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## ABSTRACT

Background: - oral hygiene measures have been practiced by different populations and cultures around the world since ancient time. There are different methods available for the maintenance of oral health. There is long history of the use of plant to improve dental health and promote oral hygiene and is still commonly practiced among Afro- Asia communitarians. The mechanical plaque removing properties of the chewing sticks is similar to that of conventional modern tooth brush.

Mefakia/chewing stick is an affordable oral hygiene device which is used by vast majority of people around the world because of it is availability and low cost. The tooth brush which appeared about the year 1600 in china also has good mechanical plaque removing property and available currently every where in the market and widely used throughout the world.

Objective: the objective of this study is to assess periodontal status of mefakia and tooth brush users among jiren secondary high school students.

Methodology and materials: A cross-sectional study design will be used for this study with a sample population of 331 students who were selected by simple random sampling technique from 2400 total students of the school. Data will be collected using a structured questionnaire and oral examination will be done using probe, dental mirror and explorer by dental interns.

Result:- a sample of 331 students with response rate of 89% out of 2400 students was selected using the sample size determination formula in which 161(54.8%) males and 133(45.2%) were females.

The dominant ethnicity and religion was Oromo and Muslim which accounts 189 and respectively. Most of the students who brush their teeth using either chewing stick or tooth brush more than twice a day with other adjunctive or tooth paste together with vertical technique of brushing have had grade zero calculus deposition, grade zero gingival bleeding and pocket depth < 3mm.

Conclusion:- This study clearly indicates that those using either chewing stick or tooth brush have almost similar periodontal status even though there were some problems regarding to both chewing stick and tooth brush on how to use, when to use and with what adjunctive to be used from what were manifested as calculus deposition, gingival bleeding and pocket depth irrespective of brushing.

Recommendation:- To start with the building up of knowledge and to change their attitude towards chewing stick, also to develop habit of oral hygiene practice, the possible source of knowledge and encouragement should be exploited with regard to the use of chewing stick for those who are not capable of using tooth brush. So I will recommend the Jimma health bureau to provide ways of expanding health education on how to keep good oral hygiene.

Key words: mefakia ,tooth brush.

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## Table of content

Contents	Page
Abstract.....I	
Acknowledgement.....II	
Table of content.....III	
List of table.....V	
Abbreviation and Acronym.....VI	
CHAPTER ONE	
1. Introduction.....1	
Background.....1	
Statement of problem.....2	
significance of study.....3	
CHAPTER TWO	
2.1. Literature Review.....4	
CHAPTER THREE	
3. Objective	
3.1. General objective.....6	
3.2. Specific Objective.....6	
CHAPTER FOUR	
Methodology	
4.1. Study area and period.....7	
Study area.....7	
Study period.....7	
4.2. Study design.....7	
4.3. Population.....7	

Source population.....	7
Sample population.....	7
Sample size and sampling technique.....	7
4.4. Study variables.....	8
Independent variables.....	8
Dependent variable.....	8
4.5. Data collection process and instrument.....	8
4.6. Data analysis.....	8
4.7. Data quality control.....	8
4.8. Dissemination of result.....	8
4.9. Monitoring and evaluation.....	9
4.10. Ethical consideration .....	9
4.11. Operational definition .....	10
CHAPTER FIVE	
Result.....	11
CHAPTER SIX	
Discussion.....	12
CHAPTER SEVEN	
Conclusion and Recommendation.....	34
Dummy Tables.....	13
Annex I.....	20
Annex II.....	22

List of Table

Table No

Table1. Number and percentage distribution of socio- demographic  
Status of Jiren secondary high school students. 2013 G.C

Table 2. Number and percentage distribution of periodontal status by the materials they use for tooth  
cleaning among jiren secondary high school students 2013 GC

Table 3a. Number and percentage distribution of periodontal status by frequency and horizontal  
technique of tooth cleaning using mefakia and tooth brush among jiren secondary high school students  
2013 G.C.

Table 3b. Number and percentage distribution of periodontal status by frequency and vertical technique  
of tooth cleaning using mefakia and tooth brush among jiren secondary high school students 2013 G.C.

Table 3c. Number and percentage distribution of periodontal status by frequency and rotational  
technique of tooth cleaning using mefakia and tooth brush among jiren secondary high school students  
2013 G.C.

Table 4. Periodontal status versus adjective material used with mefakia and tooth brush during tooth  
cleaning among Jiren secondary high school students 2013 G.C.

Table 5: periodontal status when other adjective materials are used with mefakia and tooth brush during  
tooth cleaning among jiren secondary high school students 2013 GC

Table 6: oral hygiene status mefakia and tooth brush users

## Abbreviation and Acronym

SRP- Student research program

CPI- Community periodontal index

WHO- World health organization

PPD- Periodontal pocket depth

PI- Plaque index

PI- Principal Investigator

Adv- Advisor

Sec- Secretary

CAL- clinical attachment loss

ADA- American Dental Association

US- United State

## CHAPTER ONE

### 1.1. Background

Oral hygiene measures have been practiced by different population and cultures around the world since ancient time. The oral hygiene habits in a certain population depend on various factors, such as cultural background, religious norms, educational levels and socioeconomic status (1). There are different methods available for the maintenance of oral health. These are mainly mechanical and chemical. Tooth brushes and dentifrices are widely used for cleaning the teeth. The traditional tooth brush or chewing stick has been used since ancient history (2).

