RESEARCH ARTICLE

Oral bacteria detection among children with cancer in a tertiary teaching hospital in Kuala Lumpur, Malaysia

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ABSTRACT

This study sought to determine the prevalence of pathogenic and non-pathogenic bacteria in the oral cavities of children with cancer. There were 68 paediatric patients with cancer who were included in this study. Oral swab samples from the dorsum of tongues and mouth floors of these patients were subjected to culture, staining, and molecular methods to detect the bacteria. The overall prevalence of gram-positive and gram-negative bacteria was 79.4% (54/68; 95% CI = 68.4 – 87.3) and 25% (17/68; 95% CI = 16.2 – 36.4), respectively. *Streptococcus salivarius* and *Streptococcus parasanguinis* were the predominant pathogenic gram-positive bacteria, while *Neisseria subflava* and *Neisseria perflava* were the most common pathogenic gram-negative bacteria. The results revealed that the number of bacteria isolates recovered in patients receiving cancer treatment was higher (55.9%) than those who had not received treatment (16.2%). Therefore, more isolated pathogenic bacteria were observed post-therapy (54.4%). Pathogenic organisms can have significant implications on patient health. Awareness of the types of bacteria inhabiting the oral cavity is essential to predict and prevent dental problems, and their associated systemic complications. Findings on the diversity of oral microflora can also provide a better understanding of the aetiology of oral diseases in paediatric patients receiving cancer treatment.

Keywords: Oral bacteria; paediatric; cancer; gram-staining; molecular method.

INTRODUCTION

The oral cavity is the second most complex microbiota in the body after the gut (Verma *et al*., 2018; Zhang *et al*., 2018; Kitamoto *et al*., 2020). Nearly 800 microbial species have been identified, mainly bacteria, fungi, viruses, and parasites (Sampaio-Maia *et al*., 2016; Verma *et al*., 2018; Zhang *et al*., 2018). In healthy individuals, these microbial communities serve as commensals that can influence the host immune system to maintain homeostasis (Mira *et al*., 2017). However, if the balance is disrupted, such as in the immuno-compromised host, the oral cavity will be colonized by potentially pathogenic species, leading to various diseases (Idris *et al*., 2017). Some of these pathogens may be responsible for life-threatening infections.

Despite significant advances in treatment and supportive care, cancer predisposes patients to serious infections (Villafuerte *et al*., 2018; Daugëlaitë *et al*., 2019; Nivoix *et al*., 2020). Cancer itself or chemotherapy can disrupt the intricate balance between commensal bacteria and the host defence mechanism, resulting in the spread of potentially life-threatening infections leading to ruptures in the oral mucosal tissues (Villafuerte *et al*., 2018; Bunetel *et al*., 2019), resulting in severe oral mucositis (Hong *et al*., 2019), oral candidiasis (Bertolini & Dongari-Bagtzoglou, 2019), gingivitis (Curtis *et al*., 2020), viral mucosal eruptions, and cellulitis (Crescente *et al*., 2018; Miranda-Silva *et al*., 2020). The oral microflora may subsequently be replaced by potentially pathogenic organisms like *Staphylococcus aureus, Pseudomonas aeruginosa,* and *Candida* species (Kong *et al*., 2015; Bunetel *et al*., 2019).

Within the oral cavity, bacterial populations result from the dynamic relationship between pathogens and commensals (Bowen *et al*., 2018). Oral bacteria have been implicated in causing bacterial endocarditis (Abranches *et al*., 2018), aspiration pneumonia (Maraki & Papadakis, 2015), osteomyelitis in children (Castellazzi *et al*., 2016), preterm low birth weight (Ye *et al*., 2020), coronary heart disease (Liu *et al*., 2020; Priyamvara e*t al*., 2020), and cerebral infarction (Patrakka *et al*., 2019). The incidence of bacteremia following dental procedures has been well documented (Cahill *et al*., 2017; Fernández *et al*., 2018). Oral mucositis has been