ROLE OF SIWAK IN THE MAINTENANCE OF ORAL HOMEOSTASIS AND DENTAL HYGIENE COMPARED WITH TOOTH BRUSH

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ABSTRACT

While previous research on Siwak has mostly focused on its microbiological effects, this research is aiming to evaluate its role on the maintenance of oral homeostasis and dental hygiene, an important factor for preventing caries and periodontal diseases. Two groups of subjects were studied: regular Miswak (n=60) and tooth paste brush users (n=59). Miswak used was from the "Arak" tree of Sudan, species of Salvadora Persica. Oral hygiene was assessed by measurement of plaque index (PI), gingival index (GI) and decayed, missing and filled (DMF) indices. The (PI) was significantly higher in Miswak users, but no difference was noted in the DMF and GI values. A positive correlation was found between DMF values and age among Miswak users, as well as between gingival and plaque index on both study groups. These findings suggest that use of Miswak offers a good option for maintaining oral homeostasis and hence in preventing periodontal disease and cares formation.

KEY WORDS: *Siwak; Miswak use; oral homeostasis; dental hygiene; dental plaque; periodontal disease.*

المستخلص: يُلحظُ اهتمام متزايد للتعرف على طرق لمكافحة لويحات الأسنان الجرثوميه يمكن استخدامها يومياً وبأمان. لقد تمت دراسات سابقة للجوانب الأحيائية المجهرية لإستخدام شجرة الأراك (السواك)، بينما دراستنا الحالية هدفت إلى تقيم دور السواك فى المحافظة على مستوى التوازن والأستواء الصحي للفم وبالتالي في مكافحة التسوس وأمراض اللثة والأسنان، وذلك من خلال أثره الكميائي والميكانيكي على اللويحاتالجرثوميه السنية. تضمنت الدراسة مجموعتين رئيسيتن: مستخدمي السواك بانتظام وعددهم ستون، ومستخدمي معجون وفرشة الأسنان بإنتظام وعددهم تسع وخمسون بالغا متطوعا من المجموعتين.أعواد السوك المستخدمه كانت من شجرة الأراك من فصيلة سلفادورا بيرسكا والتي تكثر زراعتها بالسودان. تم تقيم صحة الفم بقياس مؤشر اللوحة السنية ومؤشر اللثة ومؤشر تلف وفقدان وحشو الأسنان. كان مؤشر اللويحات السنية أعلى بدلالة احصائية في مستخدمي السواك. لم يكن هنالك فروق ذات دلالة احصائية في مؤشري اللثة وتلف وفقدان وحشو الأسنان. كان هنالك ارتباط أيجابي بين مؤشرتلف وفقدان وحشو الأسنان والعمر في مستخدمي السواك. كما كان هناك ارتباط ايجابي ذو دلالة احصائية بين مؤشر اللثة ومؤشر اللويحة السنية في محموعتي الدراسة.هذه النتائج تستنتج أن السواك قديكون بديلاً جيداً في الحفاظ على صحة الفم والاسنان وبالتالى في منع تكون اللويحات السنية التسوس.

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INTRODUCTION

Oral hygieneis one of the most important factors for maintenance of oral homeostasis and health.[1] The pathogenic natureof the dental plaque biofilm can be diminished by maintaining normaloral flora via oral hygiene procedures such as tooth brushing,flossing and rinsing with an antimicrobial mouthrinse,whichcan completely prevent caries and periodontal diseases.[2-4] Fluoride found in most tooth pastes and mouth rinses, is known for its anti caries properties which is attributed to the formation of fluroapatite, calcium fluoride, leading to increase of enamel resistance to demineralization.[5] Moreover, it reduces pH fall during frequent ingestion of carbohydrates.

The name miswak,an Arabic word meaning tooth cleaning stick, is known in English as the "natural toothbrush",[6-8] the most common species is the medicinal plant Salvadora persica,, also known as Arak in East Africa through to the Arabian Peninsula and the Asian subcontinent[6,9] for centuries and its fibrous branches have been promoted by theWorld Health Organization, for oral hygiene use.

