Literature Review of The Impact of Missing Teeth on Cognitive Decline

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Introduction

Cognitive decline and dementia are serious health concerns, especially among older adults. While there are various factors that can contribute to cognitive decline and dementia, recent research has suggested a potential link between missing teeth and an increased risk of these conditions. The theory is that when people have missing teeth, they may have difficulty chewing and swallowing certain foods, which can lead to poor nutrition and potentially impact brain health. Additionally, poor oral hygiene and untreated gum disease can lead to inflammation, which has been linked to cognitive decline and dementia.

Methods

- A comprehensive literature search was conducted using PRISMA.
- ProQuest, EBSCO, and PubMed databases studies published in English from January 2012 to August 2022 were used.
- Initial and full-text screening, data abstraction, and study quality assessment were conducted using the Cochrane risk of bias tool.
- Cognitive decline and/or dementia were evaluated as outcomes in longitudinal studies that used periodontal health as an exposure.
- To determine if poor periodontal health increases the risk of cognitive decline and dementia, random effects pooled estimates with 95% confidence intervals were created (pooled odds ratio for cognitive decline and hazards ratio for dementia).
- The quality of the available evidence was evaluated using quality assessment criteria, and heterogeneity between trials was quantified using I2.

Results

- The search yielded 280 articles.
- Fifty-one studies were selected for detailed screening after removing the duplicates.
- The relationships between tooth loss with cognitive deterioration were not consistently reported. Thirty-two studies confirmed the association and concluded that tooth loss is a risk factor for cognitive decline.
- Nineteen studies did not provide evidence to support this association.
- The contradictory findings are probably explained by (i) confounders factors used in their models (e.g., Covid-19, renal disease, diabetes, heart disease), (ii) different study samples (e.g., small convenient sample), and (iii) statistical methods (e.g., cross-sectional study, randomized clinical trials). More importantly, the concurrent effect of tooth loss and other systemic conditions have been rarely studied using longitudinal data.
- The data on the association between missing teeth and cognitive degeneration are inconclusive.

Discussion

- Following a thorough systematic review of the research studies, we found a strong correlation between poor periodontal health and the risk of dementia and cognitive decline.
- Low periodontal health, overall tooth loss, and partial tooth loss were linked to dementia, poor periodontal health, and impaired cognition. Yet, the overall caliber of the evidence was poor.
- Most studies had a significant risk of bias, particularly studies of cognitive decline, which generally recruited participants over the age of 65, had a shorter follow-up, and included heterogeneous exposure (such as tooth count, PPDs, and ABL) and outcome evaluations (different cognitive tests).

Reverse Causality:

- With estimates for tooth loss becoming statistically insignificant, analysis of dementia studies with less than five years of follow-up revealed a general weakening of the influence of poor periodontal health on dementia as opposed to the longitudinal studies greater than or equal to ten years.
- This suggests that some of the relationships between a missing tooth and cognitive decline may have been the result of reverse causality.
- A research duration of 10 years is less likely to eliminate the possible impacts of cognitive impairment on periodontal health because the neuropathological and cognitive alterations leading to dementia develop over a long time.

Interestingly, poor periodontal health had stronger associations with a cognitive decline across all models, including all measures of poor periodontal health, periodontitis-specific measures, overall tooth loss, complete tooth loss, and partial tooth loss.

- These analyses excluded studies where dementia/cognitive status at baseline was unclear. There are two possible explanations for this surprising observation.
- The broad definition of cognitive decline in the available research caught the whole spectrum of effects, suggesting that periodontal health may be a risk factor for numerous types and severity levels of cognitive decline (not only dementia).

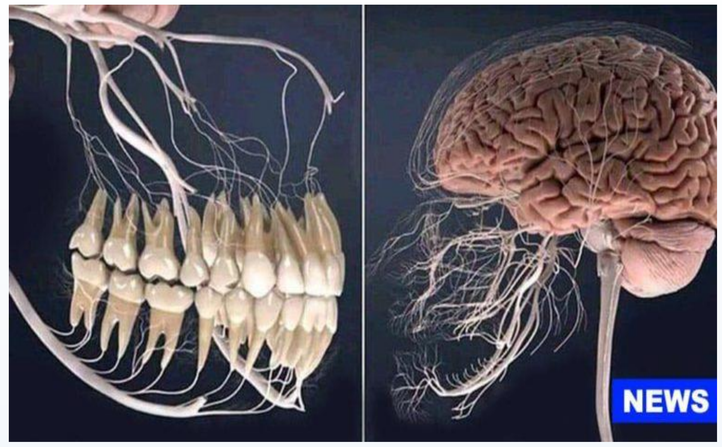
Strengths and Limitations:

- This review included the full range of periodontal deterioration, including tooth loss, in contrast to earlier reviews that mainly concentrated on either periodontitis or tooth loss alone, or on cognitive decline or dementia alone.
- Although there are other conditions that can lead to tooth loss, periodontal disease is one of the most common reasons in older people, who are also more likely to develop dementia.
- There could be internal validity issues with the quality assessment standards. In addition, it was impossible to take into account the intensity, duration, and course of periodontal treatment. The precise reason for tooth loss remained a mystery.

Clinical recommendation:

- Given the effect of cognitive impairment on periodontal health, oral health professionals must be in a position to monitor and act on early changes in periodontal health and oral self-care, but only if dental health services are sustained over time and sufficient oral health support is given at home when deterioration occurs.

Conclusion



- Both dementia and cognitive decline may be made more likely by poor periodontal health.
- The quality of the evidence was generally poor, and more research is still needed on how periodontal disease and cognitive health interact.
- From a clinical standpoint, our findings highlight the significance of monitoring and managing periodontal health in the context of dementia prevention
- The evidence currently available is insufficient to identify the best ways to identify at-risk individuals early on and prevent cognitive decline. There is a need of conducting more studies using longitudinal data to confirm the relationship between oral conditions and cognitive decline.

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