

DETERMINANTS OF TOOTH LOSS IN PREGNANT WOMEN: A REVIEW OF THE LITERATURE

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ABSTRACT

Pregnancy may cause changes in the oral cavity because of physiological factors. Tooth loss during pregnancy is a common oral health concern. Our study aimed to review the literature for determinants of tooth loss during pregnancy. We searched MEDLINE, Cochrane, CINAHL via EBSCOhost, ScienceDirect, and Google Scholar. Six relevant articles were included in the review. Several factors were significantly associated with tooth loss among pregnant women. The demographic factors included parity, place of residence, and household size. The psychological factor was defined by lifetime anxiety. The dietary factors included the intake of magnesium and the consumption of vegetables other than those that are yellow and green. The behavioral factors included active smoking, passive smoking, and the duration since the woman's last dental visit. Our findings suggest that it is imperative to provide oral health education during prenatal visits. Other recent and well-designed studies are needed to confirm the findings of this review. Understanding the mechanisms underlying tooth loss during pregnancy is critical to design successful prevention and intervention programs that can improve maternal and child health outcomes.

Key words: Prenatal care, Oral health, Pregnancy, Preventive dentistry, Dental care, Primary healthcare.

Introduction

During pregnancy, the placenta releases high levels of estrogen and progesterone, which cause certain changes in many tissues [1, 2]. The effects of pregnancy on oral tissues have been demonstrated in clinical studies [3]. Women's hormonal exposure during pregnancy affects their periodontal health throughout their lives since the periodontal tissues contain androgen, estrogen, and progesterone receptors [4-6]. It has been shown that estrogen influences fibrous collagen synthesis and maintenance [7]. Additionally, progesterone plays a direct role in the reabsorption and formation of bone in the periodontium [8, 9].

Periodontal disease is associated with many systemic diseases, such as pregnancy complications [10, 11]. In comparison to mothers with healthy periodontium, mothers who have attachment loss are more likely to give birth to low birth weight babies [12-15]. Previous studies revealed that preterm birth and periodontal disease are significantly associated [12, 16, 17]. Lopez *et al.* reported that periodontal therapy decreased the risk of preterm birth and low birth weight in pregnant women with periodontitis.

Approximately more than one third of pregnant women suffer from gingivitis [18]. It is characterized by red, swollen, and inflamed gums which, if left untreated, may lead to periodontitis, which may result in progressive bone loss and tooth loss. According to Lieff *et al.*, around 40% of pregnant women have periodontitis [19]. Many cultures believe that pregnancy leads to tooth loss, which is

exemplified by the old German saying "every child costs the mother one tooth" [20-22].

Tooth loss is an irreversible condition that negatively impacts oral and general health [23]. Increased risk of chronic inflammatory changes in the gastric mucosa, cancer of the upper gastrointestinal tract and pancreas, gastric ulcers, chronic kidney disease, non-insulin dependent diabetes mellitus, obstructive sleep apnea, hypertension, heart failure and ischemic heart disease and the possibility of stroke [24-30]. There is evidence that tooth loss is associated with impaired Oral Health-Related Quality of Life (OHRQoL), and the severity of that impairment is influenced by the location and distribution of tooth loss [31]. Loss of teeth can result in chewing, speaking, smiling, and difficulties [32, 33]. In addition to cosmetic problems which may lead to social isolation, psychological problems, such as embarrassment and low self-esteem [34, 35].

It is crucial to understand disease indicators to develop a solid prevention strategy to combat this chronic morbid condition. In this literature review, we aimed to summarize the determinants of tooth loss during pregnancy. This can help in promoting public awareness and educating pregnant women on the importance of dental follow-up during pregnancy.

Materials and Methods

The following databases were searched in June 2022: MEDLINE, Cochrane, CINAHL via EBSCOhost, ScienceDirect, and Google Scholar. The search terms

included “tooth loss” OR “teeth loss” AND “pregnancy” OR “pregnant”. There were no date or language restrictions.

A total of 24 articles were compiled in Mendeley reference manager and duplicates were removed. After removing the duplicates, 21 articles were included in the abstract screening, and 10 articles were included in the full-text screening (Figure 1). The characteristics of the studies included in this review are summarized in Table 1.

