Association of Microbiota with Oral Potential Malignant Disorder: A Mini Review

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors designed the experiments and wrote the manuscript. Both authors read and approved the final manuscript.

ABSTRACT

Most of the oral squamous cell carcinoma (OSCC) are often preceded by oral potentially malignant disorders (OPMDs). OPMDs are defined as oral mucosal lesions and conditions which are at increased risk for undergoing alteration to oral cancer. OPMDs grow in a complex tissue microenvironment to acquire oral squamous cell carcinoma (OSCC) characteristics. Oral microbiota associated with OPMD may appear as potential biomarkers as these species may help in the diagnosis and prognosis of OPMD to OSCC. This association of microbiota to OPMD may be helpful in the early treatment before the initiation of oral cancer. This article reviews the literature on association between microbiota and Oral potential malignant disorders.

Keywords: Oral potential malignant disorders (OPMD); microbiota; pre-cancer; biomarkers.

1. INTRODUCTION

92-95% of carcinoma of oral cavity are squamous in nature [1]. Most of the OSCC are preceded by oral potentially malignant disorders [2,3]. World Health Organization defined potentially malignant disorders (PMDs) as Oral mucosal disorders with increased risk of cancer.
transformation [3] Oral potentially malignant disorders (OPMDs) are defined as oral mucosal lesions and conditions which are at increased risk for undergoing alteration to oral cancer [4]. OPMDs includes Leukoplakia, Erythroplakia, oral lichen planus, oral submucous fibrosis, discoid lupus erythematosus, actinic cheilitis, palatal keratosis associated with reverse smoking, epidermolysis bullosa and dyskeratosis congenital [5]. The more frequent oral potential malignant disorders are leukoplakia, erythroplakia, and oral submucous fibrosis. The cancer transformations of oral mucosal disorders including leukoplakia [6], erythroplakia [7], and submucous fibrosis [8] are well recorded.

Oral microbiota associated with OPMD may appear as potential biomarkers as these species allow the diagnosis of OPMD and may even permit early treatment before the start of oral cancer [9,10]. The malignant transformation of OPMDs to oscc may be prevented by correct diagnosis and timely intervention [11].

OPMD exhibits diagnostic challenges and with the increased risk of cancer development not only complicates prognosis but also decreases treatment effectiveness [12-14].

It was noticed from the study that F. nucleatum can potentially promote tumor growth [15,16]. Even though microbes such as F. nucleatum can increase tumor development, many studies observed these lesions late in the malignant process and as there are lesser studies on review of oral microbiota associated with OPMD than with oral cancer, this review was done to know the association between oral microbiota and OPMD with the key question: “association of microbiota with oral potential malignant disorder”.

Table 1. Studies on association of microbiota and oral potential malignant disorder

<table>
<thead>
<tr>
<th>Authors</th>
<th>Year</th>
<th>Sample type</th>
<th>Microbial assessment platform</th>
<th>Major finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOK Shao et al.</td>
<td>2017</td>
<td>Oral swab</td>
<td>16s rDNA Sequencing</td>
<td>Prevotella melaninogenica, P. veroralis Megasphaera micronuciformis in OPMD</td>
</tr>
<tr>
<td>Feng et al. [17]</td>
<td></td>
<td></td>
<td></td>
<td>lesions</td>
</tr>
<tr>
<td>Divya Gopinath et al. [18]</td>
<td>2020</td>
<td>WMF</td>
<td>16s rRNA metagenomics</td>
<td>higher levels of Bacteriodetes were noticed in oral leukoplakia (LKP) samples</td>
</tr>
<tr>
<td>Abdrazak Amer et al. [19]</td>
<td>2017</td>
<td>Oral swab</td>
<td>qpcr</td>
<td>lower levels of Firmicutes and an increased levels of Fusobacteria in the oral leukoplakia patients</td>
</tr>
<tr>
<td>G. Décis et al. [20]</td>
<td>2019</td>
<td>Oral biopsy</td>
<td>Metagenome sequencing</td>
<td>relative abundance of Fusobacterium nucleatum, was elevated and relative abundance of Streptococcus mitis was decreased in OPMD lesions.</td>
</tr>
<tr>
<td>Wang K et al. [21]</td>
<td>2016</td>
<td>Saliva</td>
<td>MiSeq sequencing</td>
<td>More levels of Porphyromonas and Solobacterium and Prevoletella melaninogenica and with a significantly less Cellulosimicrobium, and Campylobacter were found in OLP patients</td>
</tr>
<tr>
<td>He Y et al. [22]</td>
<td>2017</td>
<td>Buccal scraping</td>
<td>high-throughput 454 pyrosequencing.</td>
<td>more levels of Fusobacterium, Leptotrichia and Lautotropia in OLP lesions</td>
</tr>
<tr>
<td>M. Y. Chen et al. [23]</td>
<td>2020</td>
<td>saliva</td>
<td>high-throughput sequencing of the bacterial 16S rRNA gene</td>
<td>higher prevalence of Fusobacterium genera in pre-cancers</td>
</tr>
<tr>
<td>Pushkar et al. [24]</td>
<td>2012</td>
<td>Oral tissue</td>
<td>16s rRNA Sequencing</td>
<td>Megasphaera micronuciformis in the tumor tissue in the oral cavity of patients with OPMD</td>
</tr>
<tr>
<td>MOK Shao et al.</td>
<td>2017</td>
<td>Oral swab</td>
<td>Culture-independent 16S rRNA approaches</td>
<td>OPMD is associated with firmicutes and bacteroidetes</td>
</tr>
<tr>
<td>Feng et al. [25]</td>
<td></td>
<td></td>
<td></td>
<td>OPMD is associated with Prevoletella multiformis</td>
</tr>
<tr>
<td>Sakamoto et al.</td>
<td>2005</td>
<td>Oral cavity</td>
<td>16S rRNA gene sequence analysis</td>
<td>OPMD is associated with Lactobacillus salivarius</td>
</tr>
<tr>
<td>Iwamoto et al. [27]</td>
<td>2010</td>
<td>Oral tissue</td>
<td>16s rDNA Sequencing</td>
<td></td>
</tr>
</tbody>
</table>
2. CONCLUSION

Through this review, the main findings of the studies on oral microbiota associated with oral potential malignant disorder have been summarized and with the results showing the association of bacteria with OPMD, it is concluded that oral microbiota have been found to be associated with oral potential malignant disorders. The studies summarized in this review has provided a lot of relevant data on the association of bacteria with OPMD and also help in improving the design of further studies.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

Disorders, Pathology & Oncology

Microbial Decsi Rothia, Leptotrichia, Campylobacter Exhibits of Potentially Malignant Oral Leukoplakia


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