Chewing sticks were used by the Babylonians some 7000 years ago, they were later used throughout the Greek and Roman empires and have been used by Jews, Egyptians, and Muslims, today they are used in Africa, Asia, the Eastern Mediterranean region, and South America (3). In geographical regions in which the Arak (Araak) shrub or tree (botanical name *Salvadora Persica*) grows, chewing stick is interpreted as tooth sticks prepared from this plant. Where *S. persica* is not growing, chewing stick is prepared from other suitable plants; The chewing stick is a pencil-sized stick 15-20cm long and with

diameter 1-1.5cm that is prepared from the root, stem, twigs or bark. The stick is chewed or tapered at one end until it becomes frayed into a brush.

The chewing stick has different names in different societies for instance, miswak, siwak or arak is used in the middle East, miswaki in Tanzania, datan in India and Pakistan(4), and mefakia in Ethiopia. The world health organization has recommended and encouraged the use of these sticks as a tool for oral hygiene in areas where their use is customary (5). The promotion of good oral health by chewing stick is mainly attributed to mechanical cleansing efficacy, including beneficiary chemicals such as trimethyleamine, salvadorine, mustard oil, vitamin C, resins, flevodine, seporins, sterol and fluoride might all play an important role (6). Therefore, periodontal treatment need was found to be low in habitual miswak users (7).

Contradictory data have been reported on the oral health of chewing stick/ miswak users, several reports have indicated that chewing sticks are effective in reducing plaque and gingival inflammation if properly used and miswak has been reported to be as effective as tooth brushing (8-10). Moreover , chewing stick/ miswak was found to have a clinical implication of enhancing the regenerative opportunity of periodontium and inhibiting root caries formation (11). However, some studies found that there were more plaque formation and gingival bleeding in individuals who used chewing sticks in comparison with toothbrush users (12, 14).

The other alternative to chewing stick is tooth brush which is best oral hygiene instrument used to clean the tooth and the gums that consists of a head of tightly clustered bristles mounted on a handle which facilitates the cleansing of hard to reach areas of the mouth.

The use of a tooth brush counted many years. A recent archeological dig has found that the earliest use of tooth brushes may have occurred in Africa. It was discovered that a bristle tooth brush had been used there as early as 1600 BC (39).

The first bristle tooth brush found was in china during the Tang Dynasty (619-907) and used hog bristle (37). Then the bristle tooth brush spread to Europe, brought back from china to Europe by travellers. It was adopted in Europe during the 17th century. The modern tooth brush has different designs for adaptation of different surfaces of the tooth such as lingual, proximal, occlusal and buccal surfaces.



The designs of tooth brush include chewable tooth brush, inter-dental tooth brush and end-tufted tooth brush.

Tooth brushes are available with different bristle textures, sizes and forms. Soft bristled tooth brushes are recommended since hard bristled tooth brushes can damage tooth enamel and irritate the gums.

Tooth brushes are usually made from synthetic fibers since they were originally developed, although animal bristles are still sometimes used.

So, the purpose of study is to assess and compare the oral hygiene, gingival and periodontal conditions among a group of population / jiren secondary high school students who uses chewing stick/miswak, toothbrush or combined chewing stick/miswak and tooth brush in their daily routine.

## 1.2. Statement of the Problem

Oral hygiene is important for the well being of the whole body.

Mefakia/ chewing stick is an affordable oral hygiene device. Natural tooth brush sticks that can be used by vast majority of people around the world because of its availability and low cost. In addition, as it is dry and small size it is easily carried around, hence enabling the user to use after every meal. The relative accessibility and popularity of chewing sticks in the Middle East and Africa as an oral hygiene tool make it as a cost effective agent for plaque control in such communities, their taste is agreeable and reported to have anti- plaque and many other pharmacological proprieties (19). Whenever mefakia is used, both the tooth and the tongue are cleaned, mefakia /chewing stick has various therapeutic uses such as benefits from the juice of the stick extracted on chewing (antibacterial extracts) and its functional aspect of chewing as a jaw exerciser, as well as a sialogogue a reflex induction of copious saliva which is beneficial to the oral hygiene and general health. It can also be used in the development of dentition during eruption. It may improve appetite and regulate peristaltic movements of the gastrointestinal tract (20).

Various explanations for the cleaning efficacy of chewing stick have been offered including (I) the mechanical effects of its fibers, (II) its release of beneficial chemical and (III) a combination of (I) and (II).

Also when the mouth cleaning procedure that includes brushing of teeth, gums and tongue is completed, mefakia is removed from or may left in the mouth for some additional time, it will stimulate salivation and thus, their may be better cleansing effect (21).

Mefakia is generally used for a longer period of time than is modern teeth brush and the cleaning is usually implicated for 5 to 10 minutes each time. The plant fibers remove plaque and simultaneously massage the gum. Unlike a modern teeth brush, the bristle of mefakia are situated along the axis of its handle, consequently, the facial surface of the teeth can be reached more easily than the lingual surface or inter dental spaces. Reduced lingual access was considered as drawback of mefakia(25).