Results and Discussion

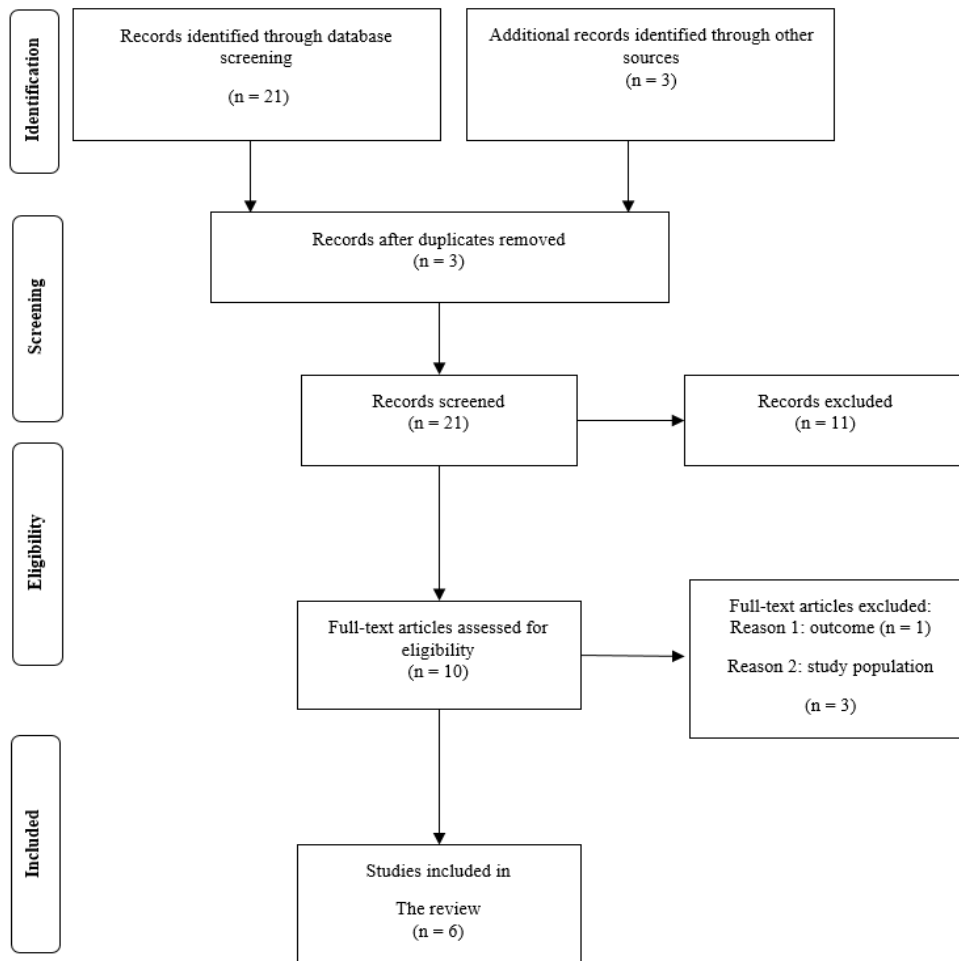


Figure 1. Flow diagram of the selection of articles

Table 1. The characteristics of the included studies

Author, year	Location	Study design	Sample size	Age in years (mean/ range)	Exposure and its measurement	Outcome and its measurement	Main findings
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Wandera <i>et al.</i> , 2009 [36]	Mbale region, Eastern Uganda	Cross-sectional	713 pregnant women at about 7 months gestational Age who underwent clinical examination	Mean age: 25.5 ± 6.6 years Age range: ≤20 - 45 years	Socio-demographic factors, parity, dental care utilization, and oral hygiene care Assessed by face-to-face interview	Tooth loss Measured by clinical examination	The prevalence of tooth loss in urban areas was 42.5% and in rural areas was 33.8%, respectively. After adjusting for confounders, tooth loss was significantly associated with the household size (AOR:1.5; 95%CI: 1.0-2.5), parity (AOR:0.4; 95%CI: 0.2-0.8), and last dental visit (AOR:0.04; 95%CI: 0.02-0.1).
Silveira <i>et al.</i> , 2016 [37]	USA	Cross-sectional	402 pregnant women responded to the 2010 Behavioral Risk Factor Surveillance System	Pregnant women aged 18 years and above Mean age was not reported	Lifetime anxiety, lifetime depression, and current depression Lifelong anxiety and depression were assessed using the Anxiety and Depression Module (ADM). Current depression was assessed using the modified version of the Patient Health Questionnaire 8 (PHQ-8).	Tooth loss Assessed by self-administered questionnaire	The prevalence of tooth loss in pregnant women was 21.2%. Lifetime anxiety was significantly associated with tooth loss among pregnant women (AOR: 3.30, 95% CI:1.01-10.77). Lifetime depression and current depression were not associated with tooth loss among pregnant women (AOR: 1.45, 95% CI: 0.54-3.85 and AOR: 1.18, 95% CI: 0.44-3.16 respectively).
Tanaka <i>et al.</i> , 2006 [38]	Japan	Cross-sectional	1002 pregnant women (The Osaka Maternal and Child Health Study)	Mean age: 29.8 years Age range: 15 to 44 years	Mineral intake: magnesium, calcium, copper, iron, zinc, and phosphate Assessed by validated self-administered questionnaire of dietary intake in the past month	Tooth loss Assessed by self-administered questionnaire	The prevalence of tooth loss was 25.6% in pregnant women. 21.4% of respondents reported losing one to four teeth, while 4.2% reported losing five or more teeth. There was a significant inverse relationship between magnesium intake and tooth loss when comparing the highest quartile of magnesium intake with the lowest quartile (AOR: 0.64, 95% CI: 0.42-0.99). Tooth loss was not associated with calcium, phosphate, iron, zinc, or copper consumption.

Tanaka <i>et al.</i> , 2007 [39]	Japan	Cross-sectional	1002 pregnant women (The Osaka Maternal and Child Health Study)	Mean age: 29.8 years	Fruits and vegetables intake Assessed using a validated, self-completed past month dietary history questionnaire	Tooth loss Assessed by self-administered questionnaire	The fourth quartile of consumption vegetables other than yellow and green vegetables was negatively associated with tooth loss compared to the first quartile (AOR: 0.64; 95% CI: 0.42-0.98). This association showed a significant linear trend (p=0.04). There was no association between tooth loss and vitamins, insoluble fiber, fruits, yellow and green vegetables, and grains.
