Oral Hygiene and Metabolic Syndrome

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Poor oral hygiene is the primary cause of common oral diseases and has been found to be associated with low-grade inflammation, suggesting its potential link to metabolic syndrome (MetS).

oral hygiene dental plaque oral bacteria tooth brushing interdental cleaning dental visit metabolic syndrome

1. Introduction

Metabolic syndrome (MetS), a clustering of abdominal obesity, hyperglycemia, hypertension, and dyslipidemia, represents a growing public health concern globally [1]. Besides socioeconomic status (SES) [2], smoking [3], diet [4], and physical activity [5], oral diseases, such as periodontal diseases and dental caries, are associated with MetS [6][7][8]. Poor oral hygiene is the primary cause of common oral diseases and is associated with low-grade inflammation [9], suggesting its potential link to MetS [10].

Although several epidemiological studies have reported the association of oral hygiene status [11] and care [10][12] with MetS, some studies found no such association [13][14]. To date, there has not been a systematic review conducted on the topic. A summary of evidence can provide a better understanding of the potential relationship and help healthcare practitioners deliver more targeted care. This systematic review and meta-analysis aimed to evaluate the associations of oral hygiene status and care with MetS.

2. Methods

Briefly, a systematic search of the PubMed and Web of Science databases from inception to 17 March 2021, and examination of reference lists was conducted to identify eligible studies. The inclusion criteria include observational studies that examined the association of oral hygiene status (e.g., oral hygiene index, plaque index, plaque score) or care (i.e., tooth brushing, interdental cleaning, and dental visit) with MetS. Two authors independently conducted study selection, data extraction, and quality assessment of the studies. Any ambiguities or disagreements were resolved by consensus. Meta-analysis was conducted separately for different types of exposure (i.e., oral hygiene status, tooth brushing, and interdental cleaning). A random-effects model was applied to pool the effects of oral hygiene status and care on MetS. Potential sources of heterogeneity were assessed using prespecified subgroup analyses by study design and country.

3. Results

Thirteen studies met the inclusion criteria and had sufficient methodological quality. Overall, good oral hygiene (OR = 0.30; 95% CI = 0.13–0.66), frequent tooth brushing (OR = 0.68; 95% CI = 0.58–0.80), and frequent interdental cleaning (OR = 0.89; 95% CI = 0.81–0.99) were associated with a lower risk of MetS. While heterogeneity was minimal for interdental cleaning (I^2 = 27%), there was substantial heterogeneity for oral hygiene status (I^2 = 91%) and tooth-brushing frequency (I^2 = 89%). The association between dental visits and MetS was evaluated only in a study by Tanaka et al. It was found that dental visits were not significantly associated with MetS (OR = 1.10; 95% CI = 0.77–1.55) [10].

Subgroup analysis

The inverse association between oral hygiene status and MetS was only observed in the subgroup of case-control studies. Subgroup analysis of oral hygiene status by study design reduced heterogeneity to less than 50%. Frequent tooth brushing was consistently associated with a lower risk of MetS in all subgroup analyses. However, high heterogeneity was still observed among these studies with a cross-sectional design. While subgroup analysis of tooth-brushing frequency by country reduced heterogeneity, it remained above 50%.

4. Conclusion

Our study found that there might be inverse associations of oral hygiene status, tooth-brushing frequency, and interdental cleaning with MetS. However, substantial heterogeneity for tooth-brushing frequency and inconsistent results for oral hygiene status in subgroup analyses were observed. There was insufficient evidence on the association between dental visits and MetS. Further well-conducted studies, preferably of longitudinal design, are needed to confirm the associations of oral hygiene status and care with MetS and to explore their underlying mechanisms. Research on this topic will provide a valuable contribution to our current understanding of the interrelationship between oral health and MetS.

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