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Review Article

Adverse Effects of Smokeless Tobacco (Toombak) on Periodontal Tissues: Review Article

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Abstract

Background and Objectives: Oral smokeless tobacco (SLT) dipping has been documented as a major risk factor for several mucosal lesions and periodontal diseases. Toombak is the most common type of SLT which contains a high concentration of nicotine, and its role as a precipitating factor for periodontal disease is less well recognized. The purpose of the present article was to review the Toombak and discuss its effects on the periodontium. The collected data of this review article was obtained from several electronic databases (PubMed, Scopus, Google Scholar, and others), the review was designed as follows; introduction, clinical effects of Toombak on periodontal tissues, and discussion of this knowledge.

Conclusions: The current study suggested that oral consumption of Toombak could be a considerable major risk factor for the progression of periodontal diseases. Further research is required to clarify the effects of Toombak in different stages of periodontitis and improve awareness in the community about the risks of various SLT.

Keywords: Periodontitis; Toombak; Smokeless Tobacco

Introduction

Toombak is a member of SLT products produced from Nicotiana rustica (Figure 1), a plant with characteristic yellow flowers, that contains up to nine times more nicotine compared to Nicotiana tabacum (Figure 2), which is more widely utilized in the production of tobacco products worldwide and more common in Sudan [1,2]. The harvested leaves of Nicotiana rustica change from yellow to brown in a process of natural or 'compost' like fermentation. The Toombak is then further prepared by milling to non-homogenous particles, in addition, alkaline carbonates, flavorings, and other additives finalize the Toombak production. Sodium bicarbonate is commonly incorporated into the final mix to improve taste and promote effective nicotine absorption into the bloodstream [3].

Toombak is sold in dark brown color with a moist coarse consistency (Figure 3), regular Toombak user would place approximately 6 to 10 g of a dip of Toombak in several areas of the oral cavity but mainly the upper or lower nasolabial folds and buccal vestibule (Figure 4) as well as the floor of the mouth. The placed mass of Toombak is often replaced around 10-15 times per day, usually when the nicotine effect becomes bland, and it may also be retained during sleep [4].

Toxicity and nicotine profiles are documented for Toombak, the chemical analysis revealed the following concentrations of the carcinogenic tobacco-specific nitrosamines (TSNAs). Toombak has the highest levels of free nicotine and nicotine-derived TSNAs ever measured in tobacco products which are considered highly carci-

nogenic materials. The release of the precancerous materials of Toombak induced alteration in oral tissues and the development of various tumors in rats after swabbing the oral cavity [5]. Smokeless tobacco use including Toombak had a local and systemic harmful effect such as attributed to cardiovascular disease, male infertility, psychological disturbances, periodontal disease, premalignant lesions, oropharyngeal and esophageal tissues, and numerous other cancers [5-7], in addition to alteration in the oral microbiome [8].

The adverse effects of Sudanese Toombak versus Swedish snuff on human oral cells were studied by Costea., *et al*. 2010. They reported that the potential role for Toombak higher than for Swedish snuff, to damage human oral epithelium and DNA could lead to further malignant progression in oral cells [5]. A recent study on the oral and periodontal manifestations of smokeless tobacco (SLT) including Toombak in Sudan users. It recorded that SLT has considerable adverse effects on oral health and periodontal tissues [9].

The purpose of the present article was to review the adverse effects of Toombak smokeless products, especially in the severity and progression of periodontal diseases.

Clinical effects of toombak on periodontal tissues

The negative impact of SLT on periodontal health status was examined by Singh., *et al*. 2011. They reported a significant increase in all the periodontal health parameters including plaque index, gingival index, calculus, clinical attachment loss, gingival recession, mobility, furcation, and probing pocket depth. In addition, the duration and frequency of smokeless tobacco use significantly affected the periodontal health. In conclusion of this study, most subjects had an onset of clinical attachment loss and gingival recession, more so amongst the smokeless tobacco users than those smoking form of tobacco, furthermore to non-tobacco users [10]. Another study assessed the periodontal health status of smokers versus smokeless users. The results found that smokeless tobacco users have more attachment loss than smokers [11]. The pattern of periodontal destruction in SLT users including Tombak was investigated by Anand., *et al.* 2021, they concluded that smokeless tobacco resulted in more destruction of periodontal tissues, patterns of periodontal destruction showed an association with the area of retention of the product, the duration of the habit, and the type of smokeless tobacco [12].

