



Gums and Tums: The Oral–Gut Axis and the Role of Hygiene in Systemic Health

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Abstract

Objective: To review the emerging concept of the oral–gut axis and highlight the role of hygiene practices—including oral, perianal, perineal, hand, environmental, and food hygiene—in maintaining gut health and preventing systemic disease.

Design: Narrative review of peer-reviewed literature from 2000–2025.

Results: Oral and gut microbiomes are interconnected through shared microbial pathways and immune signaling. Hygiene practices across multiple domains influence microbial balance, reduce pathogen transmission, and mitigate risks of gastrointestinal and systemic disorders. Figure 1 illustrates the multidimensional hygiene framework supporting the oral–gut axis

Conclusion: A multidimensional hygiene framework—spanning oral care, perianal/perineal hygiene, hand hygiene, sanitation, and food safety—offers a holistic strategy to strengthen the oral–gut axis and promote health across the lifespan.

Keywords: Oral–Gut Axis; Hygiene; Microbiome; Sanitation; Systemic Health

Summary Box

What is already known on this topic

- Oral and gut microbiomes are linked through microbial translocation and immune signaling.
- Hygiene practices reduce pathogen load and prevent gastrointestinal infections.

What this study adds

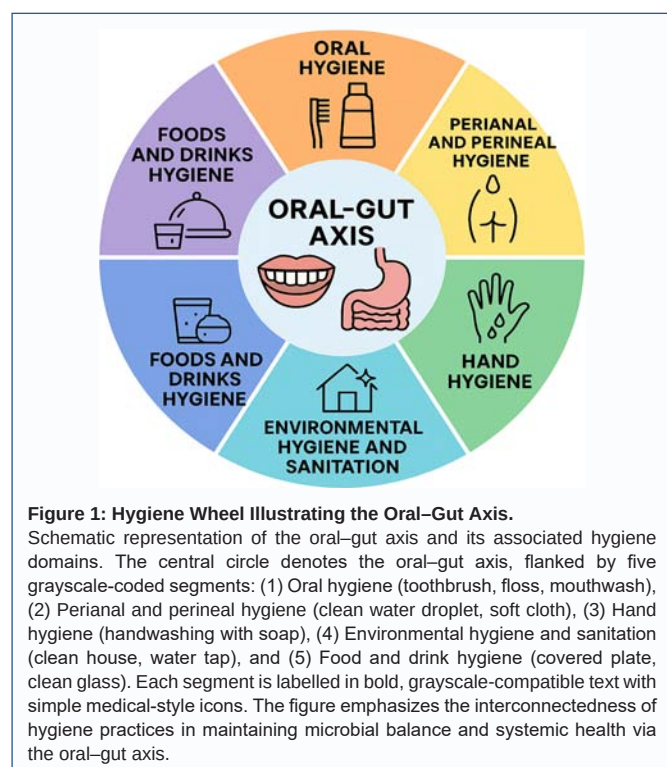
- Integrates oral, perianal, perineal, hand, environmental, and food hygiene into a unified oral–gut axis framework.
- Highlights hygiene as a systemic health determinant beyond infection control.

Introduction

The human body hosts diverse microbial ecosystems, with the oral cavity and gut representing two major hubs. Increasing evidence suggests bidirectional communication between these sites—the oral–gut axis—mediated by microbial migration, immune modulation, and metabolic signaling. Disruption of this axis contributes to conditions ranging from periodontitis and inflammatory bowel disease to systemic metabolic disorders. Hygiene practices, traditionally compartmentalized, can be reframed as interconnected strategies to preserve oral–gut health.

Oral Hygiene and the Oral–Gut Axis

- Oral dysbiosis (e.g., *Porphyromonas gingivalis*) has been linked to gut inflammation and systemic disease.



- Daily toothbrushing, flossing, and antimicrobial rinses reduce oral microbial load and systemic translocation.
- Periodontal therapy has shown downstream benefits on gut microbiota composition and systemic markers of inflammation.

Perianal and Perineal Hygiene

- Proper perianal hygiene prevents fecal contamination of the perineum and reduces risk of urinary tract and gastrointestinal infections.
- In infants, perineal hygiene is critical for preventing diaper dermatitis and microbial imbalance.
- In adults, hygiene practices reduce risk of anal fissures, hemorrhoids, and secondary infections.

Hand Hygiene

- Hands are vectors for oral-gut microbial exchange.
- Handwashing with soap significantly reduces diarrheal disease incidence, especially in children.
- Alcohol-based sanitizers complement soap-and-water hygiene in healthcare and community settings.

Environmental Hygiene and Sanitation

- Safe water, sewage disposal, and clean living environments reduce pathogen exposure.
- Poor sanitation perpetuates enteric infections and disrupts gut microbiota resilience.
- Hygiene interventions in schools and workplaces improve gastrointestinal health outcomes.

Food and Drink Hygiene

- Contaminated food and beverages are major sources of gut pathogens.
- Safe food handling, refrigeration, and pasteurization reduce microbial risks.
- Probiotic-rich foods may positively influence both oral and gut microbiomes.

Integrative Framework: Hygiene as a Systemic Health Strategy

The oral-gut axis underscores the need for integrated hygiene practices. Oral care, perianal/perineal hygiene, hand hygiene, sanitation, and food safety should be viewed as synergistic interventions. Together, they reduce microbial dysbiosis, strengthen mucosal immunity, and mitigate systemic inflammation.

Strengths and Limitations

This review synthesizes hygiene practices across domains into a unified oral-gut axis framework. Limitations include reliance on narrative synthesis rather than meta-analysis, and heterogeneity in study designs.

Patient and Public Involvement

Patients and communities were not directly involved in this review. However, public health relevance and patient-centered outcomes guided the selection of literature.

Discussion

This manuscript explores the emerging concept of the oral-gut axis and integrates hygiene practices across oral, perianal/perineal, hand, environmental, and food domains into a unified framework for systemic health.

Novelty and Clinical Relevance

- The review synthesizes evidence linking oral and gut microbiomes with hygiene practices across multiple domains.
- It reframes hygiene not only as infection control but as a systemic health determinant, relevant to clinicians, researchers, and public health practitioners.
- The proposed “hygiene wheel” schematic provides a practical, accessible tool for education and policy.

It will be of interest to readers concerned with microbiome science, hygiene practices, and systemic health promotion. It highlights novelty, clinical relevance, and compliance, while keeping the tone professional and concise.

Conclusion

The oral-gut axis represents a critical pathway in systemic health. Hygiene practices across oral, perianal, perineal, hand, environmental, and food domains collectively safeguard this axis. A multidimensional hygiene framework should be integrated into public health strategies, clinical care, and patient education.

Compliance Statements

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References

1. Kilian M, Chapple ILC, Hannig M, et al. The oral microbiome—an update for oral healthcare professionals. *Br Dent J*. 2016; 220(9): 411–417.
2. Schmidt TS, Hayward MR, Coelho LP, et al. Extensive transmission of microbes along the oral–gut axis. *Nature Microbiology*. 2019; 4(3): 326–336.
3. Curtis V, Cairncross S. Effect of washing hands with soap on diarrhoea risk in the community: systematic review. *Lancet Infect Dis*. 2003; 3(5): 275–281.
4. Prüss-Ustün A, Bartram J, Clasen T, et al. Burden of disease from inadequate water, sanitation and hygiene. *Trop Med Int Health*. 2014; 19(8): 894–905.
5. WHO. Food safety. World Health Organization. 2023.