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Digital oral health biomarkers: A public health use

AlHassan, A.K., Zaric, S., Sabbah, W.*
Faculty of Dentistry, Oral & Craniofacial Sciences, King's College London, United Kingdom

Background:

Poor oral health imposes significant social, psychological, and economic burdens on individuals, communities, and healthcare services. Advancements in digital sensors and oral biomarkers offer a potential avenue for a novel public health strategy in preventing, diagnosing, and monitoring oral health conditions.

Objectives:

To review currently available digital instruments to detect biomarkers for oral diseases (dental caries, periodontal diseases, and oral cancer) in the saliva, and evaluate their potential impact on dental public health.

Methods:

A search in the literature across seven databases was performed in February 2024 to investigate the recent developments in digital tools to detect saliva biomarkers to diagnose dental caries, periodontal disease, and oral cancer. The search utilized keywords such as biomarkers, digital, diagnosis, saliva, caries, periodontal diseases, and oral cancer.

Results:

After eliminating duplicates and irrelevant articles, only 21 remained out of the initial 98 identified. For dental caries the most promising sensors and smartphone-based technologies rely on detecting phosphate ions in saliva. However, further attention and research are required to advance this field. For periodontal diseases, various sensors designed for home use are currently being developed. Many rely on detecting C-reactive protein, matrix metalloproteinase-8, and interleukin 1β detection. For oral cancer, significant advancements are being made with self-reporting tests capable of detecting microRNA and tumour markers through electrochemical techniques or fluorescence.

Conclusion:

While biomarkers represent a significant advancement in diagnosing and preventing oral diseases, additional research is required to facilitate their implementation for the general public.

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Correspondence to:

Aseel Alhassan

Email: k23099316@kcl.ac.uk

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