When properly used, miswak had been reported to be as effective as tooth brushing.[10-12] Besidethe mechanical effects of its fibers, if Left in mouth, stimulate salivation and release of beneficial chemicals[13]; thus, there may be a better cleansing effect. The roots of S. persica, contains a number of identified antimicrobial and other prophylactic components including fluoride, alkaloids, sulphur compounds glucosinolates, and volatile oils such as benzyl isothiocyanate. As to other researchers, Salvadora persica , contains, in large amounts silica, sulphur, vitamin C, and small amounts of tannins, saponins, flavonoids and sterols. It also contains,trimethyline, salvadorine, chlorides, fluoride.[14-18] The tannins and resins have an astringent effect on the mucus membrane and form a layer of enamel, thus giving protection against caries.[19]

Baghdady and Gose in 1979 conducted a study comparing caries prevalence among Iraqi and Sudanese schoolchildren using the WHO DMFT (diseases, missing, filled teeth) index. Their results reported that Sudanese children showed lower caries prevalence due to use of miswak and their diet.[20]

Daroutet al (2000) also reported that the periodontal status of miswak users in a Sudanese population was better than that of tooth brush users, suggesting that the efficiency of miswak use for oral hygiene is comparable or even better than tooth brush.[21]

A 2003 scientific study comparing the use of miswak with ordinary tooth brushes concluded that the results clearly were in favor of the users, who had been using the Miswak, provided they had been given proper instruction in how to brush using it [11]. The aim of this study is to compare miswak use with conventional tooth paste and brush use on dental health.

SUBJECTS AND METHODS

A volunteer non-probability Sampling technique was used to recruit study participants. Volunteers were interviewed and verbal consent was taken. Oral hygiene habits were assessed using a structured questionnaire. The study was conducted on two categories of subjects: regular Miswak users, regular tooth paste and brush users. One hundred and nineteen volunteer students and employees in the Faculty of Medicine U of K, and from Masjid Bilal in Jabra, Khartoum participated in the study. Age of the participants range was 18-65 years.

Periodontal status was assessed clinically using gingival and dental plaque indices (GI, PI) and decayed, missing and filled (DMF). The miswak used by the participants, from the "Arak" tree of Sudan, species of Salvadora Persica.Inclusion criteria included regular miswak and brush users, good general health, absence of chronic illnesses such as diabetes and hypertension, no past or present history of smoking or snuff use (Tomback languages). Also excluded from our study, those who had used antiseptic mouth wash or received antibiotics for at least one month before clinical assessment.

Periodontal status: Assessed on six sextants/subject according to Loe and Silness[22] for GI, PI and WHO[23] for DMF.

Gingival index system as follows:

Appearance	Bleeding	Inflammation	Points
Normal	No bleeding	None	0
Slight change in color and mild edema with slight change in texture	No bleeding	Mild	1
Redness, hypertrophy ,edema , glazing	Bleeding on probing/ pressure	Moderate	2
Marked redness, hypertrophy, edema, ulceration	Spontaneous bleeding	Sever	3

Gingival index mean calculation

The index for each volunteer is obtained by summing the indices for all six teeth and dividing by six.

Plaque index calculation: The index of the subject was obtained by summing the indices for all six teeth and dividing by six.

Plaque index system as follows:

Scores	Criteria
0	No plaque
1	A film of plaque adhering to the free gingival margin and adjacent area of the tooth. The plaque may be seen in situ only after application of disclosing solution or by using the probe on tooth surface
2	Moderate accumulation of soft deposit within the gingival pocket, or the tooth and gingival margin which can be seen by the naked eye
3	Abundance of soft matter on the tooth and gingival margin.

Disclosing agent: used was in the form of tablets colored (red-cote dentdisclosing tabs. butler Code No 130065-0), examination was performed after chewing one tablet where supra gingival plaque could be seen as a violet or purple spots.

Sites of examination: The teeth examined in GI and PI represented six sites and 4 surfaces on each tooth: 1)buccal, 2)lingual, 3)mesial, 4)distal

DMF index: DMF index has been recommended by WHO, as a parameter to assess the dental health situation in various societies.

DMF index calculation: The DMF index mean was calculated simply as the total number of decayed teeth (D), Missed (M) and Filled (F) teeth divided by the number of cases investigated. Great variations between societies, has been noted.

Statistical analysis: The data has been organized and analyzed using the statistical program SPSS (Statistical Packages for Social Sciences):The T-test for equality of means; Regressions and curve estimations were used to show relationships between different parameters; Descriptive statistics, include cross- tabulations; simple charts.

RESULTS

Below intermediate education, Miswak users were 28.3% compared to 6.8% of brush users.Table.1

Education level	*Miswak*		*Brush*	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Illiterate	2	3.3	0	0
Elementary school/ khalwa	15	25.0	4	6.8
Intermediate school	9	15.0	6	10.2
Secondary school	20	33.3	17	28.8
High education	14	23.3	27	45.8

Periodontal status concerning GI and DMF, were the same in both study groups (p=0.345, 0.390); higher PI index was found in Miswak users (p=0.034) [Table.2.].

