Review

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Use of natural products for oral hygiene maintenance: revisiting traditional medicine

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Abstract:
The use of traditional means of oral hygiene maintenance has a long-recorded history, with widespread usage in rural areas of Africa, South America and the Indian subcontinent till date. Though dental healthcare professionals and the general population, especially in the urban areas can have the temptation of out-rightly rejecting them as ineffective, the usage of these natural products is based on time-tested scientific principles. The present article provides an overview of the major traditional practices of oral hygiene maintenance and how they compare against the modern-day armamentarium of oral hygiene maintenance.

Keywords: chewing stick, medicinal plants, oral hygiene, traditional medicine

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Introduction

Diseases of the oral cavity are as old as humanity itself, and so are the measures to prevent or treat them. Rinsing of the mouth to treat gum ailments finds a mention for the first time in traditional Chinese's medicine in 2700 B.C.E[1]. The use of chewing sticks is considered an ancient custom[2] practiced by various religious communities, especially Muslims because it uses (miswak) was supported by Mohammad for the maintenance of healthy teeth and gums. The origin of the toothbrush dates back to 1498 CE in China where hog hair bristles were set in ox bone to make the first toothbrush. Plants and other natural substances have been used in ancient system of medicines for treatment of various ailments since time immemorial. The maintenance of oral hygiene is no exception. Green tea which is customarily drank after every meal in Japan contains several polyphenols that are known to inhibit the growth of *S. Mutans*, the primary organism responsible for dental caries[3]. Papua mace extract, cinnamon bark oil and clove bud oil has been reported to inhibit the growth of many oral bacteria[4]. The use of plants and their parts have not only been used for treatment of oral diseases but also for routine maintenance of oral hygiene in the form of chewing sticks, mouth wash, etc.

Mechanical removal of plaque has a direct correlation with the incidence of caries and periodontal diseases. [5, 6] Home-care oral hygiene practices are the mainstay of plaque removal, and their frequency and duration has been positively correlated with the incidence of caries and periodontal diseases.

As has been said by the famous American Poet Pearl S. Buck "If you want to understand today, you have to search yesterday." Therefore, the present article revisits the age-old traditional practices of home oral hygiene maintenance followed by people around the world and how they compare with contemporary methods.

Methods

Chewing sticks

The chewing stick can be considered as the predecessor of the modern-day toothbrush. The use of chewing sticks from different plants is widespread in Asia, Africa and the Middle East "Miswak" is an Arabic traditional name used for any plant part that is used as a chewing stick [7]. The conventional meaning of Miswak is a stick used on teeth and gums to clean them. A small pencil sized stick is chewed on one end until it becomes

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frayed into a sort of brush and then the frayed end is used to clean the teeth. Various plants have been used in different parts of the world for this purpose. Arak (*Salvadora persica*) is mostly used in the middle east; lime tree (*S. aurantafolia*) and orange tree (*Citrussinensis*) are used in West Africa, Neem (*Azadirachta indica*) in Indian subcontinent [8] while the roots of the senna (*Cassia vinnea*) are used by American and African Negros and Laburnum (*Cassia sieberianba*) has been used in Sierra Leone [9].

Miswak in the Middle Eastern countries refers to the Arak plant as it does to the Muslim population elsewhere in the world. Normally, miswak is obtained from the root of the arak plant, but its bark and branches are also sometimes used [10]. As compared to other chewing sticks, the use of arak plant has the oldest recorded history [11]. There have been numerous studies to prove the efficacy of miswak when compared to the modern methods of home oral hygiene maintenance. A study by Al- Khateeb TL et al. in 1991 suggested that people using miswak scored lower on the community periodontal index of treatment need (CPITN) [12]. In 2004, another study by Al-Otaibi M reported that miswak use was at least as effective as tooth brushing in the control of gingivitis and plaque. This study further stated that the antimicrobial effect of the arak plant was beneficial for the prevention/treatment of periodontal diseases [13].