Another best alternative to mefakia is toothbrush which is available with different bristle textures, sizes and forms. Soft bristled tooth brushes are recommended since hard bristled tooth brushes can damage tooth enamel and irritate the gums. Toothbrushes are usually made from synthetic fibres since they were originally developed, although animal bristles are still some used. It also consists of a plastic handle and nylon bristles attached to the head of the brush(18).

Contemporary designs offer a variety of styles and shapes in a market. On average each person in the USA purchases 3 tooth brushes every 2 years, although the ADA recommends that tooth brushes can be changed every 3-4 months.

Modern medical research has shown that brushing teeth properly can prevent cavities, gingivitis, and periodontal or gum disease, which causes at least 1/3 of adult tooth loss(17).

### 1.3. Significance of the Study

Surprisingly, despite the widespread use of chewing stick/ miswak since ancient times, relatively little scientific attention has been paid to its oral health beneficial effects. In 1987, the world health organization encouraged developing nations to use chewing stick for oral hygiene because of tradition, availability and low cost ( 5).

Recently, it was concluded that chewing sticks may have a role to play in the promotion of oral hygiene and that evaluation of chewing stick /miswak effectiveness warranted further research (36), so this study will help to provide scientific based knowledge about mefakia and tooth brush on the prevention of oral disease such as gingivitis and periodontal disease. This in turn will create awareness on how to use mefakia effectively, and also initiate large scale study in Ethiopia on the traditional and religious based use of mefakia.

## CHAPTER TWO

### 2.1. Literature review

One investigator studied the effects of the chewing stick and tooth brush on plaque removal and gingival health and concluded that mefakia is more effective than tooth brush for reducing plaque and gingivitis when preceded by professional instructions. Further they state that mefakia appeared to be more effective than tooth brush for removing plaque from the embrasures, thus enhancing inter-proximal health.(10)

Another person studied the efficacy of chewing stick and concluded that patient with severe control; however, for patients with moderate plaque deposits, the chewing stick is as efficacious as the tooth brush in plaque control.(24)

Another researchers stated that the plaque removing properties of mefakia and conventional tooth brushes are similar.(6)

Another researcher called Helderman WH, compare oral hygiene of habitual chewing sticks and tooth brush in a group of people. They reported that though at baseline, chewing stick users exhibit statistically more plaque, but their gingival condition was comparable with tooth brush users. Further at three months, the chewing stick and the tooth brush user; had reduced their plaque and gingival bleeding scores significantly to the same extent. The authors suggest that effective tooth brushing was helpful to improve oral hygiene regardless of whether chewing stick or tooth brush is used.(30)

It was also assessed the efficacy of brushing with chewing sticks on plaque removal and concluded that brushing with a chewing sticks for five minutes resulted in a net reduction of the proportional of plaque deposit and the tooth paste resulted in no additional affect.(29)

Another examination has shown the relationship b/n mefakia and gingival health in terms of pocket depth, periodontal disease severity and gingival recession in 264 patient who were on routine periodontal treatment. They suggested that use of mefakia may influence periodontal health and may be considered as a contributing factor to gingival recession.(31)

Some researchers also suggested that rinsing with slurry of mefakia tooth paste reduced gingival inflammation and bleeding on probing. Chlorhexidine and mefakia were compared and chlorhexidine

(CHX) was found to be more effective than mefakia in plaque reduction. It was found that streptococcus mutans were eliminated in the mefakia group and were less in CHX.(7)

One research also reported that plaque and gingivitis were significantly reduced when mefakia was used five times a day compared with conventional tooth brush. (34)

One research done in 1989 recorded the oral hygiene and gingival health of adult Ghanaians who used chewing sticks, tooth brushes or a combination of both for tooth cleaning. Plaque and gingivitis scores were higher in chewing sticks users. They further reported that men had poorer oral hygiene and gingival health than women, irrespective of oral hygiene regimen. They suggested that longer time is necessary for the cleaning with chewing sticks may explain the apparent reduced cleaning efficiency in men. They also concluded that the antimicrobial substances in chewing sticks appear to provide no additional benefits to those produced by the antimicrobial activity of commercially available tooth paste. (12)

In general, it is concluded from the above mentioned studies that reduction in plaque leads to a decreases in gingivitis and ultimately a reduction in bleeding from the gums.

Some also tasted the antimicrobial activities of *Salvadora persica* in vivo on streptococcus mutans and lactobacilli. There was marked reduction of streptococcus mutans among all groups. When the group were compared, the reduction of streptococcus mutans was significantly greater using mefakia in comparison to tooth brushing and there was no significant difference for lactobacilli reduction. Mefakia has got antibacterial activities (2).

The tooth brush is another oral hygiene instrument used to clean the gums and the teeth which consist of ahead of tightly clustered bristles mounted on a handle that facilitates the cleansing of hard to reach areas of mouth. Tooth brushes are available with different bristle texture,sizes and forms.Soft bristled tooth brushes are recommended since hard bristled tooth brushes can damage tooth enamel and irritate the gingiva. The modern tooth brush has different designs for adaption of different surfaces of the teeth. (39)

Modern medical research has shown that brushing teeth properly can prevent cavities, and periodontal or gum disease which causes at least one third of adult tooth loss. Poor dental health has been associated with heart disease and shortened life expectancy.

