



Oral microbiome research – a call for equity and inclusion

[Special issue of Community Dental Health, to be disseminated at the ‘The oral microbiome – from cells to populations’ International Association for Dental Research symposium, March 2024, New Orleans, USA]

L. M. Jamieson

Australian Research Centre for Population Oral Health, Adelaide Dental School, University of Adelaide, South Australia 5005, AUSTRALIA

Over 700 oral bacterial species have been identified in human populations, with ~200 bacterial species identified in any given individual mouth. The relationship between the oral microbiome and health is evidenced in many studies, with dysbiosis (a shift from a healthy to less healthy state of microbial community) associated with dental caries, periodontitis, halitosis and oral cancer. However, oral microbiome research to date has focused primarily on European populations, particularly those in large urban centres housing academic institutions with access to research funding. Key anthropological perspectives examining the sociocultural, epidemiological, genetic and environmental factors that influence the oral microbiome have also been Euro-centric. Very little is known about how the oral microbiome mediates both oral and general disease risks specifically within Indigenous and other vulnerable populations. Undertaking oral microbiome research in under-served communities requires consideration of many issues often unfamiliar in the broader research community, including being acceptable, relevant and of perceived benefit to the communities being studied. Research materials need to be managed respectfully in a culturally safe way, sharing/translating the knowledge obtained. These approaches will likely provide unique insights into the complex connections between environment and biology, people and place, and culture and science in relation to the oral microbiome. The ongoing development of oral microbiome research must facilitate frameworks that are equitable and inclusive to better enable clinical and scientific expertise within marginalised communities.

We aim, in this special issue, to provide an overview of the history of oral microbiome research, and to show how the relative exclusivity of oral human microbiome research means the study populations used to date do not have the diversity required to fully appreciate human genetic or behavioural influences. This, in turn, provides a weak basis upon which to understand the complex roles of the oral microbiome, with insufficient diversity in study cohorts limiting the ability of important novel traits in under-studied populations to be identified. We have authors from the United States, United Kingdom and

Australia, including Indigenous Australia, whose engaging papers both elucidate the far-reaching influence of the oral microbiome in oral and general health, and the multi-faceted shortcomings of oral microbiome research to date that has been largely Eurocentric in focus. Specifically, this special issue: (1) presents an overview of the oral microbiome at a cellular level; (2) describes how the oral microbiome is associated with systemic health and mental health conditions; (3) provides a sociological lens on the limitations of oral microbiome research to date that has focussed on white, cultural non-diverse populations, and; (4) provides examples of novel, cutting edge approaches to treatments involving the oral microbiome to improve oral, general and social and emotional wellbeing. The papers form the basis of a symposium at the 102nd General Session of the International Association of Dental Research held March 2024 in New Orleans, in the United States.

Nath describes how much of the oral microbiome research to date has overlooked the huge potential for dental public health interventions. She stresses that future oral microbiome research needs to both recognise and embrace population diversity to better enable equity in future public health practices. One example is through population-level interventions involving oral microbiome transplantation. Hedges provides examples of inequities in oral microbiome research through an Indigenous Australian lens and by use of the CONSIDER framework. Challenges include cultural safety obstacles, longer completion time of studies due to community consultation practises and extensive travel, and resources required to recruit staff with the necessary cultural humility.

Lala posits that inclusion in oral microbiome research needs to mitigate racial capitalism. Suggestions include working with partnering communities to co-design studies, and ensuring marginalised communities have the power to establish agendas. She argues that agendas focusing on inclusion need to acknowledge the much larger anti-oppression social reforms needed to address health inequities to truly create meaningful inclusion. Weyrich emphasises how development of equitable oral microbiome transplant (OMT) technology requires a tremendous

amount of planning to ensure that inequities aren't in fact widened. This will require clear leadership with a wide range of stakeholders, including those from marginalised communities, policy makers and technology developers to ensure that equitable societal benefit is equally matched with return on investment. Through such partnerships, OMT technology has potential to become a model for other emerging health intervention advances that have potential to benefit all of society.

In conclusion, the papers inform researchers, clinicians and policy makers on the intractable role of the oral microbiome in both oral and general health; understanding its history and current shortcomings. Examples are provided of the increasingly sophisticated techniques for identifying, measuring and modelling how the oral microbiome impacts population oral health research, including limitations of current approaches. Implications of addressing (or not addressing) the issues of equity and inclusivity of oral microbiome research at an international level are discussed, including the role of advocacy and engaging with health policymakers to both identify and increase comprehension of the far-reaching impacts, and many guises, of Eurocentric oral microbiome research that may lead to misinformed policy.