Tanaka <i>et al.</i> , 2008 [40]	Japan	Cross-sectional	1002 pregnant women (The Osaka Maternal and Child Health Study)	Mean age: 29.8 years	Beverage consumption and its frequency: milk, coffee, green tea, black tea, cola, 100% fruit juice Assessed by validated self-administered diet history questionnaire in the past month	Tooth loss Assessed by self-administered questionnaire	High consumption of coffee was negatively associated with tooth loss among pregnant women in comparison to low consumption (AOR:1.52, 95% CI: 1.04-2.22). Intermediate consumption of green tea was negatively associated with tooth loss among pregnant women in comparison to low consumption (AOR: 1.53, 95% CI: 1.10-2.13). Neither coffee consumption nor green tea consumption were associated with number of teeth loss.

Tanaka <i>et al.</i> , 2005 [41]	Japan	Cross-sectional	1002 pregnant women (The Osaka Maternal and Child Health Study)	Mean age: 29.8 years	Passive and active smoking at work and home Assessed by self-administered questionnaire	Tooth loss Assessed by self-administered questionnaire	<p>It was found that 22.8% of never-smokers, 30.6% of former smokers, 32.9% of heavy smokers, and 32.4% of light smokers had at least one missing tooth.</p> <p>There was an independent association between current light smoking and tooth loss (adjusted OR 1.71; 95% CI, 1.02–2.83).</p> <p>Active smoking for 8.0+ pack-years or more is significantly associated with tooth loss when compared with never smoking (AOR:2.35, 95% CI: 1.46-3.78).</p> <p>There was a statistically significant association between current heavy passive smoking at home and tooth loss (AOR:1.79, 95% CI: 1.08-2.94). However, the association was not significant for passive smoking at work.</p>
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The integration of dental health into prenatal care is imperative to improve the health and well-being of pregnant women [42]. The planning and evaluation of dental care for pregnant women could be more effectively addressed if more understanding was gained of the social, psychological, and functional consequences of oral disease during pregnancy [43].

A cross-sectional study examined the association between socio-demographic factors and tooth loss using the same sample of Ugandan pregnant women [36]. Results revealed that pregnant women living in households with five or more individuals were more likely to have at least one missing tooth compared to pregnant women living in households with 1-4 individuals (AOR:1.5; 95%CI: 1.0-2.5) [36]. Additionally, pregnant women who never visited a dentist were less likely to have missing teeth than those who did (AOR:0.04; 95%CI: 0.02-0.1) [36]. This might be due to the fact that those who visited the dentist suffered from severe dental problems [44]. Moreover, pregnant women in their first pregnancy were less likely to have missing teeth than pregnant women who had one or more child (AOR:0.4; 95%CI: 0.2-0.8) [36].