## CHAPTER THREE

### 3. Objective

#### 3.1. General Objective

The objective of this study was to assess the oral hygiene, gingival and periodontal conditions among Jiren secondary high school students who use either miswak or tooth brush or use both for their routine daily oral hygiene 2013 G.C

#### 3.2 Specific Objectives.

To assess and compare periodontal status among tooth brush and mefakia/chewing stick users with respect to:-

1. To assess the number and percentage distribution of periodontal status by the frequency of tooth cleaning using mefakia and tooth brush among jiren secondary high school students 2013 G.C
2. To assess the number and percentage distribution of periodontal status by technique of tooth cleaning using mefakia and tooth brush among jiren secondary high school students 2013 G.C
3. To assess periodontal status when other adjective materials are used with mefakia and tooth brush during tooth cleaning among jiren secondary high school students 2013 G.C.

## CHAPTER FOUR

### 4. Methodology

#### 4.1 Study area and period

Study area: - The study was conducted in Jiren high school which has a total of 2400 grade 9 and 10 students. The school is found in Jimma town which is 352 Km away from Addis Ababa, the capital city of Ethiopia. The town is characterized by topical climate, heavy rainfall, warm temperature and long wet season. It has an altitude of 1750-2000m above sea level with annual rain fall of about 1200-2000 mm<sup>3</sup>

Study periods: The study was conducted from May 5-9/2005 E.C

#### 4.2. Study design: A cross sectional study

#### 4.3. Population

Source population: All students learning in Jiren high school in 2005 E.C

Sample population: Jiren secondary high school students from grade 9-10 who used either miswak or tooth brush regularly as their main oral hygiene tool.

Sample size and sampling technique: Since data collection time is short, all students attending the class during data collection time and who are volunteer are participant; the sampling technique was stratified sampling technique in which total sample size of 331 students were selected by proportional allocation system by which 172 from grade 9 and 159 from grade 10.

The sample size was determined using the following formula

$$N = (z^2 p (1-p)) / D^2$$

D- Is the margin of sampling error to be foleratal (0.05%)

Z: confidence interval creeping to 95% and (I=1.96)

P-estimate prevalence

So that n from this calculation will be:-

$$n = (1.96)^2 (0.5)^2 / 0.05^2 = 384$$

Then the final population (nf) from this formula;  $nf = n / (1 + n/N)$   
 $= 384 / 1 + 384 / 2400$

#### 4.4. Study variables

##### 4.4.1. Independent variables

- ② Age -
- ② sex
- ② occupation
- ② Religion
- ② Marital status
- ② Address
- ② Mefakia
- ② Tooth brush

##### 4.4.2. Dependent variables

- ② Periodontal status

#### 4.5. Inclusion and exclusion criteria

##### Inclusion criteria

Those students who use either mefakia or tooth brush and who are volunteer & present in the class during data collection time.

##### Exclusion criteria

Those students who not use either mefakia or tooth brush & who not keep their oral hygiene and not volunteer and present in the class during data collection time. It also excludes those students who missed one or more of the following sextants: 11, 16, 26, 31, 36 or 46.

#### 4.6 Data collection process and instrument

Data was collected by a qualified dental interns using structured questionnaire which is prepared in English language. The examination was done using probe, explorer and dental mirror after fulfilling the entry criteria.

#### 4.7. Data analysis

After accomplishment of data collection, the data was put into the computer and analyzed by the principal investigator. Result was tabulated in relevant tables.

#### 4.8. Data quality control

Proper explanation was given to data collectors and they are supervised during data collection time and the collected data was handled properly.

The data was checked for consistency and accuracy.

#### 4.9. Dissemination of result

The result of the study was disseminated to Jiren school students, Jiren school teachers and on line by principal investigator besides submitting the report to Jimma University student research program office and research department.

#### 4.10. Ethical consideration

An official letter was written from Jimma University SRP and submitted to Jiren school director to permission for the study. Informed consent was obtained from all students prior to enrolment and only volunteer was candidate. Their response was kept confidentially.

#### 4.11 Operational definition

Mefakia: pencil sized sticks which are fashioned from certain plant parts and are chewed on one end until they become frayed into a brush. Chewing stick: other name of mefakia

Plaque: - is a matrixes of extracellular bacteria polymers and salivary- gingival exudates products.

Gingivitis: the inflammation of gingiva

Calculus:- the mineralized form of plaque

periodontitis:-the inflammation of the supporting tissue of the teeth

Periodontal status:- A condition of poriodontiun whether it is healthy or diseased , and to what degree it is affected .

Clinical attachment loss: -pathological detachment of collagen fibres from cemental surface with concomitant apical migration of the junctional or pocket epithelium on to the root surface.

Probing pocket depth: - distance from free gingival margin to bottom of the pocket usually measured in millimetre using graduated periodontal probe.

Gingival recession: - apical movement of the free gingival margin

Community periodontal index: It is a tool used to examine selected tooth for calculus deposition, gingival bleeding and probing pocket depth.

