dental health education can improve public awareness and understanding of oral health maintenance. Therefore, integrating oral-systemic concepts into periodontal education may represent an important strategy to enhance patient knowledge, encourage preventive behaviors, and strengthen engagement in periodontal care (Yuniawati et al., 2023). However, this study is limited by its qualitative design and the specific cultural and healthcare context of patients in Yogyakarta, which may influence transferability to other populations.

CONCLUSIONS AND RECOMMENDATIONS

This study concludes that patients' understanding of the oral–gut connection remains limited, although they recognize the importance of maintaining periodontal health. Patients generally perceive periodontal disease based on symptoms and personal experiences rather than through an understanding of microbial imbalance and systemic interactions. The findings highlight that the oral–gut connection should not only be approached as a biological phenomenon but also as a patient communication and health literacy issue. Integrating oral-systemic concepts into periodontal education may improve patients' awareness, preventive behavior, and engagement in periodontal care. Dental professionals are encouraged to develop clearer and more accessible communication strategies to bridge the gap between scientific knowledge and patient understanding.

FURTHER STUDY

Future studies should investigate patients' perceptions of the oral–gut connection across broader populations with different cultural, educational, and healthcare backgrounds. Quantitative studies may also be developed to measure the relationship between oral-systemic health literacy, preventive behavior, and periodontal treatment adherence. Furthermore, intervention-based research is recommended to evaluate whether integrated oral–systemic education programs can improve patient awareness and long-term periodontal health outcomes. Future research combining qualitative perspectives with clinical or microbiome-based assessments may provide a more comprehensive understanding of the interaction between biological mechanisms and patient experiences.

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