Silveira *et al.* examined the association between anxiety, depression, and tooth loss among pregnant women using the 2010 Behavioral Risk Factor Surveillance System [37]. Their study revealed that pregnant women with lifetime anxiety experienced significantly higher odds of tooth loss compared to those without lifetime anxiety (AOR: 3.30, 95%

CI:1.01-10.77) [37]. However, there were no association between lifetime depression or current depression with tooth loss among pregnant women (AOR: 1.45, 95% CI: 0.54-3.85 and AOR: 1.18, 95% CI: 0.44-3.16 respectively) [37].

The Osaka Maternal and Child Health Study sample was used to investigate the association between mineral intake and tooth loss in Japanese pregnant women [38]. They found that 25.6% of pregnant women had at least one missing tooth [38]. Their findings revealed an inverse relationship between magnesium intake and tooth loss when comparing the highest quartile with the lowest quartile (adjusted odds ratio AOR: 0.64, 95% CI: 0.42-0.99) [38]. However, there was no association between tooth loss and calcium, copper, iron, zinc, and phosphate intake. Prior research has shown that magnesium consumption might improve immunity and reduce systemic inflammation, which would lead to improved oral health [45]. Additionally, Magnesium plays a critical role in regulating bone and mineral homeostasis as well as optimizing bone crystal growth and stabilization [46].

Another study used the Osaka Maternal and Child Health Study sample to examine the association between tooth loss and fruit and vegetable consumption in pregnant women [39]. They found that higher consumption of vegetables other than yellow and green vegetables had negative association with tooth loss in pregnant women [39]. However, they did not find a significant association between

tooth loss and vitamins, insoluble fiber, fruits, yellow and green vegetables, and grains [39].

Another cross-sectional study examined the relationship between beverage consumption and tooth loss among pregnant women using the Osaka Maternal and Child Health Study sample [40]. Their results revealed that pregnant women who consumed high levels of coffee experienced tooth loss more frequently than those who consumed low amounts of coffee (AOR:1.52, 95% CI: 1.04-2.22) [40]. In addition, an intermediate green tea consumption was negatively associated with tooth loss in pregnant women compared to a low consumption (AOR: 1.53, 95% CI: 1.10-2.13) [40]. However, coffee and green tea consumption were not associated with the number of missing teeth [40]. They explain that might be due to the unhealthy lifestyle associated with heavy coffee consumption [40].

Tanaka *et al.* examined the association between smoking and tooth loss [41]. They found that the prevalence of tooth loss was 22.8% of never-smokers, 30.6% of former smokers, 32.9% of heavy smokers, and 32.4% of light smokers [41]. Additionally, there was a significant positive relationship between current light smoking and tooth loss (AOR 1.71; 95% CI, 1.02–2.83) [41]. As compared with those who never smoked, those who smoked 8.0+ pack-years had a greater odds of tooth loss (AOR:2.35, 95% CI: 1.46-3.78) [41]. A significant association was found between current heavy passive smoking at home and tooth loss (AOR:1.79, 95% CI: 1.08-2.94) [41]. In contrast, passive smoking at work did not appear to be associated with the association [41].

Interpreting these findings requires consideration of some issues. The studies included have all had cross-sectional designs, which do not allow causal inferences. Moreover, the studies included in this review were conducted in Japan, Uganda, and the US, so the generalizability of the findings is limited. Also, tooth loss was assessed by a self-reported questionnaire in all the studies, which may have resulted in recall bias. Apart from these limitations, our study reveals the factors associated with tooth loss during pregnancy, enabling policymakers to formulate comprehensive strategies that incorporate oral health education into prenatal visits and remove the barriers to accessing dental care for pregnant women.

Conclusion

In conclusion, the determinants of tooth loss during pregnancy include demographic, psychological, dietary, and behavioral factors. The findings of this review need to be confirmed with recent well-designed studies. During pregnancy, obstetrician-gynecologists are the most frequently health care professionals accessed by women, offering them the chance to educate pregnant women about the importance of oral health and dental care.

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