Gingiva: the soft tissue lining the teeth and provide a seal around them.



Periodontium: refers to the specialized tissues that surround and support the teeth, maintaining them in the maxillary and mandibular bones.

Criteria of calculus deposition, gingival bleeding, furcation involvement and tooth mobility evaluation according to CPI.

1. The criteria of calculus deposition evaluation

0 -no calculus

1 -Supra gingival calculus which covers 1/3 of tooth surface

2 -Supra gingival calculus which covers 1/3-2/3 of tooth surface

3 -Supra gingival calculus which covers > 2/3 of tooth surface

2. Grading of gingival bleeding

0- no gingival bleeding

1- Gingival bleeding on probing

2- Spontaneous gingival bleeding

3. Classification of furcation involvement

Class I- curvature of concavity can be felt with probe tip.

Class II. The probe is able to partially enter furcation

Class III. Probe will pass completely through the furcation

Class IV- Same as the class III except that the entrance to the fraction is visible clinically b/c of the presence of gingival recession

4. Grading of tooth mobility

Grade I- If the mobility is less than 1mm

Grade II- if the mobility is approximately 1mm

Grade III. If the mobility is >1mm

## CHAPTER FIVE

### Result

Most of the study subjects were participated with response rate of 89%. Some of them refused to respond due to fear of opening their mouth during intraoral examination.

Table1. Number and percentage distribution of socio- demographic status of Jiren  
Secondary High School Students 2013 G.C

S.No.	Demographic	Educational status	No.	Percentage (%)
1	Sex	Male	161	54.8
		Female	133	45.2
2	Age	14-18	238	80.9
		19-23	49	16.7
		24-28	7	2.4
		>28	0	0
		Orthodox	91	30.9
	Protestant	42	14.3	
3	Religion	Muslim	161	54.7
		Others	0	0
		Grade 9	153	52.1
	Grade 10	141	47.9	
4	Educational status	Oromo	189	64.3
		Amhara	35	11.9
5	Ethnicity	Tigray	7	2.4
		Gurage	21	7.1
		Others	42	14.3
		Urban	175	59.5
		Rural	119	40.5

Out of 294 students 161 (54.76%) were males while the rest 133 (45.24%) were females. The majority of the respondents (Students) 238 (80.92%) and 49(16.7%) were in the age range of 14-18 and 19-23 years respectively, 7(2.38%) were in the age range of 24-28 years and none of the students is greater than 28 years.

Regarding religion 161 (54.74), 91(30.94) and 42 (14.28) were Muslim, Orthodox and Protestant respectively.

The majority of the students 153 (52.06%) were grade 9 while 141(47.94%) were grade 10.

The majority of the respondents were Oromo in ethnicity 189 (64.3%), 35(11.90%) were Amhara, 21(7.14%) were Gurage, 7(2.38%) were Tigre and the rest 42 (14.29%) were others (Like yem, Kullo .....).

About 175 (59.52%) students were from Urban area and 119(40.48%) from the rural area.

Table2: Number and percentage distribution of periodontal status by the materials used for tooth cleaning among Jiren high school students.

Variable	Type of sextants assessed and materials used										
	Severity		Mefakia		Tooth brush						
No	%	No	%	No	%	No	%	No	%	No	%
Calculus deposition	0	135	80.4	151	89.9	135	91.1	153	91	140	
	83.3	148	88.1	121	96	124	97	121	96	123	97.6
				96	122	96.8					
	1	33	19.6	17	10.1	33	8.9	15	8.9	28	16.7
	11.9	5	4	2	1.6	5	4	3	2.4	5	4

2	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
					0							
3	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
					0							
Gingival bleeding		0	155	92.3	160	95	157	93.5	162	96.4	158	
	94.1	156	92.9	123	97.6	126	100	124	98.4	126	100	124
					98.4	126	100					
1	13	7.7	8	4.8	11	6.6	6	3.6	10	6	12	
7	3	2.4	0	0	2	1.6	0	0	2	1.6	0	
					0							
2	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
					0							
Pocket depth	<3mm	168	100	168	100	168	100	168	100	168	100	100
	168	100	126	100	126	100	126	100	126	100	126	100
					126	100						

Type of sextants assessed and materials used

Variable	Severity	Mefakia	Tooth brush
16	11	26	36
		31	46
		16	11
		26	36
			31





0			12	70.6	26	81.3	21	84	3
100			22	95.7	28	96.6	8	100	3
			100						
1			5	29.4	6	18.8	4	16	0
0			1	4.4	1	3.4	0	0	0
			0						
2			0	0	0	0	0	0	0
0			0	0	0	0	0	0	0
			0						
3			0	0	0	0	0	0	0
0			0	0	0	0	0	0	0
			0						
Gingival bleeding	0				15	88.2	30	93.8	24
	96	2	66.7		22	95.7	28	96.6	8
			100	2	66.7				
1			2	11.8	2	6.3	1	4	1
33.3			1	4.4	1	3.5	0	0	1
			33.3						
2			0	0	0	0	0	0	0
0			0	0	0	0	0	0	0
			0						
Pocket depth <3mm					17	100	32	100	25
	3	100			23	100	29	100	8
			3	100					

- Out of 17 students who clean their teeth horizontally using chewing stick every other day 12 (70.6%) have had grade zero calculus deposition, 5 (29.4%) were with grade one calculus deposition and out of 23 students who clean their teeth horizontally using tooth brush every other day 22(95.7%) were with grade zero calculus deposition, 1(4.3%) was with grade one calculus deposition.