The results from the studies about the anticariogenic potential of miswak against modern tooth brushing are not discouraging. F Ezoddini-Ardakani reported in 2010 that miswak was as effective in preventing dental caries as the tooth brush [14]. A survey conducted by Emslie RD in Sudan reported lower caries prevalence in miswak users as compared to tooth brush users [15]. Similar findings were reported about a lower caries incidence by Baghdady and Ghose [16], Younes and El-Angbawi [17] and Sathananthan K et al.

Datun is the traditional name given to the chewing stick in the Indian subcontinent. Datun is made from neem (*Azadirachta indica*), mango (*Mangifera indica*), babul (*Acacia arabica*), guava (*Psidium guajava*) and pilu (*Salvadora persica*). Out of these, the neem datum is most popular in its use. To this date, a large part of rural Indian population uses neem datum for maintaining oral hygiene. The neem tree which is native to Indian subcontinent is known as the "tree of thousand uses" as every part of the tree has some medicinal, cosmetic or agricultural use. An *in vivo* study conducted by Ajay Bhambal et al., found significant difference in the plaque and gingival index scores with 3-week usage of neem stick and tooth brush [18]. In an epidemiological study by Venugopal et al., it was reported that children who used neem stick had lower incidence of dental caries [19]. Prashant GM et al. in 2007 reported that the use of mango and neem sticks together provide effective protection against cariogenic bacteria [20]. A study by Abhishek Sharma et al. in 2014 conducted to determine the antimicrobial activity of the neem and babul extracts reported that both had antimicrobicidal activity against S. Mutans, although it was much stronger in neem extracts as compared to babul [21]. In another *in vitro* study by Wolinsky LE et al., it was reported that the aqueous extracts of neem significantly reduced the adhesion of cariogenic bacteria to hydroxyapatite, which is the main component of enamel [22].

Shekhawat and Batra in 2006 reported that ash of the bark of babul tree mixed with crushed salt, and pepper is used for brushing daily in parts of Rajasthan state in India.

Tobacco based products

The use of tobacco based products as a dentifrice is common in western India, particularly in the state of Maharashtra where it is used in the form of tobacco snuff and is known as "Mishri" or "Bajar". Mishri is produced by grinding and roasting of tobacco on a hot plate till it turns black. The use of this form of tobacco is prevalent amongst females. Gupta et al., in 1988 reported the prevalence of 22 % in an extensive survey [3] of 100,000 individuals in rural areas with 39 % female users and only 0.8 % male users [23, 24]. There are no studies to indicate an alteration in the incidence of dental caries with the use of Mishri. It has been reported that use of smokeless tobacco when not kept at a certain place (pouching) is known to reduce the incidence of dental caries. This can be explained by the fact that attrition caused by the chewing and rubbing of tobacco lowers the pits and fissures thereby lowering the risk of caries [25]. Similar findings can be assumed for the use of mishri, though Mani et. al. In 2009 reported that a correlation existed in the duration of usage of mishri and periodontal attachment loss [26].

Though the use of mishri starts as a dentifrice but it soon becomes an addiction like any other tobacco product. The use of mishri is linked with oral cancer and reduction of gestational age and birth weight of the child when used by pregnant females, and its use should be discouraged.

Mouthwash

Contrary to popular notion, use of mouthwash for oral hygiene maintenance is very old. Use of mouthwash has its origin in religious codes of conduct like the ancient laws of Manu from India which stated that everyone

should rinse the mouth after a meal. The ancient Chinese used the bone powder of small animals in the form of mouthwash, which resembles the modern remineralizing mouthwashes of today [27]. One ingredient which was till the eighteenth century very popular in mouthwashes was human urine because of the cleansing effect of ammonia [28]. The use of mouthwashes made from the decoction of guava [29], pomegranate extracts [30], neem extracts [31], green tea [32] and cranberries juice [33] has been reported from different parts around the world with good efficacy in maintaining oral health. Khalessi et al. observed that the use of mouthwash containing the extracts of *Salvadora persica* resulted in significant reduction in gingival bleeding and the carriage of mutans streptococci [34]. Gupta et al. in 2014 reported the efficacy of tulsi containing mouthwash to be as effective as chlorhexidine [35] while Pereira et al. in 2011 reported the lowering of the plaque and gingival score with the use of alcohol-free mouthwash containing 5 % Brazilian green propolis [36].