Table.2. Comparison of the oral hygiene indices between study groups

Oral hygiene measures	*Miswak*		*Brush*		
	N	Mean± SD	N	Mean± SD	p-value
DMF	55	4.24± 4.13	52	5.00± 4.19	0.345
PI	60	1.62± 0.64	55	1.36± 0.62	0.034
GI	60	1.32±0.50	55	1.40±0.53	0.390

Also in Miswak users only DMF was found to be related positively to age (p=0.009)[Fig.1], while no correlation between age and DMF in brush users (p=0.127), nor between other indices and age in both study groups.

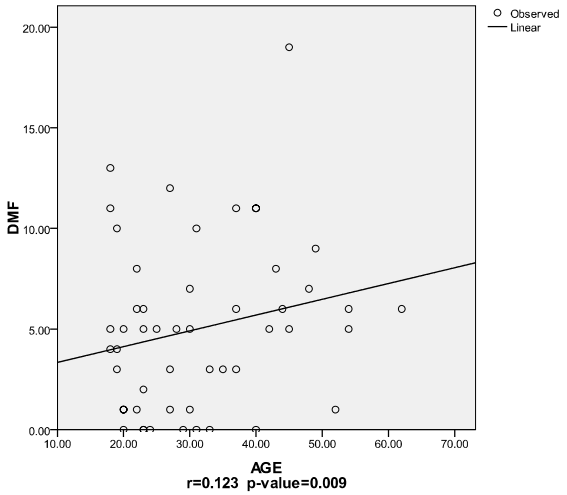
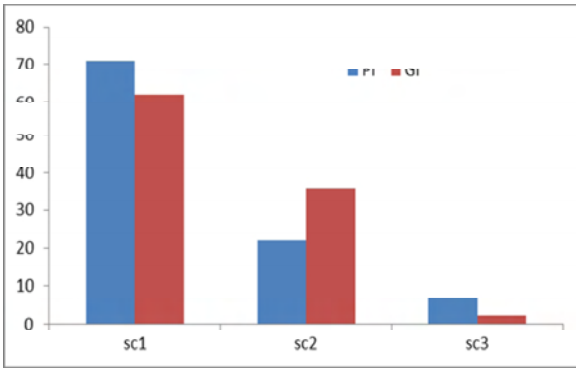


Fig.1.Relationship of the DMF index to age in Miswak users

Strong positive correlation was found between Gingival index (GI) and Plaque index (PI) in both study groups (p=0.000)[Fig.2]. No relationship had been detected in both study groups between oral hygiene indices and years of toothbrush or Miswak use, nor with duration and frequency of use.



Brush (r=0.305, p-value=0.000), Miswak (r=0.243,p-value=0.000)

Fig.2. Relationship between the PI and the GI index in both study groups

DISCUSSION AND CONCLUSION

Illiterate and elementary school education represented (28.3%) of miswak users compared to only (6.8%) among brush users, indicating more frequent use of Siwak compared to brush use among low educational, and probably also low socio-economic groups in the community. The strong relationship between DMF and age in miswak users can only be explained by other studies that showed that DMF index is directly correlated with the health & economic, cultural, social state of the society and therefore it can be used for comparative studies.[24]

A direct significant relationship between PI and GI was found in both study groups, demonstrate the well, known relationship between dental plaque and periodontal disease.[25]

The three known periodontal variables assessed (DMF, PI, GI), showed no significant differences between study groups except for the plaque index (PI) where higher index was found in regular miswak users compared to the brush users; a finding which could suggest improper use of miswak,[11] as this is contrary to other studies that found that miswak efficacy was comparable to that of the conventional tooth brush.[26] Gazi had demonstrated that there were no significant differences in plaque scores measurements between habitual miswak and toothbrush and that plaque scores could be significantly lower following the use of miswak when compared with the conventional tooth brush, if used without tooth paste.[12] Eid also reported that the majority of miswak users apply miswak to both aspects of their teeth and that there was no significant difference in plaque scores and attachment loss noted between miswak and tooth brush users.[27] Higher (PI) in miswak users without significant difference in the (GI) and (DMF), despite the positive relationship between PI and GI may suggest the interplay of some other factors in Siwak such as abrasives, antiseptics, astringent, detergents, enzyme inhibitors and fluoride, that may suggest miswak as to be of comparable efficacy to that of the conventional tooth brush.

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