- Out of 32 students who clean their teeth horizontally using chewing stick once a day 26(81.3%) have had grade zero calculus deposition,6(18.7%) were with grade one calculus deposition and from 29

students who brush their teeth horizontally using tooth brush once a day 28 (96.6%) have had grade zero calculus deposition, 1(3.4%) was with grade 1 calculus deposition.

- From 25 respondents who brush their teeth horizontally using chewing stick twice a day 21 (84%) were with zero grade calculus deposition, 4(16%) were with grade 1 calculus deposition and all students 8(100%) who brush their teeth horizontally using tooth brush twice a day were with grade zero calculus deposition.
- All students 3(100%) who brush their teeth horizontally using chewing stick more than twice a day have had grade zero calculus deposition and the same is true for those who use tooth brush horizontally more than twice a day.
- There were no students who brush their teeth horizontally using either chewing stick or tooth brush once a week or twice a week.
- Out of 17 students who brush their teeth horizontally using chewing stick every other day 15(88.2%) were with no gingival bleeding, where as 2 (11.8%) were with grade one gingival bleeding and from 23 students who brush their teeth horizontally using tooth brush every other day 22(95.7%) were with no gingival bleeding, 1(4.3%) was with grade one gingival bleeding.
- Out of 32 respondents who brush their teeth horizontally using chewing stick once a day 30(93.8%) were with no gingival bleeding, 2(6.3%) were with grade one gingival bleeding.
- From 25 students who clean their teeth horizontally using chewing stick twice a day 24 (96%) have had no gingival bleeding, 1(4%) was with grade one gingival bleeding and all of 8(100%) students who brush their teeth horizontally using tooth brush twice a day have had no gingival bleeding.
- From 3 students who brush their teeth horizontally using chewing stick more than twice a day 2(66.7%) have had no gingival bleeding, 1(33.3%) was with grade one gingival and equal number and percentage also for those who use tooth brush, more than twice a day.
- There were no students with pocket depth > 3mm at all frequencies in both chewing stick and tooth brush users.

There were no students with furcation involvement of any grade and any grade of tooth mobility at all frequencies in both who brush their teeth horizontally using either chewing sticks or tooth brush.





	2		0	0	0	0	0	0	0
	0		0	0	0	0	0	0	0
			0						
Pocket depth <3mm			11	100	26	100	24	100	
	2	100							
			15	100	14	100	3	100	
			3						

Out of 11 students who brush their teeth vertically using chewing stick every other day 8(72.7%) have had grade zero calculus deposition while 3(27.3%) were with grade one calculus deposition and out of 15 students who brush their teeth vertically using tooth brush every other day 14(93.3%) were with grade zero calculus deposition where as 1(6.7%) was with grade 1 calculus deposition.

- Out of 26 respondents who brush their teeth vertically using chewing stick once a day 21 (80.8%) were with grade zero calculus deposition, where as 5(19.2%) were with grade one calculus deposition and all students 14(100%) who brush their teeth vertically using tooth brush once a day were with grade zero calculus deposition.

- From 24 students who brush their teeth vertically using chewing stick twice a day 20(83.3%) have had grade zero calculus deposition, while 4(16.7%) were with grade one calculus deposition and all students 3(100%) who brush their teeth vertically using tooth brush twice a day were with grade zero calculus deposition.

- All students 2(100%) who brush their teeth vertically using chewing stick more than twice a day and all students 3(100%) who brush their teeth vertically using tooth brush more than twice a day have had zero grade calculus deposition.

- Out of 24 students who clean their teeth vertically using chewing stick twice a day 23 (95.8%) were with no gingival bleeding and all of 3(100%) those who brush their teeth vertically using tooth brush twice a day have had no gingival bleeding.

- Both of the students who brush their teeth vertically using chewing stick more than twice a day have had no gingival bleeding and all students 3(100%) who clean their teeth using tooth brush more than twice a day were with no gingival bleeding.

- There were no students who appeared with pocket depth > 3mm at all frequencies in both who use either chewing stick or tooth brush.



Gingival bleeding	0			6	85.7	11	91.7	6
	85.7	2	100					
				11	100	13	100	3
			100	1	100			
	1			1	14.3	1	8.3	14.3
	0			0	0	0	0	0
				0				
	2			0	0	0	0	0
	0			0	0	0	0	0
				0				
Pocket depth <3mm				7	100	12	100	7
	2	100						
				11	100	13	100	3
				1	100			

Out of 7 students who brush their teeth rotationally using chewing stick every other day 5(71.4%) were with zero grade calculus deposition, where as 2(28.6%) were grade one calculus deposition and out of 11 students who brush their teeth rotationally using tooth brush every other day 10(90.9%) were with grade zero calculus accumulation, while 1(9.1%) was with grade 1 calculus deposition.