Use of charcoal

The use of charcoal as a dentifrice has been reported from Africa [37] and various parts of Asia for a long time. In 1807, a group of London chemists claimed that charcoal helps in maintaining the whiteness of teeth and prevents bad odor from the mouth [38]. There has been a renewed interest in the use of charcoal in oral hygiene products in the recent times.

Use of medicinal plants

Phytotherapy is the Science of using extracts of natural origin as health promoting agents which can provide viable and safe alternative to antibiotics and other synthetic products for the prevention and treatment of oral and dental problems. Ethnomedicine is another branch of science, which deals with the practice of traditional medicine in ethnic groups. There has been a re-emergence of interest in traditional medicine in the recent years due to cultural familiarity, affordability and availability [39] and oral hygiene has not been unaffected by it. Both phytotherapy and ethnomedicine relies heavily on the use of medicinal plants. Though thousands of plants have been used for oral/dental problems but only the main, and the most popular ones are discussed throughout this section.

The use of clove and its oil are known to prevent a toothache and have been used for hundreds of years by rural folks. In a study conducted by Moon SE et. al., the major compounds of clove, which are eugenol and β-caryophyllene were tested for their antimicrobial activity alone or in combination with ampicillin or gentamicin. The results suggest that the clove oil and eugenol could be employed as a natural antibacterial agent against cariogenic and periodontal pathogenic bacteria [40].

The use of *Areca cathecu* also known as betel nut is widespread in the Indian subcontinent and Africa. The bark of *Areca cathecu* is used in various ethnic groups for treatment of a toothache [41]. The fruit from the areca tree commonly known as "supari" is very widely used for chewing throughout India, both in the urban and rural areas. Supari is known to be the single most important causative agent for oral submucous fibrosis [42, 43] a pre-cancerous condition. It is also known that habitual chewers of areca nut have reduced the incidence of caries though it does not have any anticariogenic ingredient in it. The reduced caries incidence is thought to be caused by attrition of the teeth caused by the nut, and its stains on the teeth forming a protective coating against the adhesion of plaque on enamel [25]. Its gritty consistency is also thought to be responsible for mechanical cleansing of the oral cavity [44].

Awala (*Phyllanthus emblica*) is an excellent source of vitamin C and has anti-inflammatory and antibacterial properties. It is also known to be equally or more effective than the commonly used antibiotics with the added advantage of acceptable taste [45]. Awala is a part of many herbal preparations for the treatment of bleeding gums [46].

Tulsi (*Ocimum tenuiflorum*) is widely used in all parts of India and is considered holy in the Hindu religion. It is also known as the "queen of herbs". Tulsi is known to have strong antimicrobial properties towards *Streptococcus mutans*, one of the main organisms responsible for dental caries [47]. Gupta D et al. in a clinical study on the efficacy of tulsi extract mouthwash compared it to chlorhexidine and reported that tulsi mouthwash was equally effective in reducing plaque and gingivitis [35].

Pandita V et al. has reviewed various studies carried out on the usage of neem, tulsi, pudina, aloe vera, propolis, turmeric, curry leaves, garlic and tulsi for periodontal health maintenance with encouraging results [48].

There are studies on the anticariogenic activity of eucalyptus (*Globulus Labill*) and garlic (*Allium sativum*) extracts [49], onion bulb (Allium cepa) and ginger rhizome (*Zingiber officinale*) [50] and ginger and honey (*Apis mellifera*) [51], all of which show encouraging results.

Conclusions

The use of traditional methods of oral hygiene maintenance should not be considered as obsolete or ineffective without having knowledge of the same. In fact, a thorough knowledge about the advantages and disadvantages of the same will help the dental health care professionals to guide the people using them in the right direction, and this can go a long way in reaching the goal of optimal oral hygiene to areas where modern means of oral health care still have not reached.

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