Very few clinical studies have described the pattern of periodontal destruction among Toombak users. A case report study on oral melanosis and severe periodontitis of Toombak users was conducted by Al-Tayar., *et al.* 2017, they noticed that heavy deposition of dental calculus and grade III mobility of mandibular left central incisor and mandibular right canine, periodontal probing revealed a pocket depth ranging from 6 to 10 mm in the mandibular anterior region, in association of gingival recession. Also, oral mucosal pigmentation was found on the site of habitual Toombak placement (Figure 5) [13]. Toombak is a major product of smokeless tobacco with high prevalence and is widely distributed in Sudan [2,14,15]. Recently, Suliman and Mohamed 2024 recorded that SLT including Toombak is a major risk factor for exaggerating periodontal and oral diseases, and most of the patients had mucosal changes and gingival recession [9].

For knowledge and the negative impact of Toombak in the community, Almahdi., *et al*. 2017 measured the availability and effectiveness of control policies and preventive parameters in schools in Sudan. They established that using Toombak in participants was associated with poor knowledge, negative attitudes towards their role in Toombak control, and poor preventive practice. Moreover, school workers' use of Toombak may reduce their motivation as the potential intervention in major health problems caused by Toombak users [16].

Figure 1: Nicotiana Rustica; the tree for the production of Toombak

Figure 2: Nicotiana tabacum; the famous type of Tobacco.

Figure 3: Toombak after manufacturing.

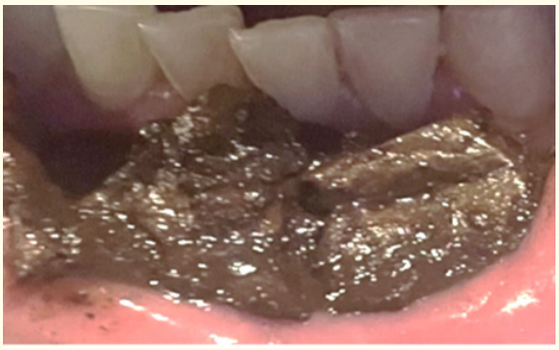

Figure 4: A user placed the Toombak dip in the lower labial vestibule [3].

Figure 5: Severe periodontal destruction and changes of oral melanosis at the lower right muco-buccal vestibule [13].

Discussion

The products of SLT were widespread in several countries under several names: Toombak, Snuff, Shammah, Zarda, Gutkha, Nass, Chewing tobacco, and others [17]. The SLT users have a higher likelihood of developing periodontitis [18]. Toombak has a high concentration of nicotine in comparison to other types of smokeless tobacco products and became a highly toxic and more carcinogenic effective due to the addition of strong alkaline carbonates to enhance the release of nicotine and other harmful constituents [4,5]. The adverse effect of Toombak on oral mucosa and the development of several oral lesions was documented in several studies [5-9,13,19].

Regarding the harmful effects of Toombak on periodontal health, few studies evaluate Toombak as an entity product rather than other SLT [9,13,16]. On the other hand, several studies investigated the negative effects of SLT on periodontal status without demarcation between the types of SLT products [10-12,19,20]. Therefore, the previous knowledge is considered a limitation of the current study.

For recommendations, the tissue-damaging effects of Toombak on the periodontium as the most common SLT product containing a high concentration of nicotine versus other tobacco products is measured as an interesting point of research. Additionally, periodontists may play an important role in awareness of the dangerous effects of SLT especially the Toombak, and motivation of the patients to stop the consumption of these unusefulness materials.

Conclusions

Based on the available data, Toombak is considered a major risk factor in the progression of periodontal diseases. Several clinical trials on large-size samples of the population are required to elucidate the actual role of Toombak in the development and progressing of periodontitis in various stages of periodontitis patients.

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Conflict of Interest

None declared.

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