From 12 students who brush their teeth rotationally using chewing stick once a day 10 (83.3%) have had zero grade calculus while 2(16.7%) were with grade one calculus deposition and out of 13 students who brush their teeth rotationally using tooth brush once a day 12 (92.3%) have had grade zero calculus, 1(7.7%) was with grade one calculus deposition. There were no students with grade 2 & 3 calculus deposition in both chewing stick & tooth brush users.

Out of 7 students who brush their teeth rotationally using chewing stick twice a day 5(71.4%) have had grade zero calculus while the rest 2(28.6%) were with grade one calculus deposition and all students 3(100%) who brush their teeth rotationally using tooth brush twice a day have had grade zero calculus deposition.

All students who brush their teeth rotationally using chewing stick and tooth brush more than twice a day , 2(100%) & 3(100%) respectively were with grade zero calculus deposition.

Out of 7 students who brush their teeth rotationally using chewing stick every other day 6(85.7%) have had no gingival bleeding while 1(14.3%) was with grade one gingival bleeding and all students 11(100%) who brush their teeth using tooth brush every other day were with no gingival bleeding.

From 12 students who brush their teeth rotationally using chewing stick once a day 11(91.7%) have had no gingival bleeding, 1(8.3%) was grade 1 gingival bleeding and all students 13(100%) who brush their teeth rotationally using tooth brush once a day were with no gingival bleeding.

Out of 7 students who brush their teeth rotationally using chewing stick twice a day 6(85.7%) were with no gingival bleeding, where as 1(14.3%) was with grade one gingival bleeding and no student has had gingival bleeding in those who use tooth brush rotationally twice a day  
 Both students who brush their teeth rotationally using chewing stick more than twice a day have had no gingival bleeding and there was no student with gingival bleeding among those who use tooth brush rotationally more than twice a day.

There were no students with pocket depth >3mm at all frequencies in both those who use either chewing stick or tooth brush.

There were no students with furcation involvement of any grade and any grade of tooth mobility at all frequencies in both who brush their teeth rotationally using either chewing stick or tooth brush.

Table Number and percentage distribution of periodontal status by technique of tooth cleaning using mefakia and tooth brush among Jiren secondary high school students 2013 G.C

Grade of severity of periodontal variable		Method of tooth brushing by	
chewing stick	Method of tooth brushing by tooth brush	Horizontal	vertical
Horizontal	Vertical Rotation	Horizontal	Rotation

Calculus	No		%		No		%		No		%	
	No	%	No	%	No	%	No	%	No	%	No	%
0	62	80.5	51	80.9	22	78.6	61	96.8	34	97	26	92.9
1	15	19.5	12	19.1	6	21.4	2	3.2	1	3	2	7.1
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
Gingival bleeding	0			71	92.2	59	93.7	25	89.3	60	95.2	
				34	97	28	100					
1	6	7.8	4	6.4	3	10.7	3	4.8	1	3	0	
2	0	0	0	0	0	0	0	0	0	0	0	
Pocket depth <3mm	77	100	63	100	28	100	63	100	35	100	100	
					28	100						

Out of 77 students who clean their teeth horizontally using chewing stick 62(80.52%) were with grade zero calculus deposition, 15(19.48%) were with grade one calculus deposition, none of them were with grade three and four calculus deposition. Out of 63 students who clean their teeth with tooth brush using horizontal technique 61(96.83%) were with grade zero calculus deposition, 2(3.17%) were with grade one calculus deposition, no one with grade three or four calculus deposition.

Out of 63 students who clean their teeth vertically using chewing stick 51(80.95%) were with grade zero calculus deposition, 12(19.05%) were with grade one calculus deposition and no student was with grade three or four calculus deposition. Out of 35 respondents who clean their teeth vertically using tooth brush 34(97.14%) were with grade zero calculus deposition, 1(2.86%) was with grade 1 calculus deposition.

Out of 28 students who clean their teeth rotationally using chewing stick 22(78.57%) was with grade zero calculus deposition 6(21.43%) were with grade one calculus deposition. Out 28 students who clean their teeth rotationally using tooth brush 26(92.86%) were with grade zero calculus deposition,

2(7.14%) were with grade one calculus deposition. None of them have had grade 2 or 3 calculus deposition.

Regarding gingival bleeding out of 77 students who clean their teeth horizontally using chewing stick 71(92.25%) were with grade zero gingival bleeding and the rest 6(7.79%) were with grade one gingival bleeding and from those using tooth brush horizontally 60(95.24%) were with grade zero gingival bleeding and 3(4.76%) were grade one gingival bleeding.

Out of 6.3 students who clean their teeth vertically using chewing stick 59(93.65%) were with grade zero gingival bleeding, 4(6.35%) were with grade one gingival bleeding and out of 35 students who clean their teeth vertically using tooth brush the majority 34 (97.14%) were with grade zero gingival bleeding and 1(2.86%) was grade one gingival bleeding.

From 28 students who clean their teeth rotationally using chewing stick 25 (89.29%) were with grade zero gingival bleeding and 3(10.71%) were grade one gingival bleeding and all of students 28(100%) who clean their teeth rotationally using tooth brush have had grade zero gingival bleeding.

All students 77(100%) who clean their teeth horizontally using chewing stick were <3mm pocket depth and as well as all students 63(100%) who clean their teeth horizontally using tooth brush were with < 3mm pocket depth.

All respondents 63(100%) who clean their teeth vertically using chewing stick have had <3mm pocket depth and all students 35(100%) who clean their teeth vertically using tooth brush were also with <3mm pocket depth.

All the students 28(100%) who clean their teeth rotationally using chewing stick have had <3mm pocket depth and the same is true for all those who use tooth brush rotationally to clean their teeth.

All students 77 (100%) who brush their teeth horizontally using chewing stick have had no abnormal tooth movement other than the normal physiological tooth mobility and non of those who clean their teeth horizontally using tooth brush have had abnormal tooth mobility. The same is true for vertical and rotational technique using either chewing stick or tooth brush.

There were no students with furcation involvement who clean their teeth vertically either using chewing stick or tooth brush and similarly there were no student with furcation involvement who clean their teeth both horizontally and rotationally either using chewing stick or tooth brush.

Variable	Grade of severity of periodontal variable	Adjunctive material used with chewing stick and tooth brush
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	Adjunctive used with chewing stick					Adjunctive used with tooth brush					
	Nothing		Tooth paste		Other adjunctive adjunctive	Nothing		Tooth paste		Other	
	No	%	No	%		No	%	No	%		
Calculus											
0	124	80.5			11	78.6	27	96.4	94	95.9	
1	30	19.5			3	21.4	1	3.6	4	4.1	
2	0	0			0	0	0	0	0	0	
3	0	0			0	0	0	0	0	0	
Gingival bleeding											
	0	142	92.2				13	92.9	25	92	96
					98						
1	12	7.8			1	7.1	3	8	2	2	
2	0	0			0	0	0	0	0	0	
Pocket depth <3mm	154	100					14	100	28	100	100

Table5. Periodontal status versus adjunctive material used with mefakia and tooth brush during brushing among jiren secondary high school students 2013 G.C

From 154 students who brush their teeth with chewing stick without adjunctive materials majority 124(80.52%) were with grade 0 calculus deposition, where as 30(19.48%) were with grade 1 calculus deposition but there were no students who clean their teeth using chewing stick with tooth paste and out of 28 students who brushes their teeth with tooth brush without adjunctive nearly all 27(96.45%) were with grade zero calculus deposition, where as 1(3.57%) was with grade one calculus deposition. Out of 98 students who clean their teeth using tooth brush with tooth paste 94(95.92%) were grade zero calculus deposition, where as 4(4.08%) were with grade one calculus deposition and out of 14 students who brush their teeth using chewing stick with other adjunctive 11(78.57%) were with grade zero calculus, 3(21.43%) were with grade one calculus deposition.

Again out of 154 students who brushes their teeth with chewing stick without adjunctive majority 142(92.21%) were with no gingival bleeding, where as 12(7.79%) were with grade 1 gingival bleeding



and no student with grade 2 gingival bleeding and out of 28 students who brushes their teeth with tooth brush without other adjective majority 27(96.43%) were with no gingival bleeding where as 1(4.57%) was with grade one gingival bleeding.

Out of 98 students who clean their teeth using tooth brush with tooth paste 96(97.96%) were grade zero gingival bleeding, where as 2(2.04%) were with grade 1 gingival bleeding and out of 14 students who brushes their teeth using chewing stick with other adjunctive majority 13(92.86%) were with no gingival bleeding, 1(7.14%) was with grade 1 gingival bleeding.

Out of 154 students who brush their teeth using chewing stick without adjunctive all students 154(100%) were < 3mm pocket depth and all students 28(100%) who brush their teeth using tooth brush without other adjunctive were < 3mm pocket depth.

All students 98(100%) who clean their teeth using tooth brush with tooth paste have had < 3mm pocket depth and all students 14(100%) who clean their teeth using chewing stick with other adjunctive were < 3mm pocket depth.

Table 6: Oral hygiene status of Jiren high school students 2013.

Material Used	Periodontal status		Grade 9		Grade 10	
		No	%	No	%	
Mefakia	Fair	6	6.9	4	4.9	
	Fair	33	37.9	27	33.3	
	Good	48	55.2	50	61.7	
Tooth brush	Poor	7	10.9	5	8.3	
	Fair	19	29.7	16	26.7	
	Good	38	59.4	39	65	

From 168 students who brush their teeth with mefakia 6(6.9%) and 4(4.9%) have had poor oral hygiene each from grade 9 & 10 respectively.

Out of 168 students who clean their teeth using mefakia 33(37.9%) from grade 9 27(33.3%) from grade 10 have fair oral hygiene and the rest 48(55.2%) from grade 9 and 50(61.7%) from grade 10 have good oral hygiene.

Out of 126 students who brush their teeth using tooth brush 7(10.9%) from grade 9 & (8.3%) from grade 10 have poor oral hygiene, 19(29.7%) from grade 9 & 16 (26.7%) from grade 10 have had fair oral hygiene while the rest 38(59.4%) from grade 9 and 39(65%) from grade 10 have had good oral hygiene.

Material Used	Periodontal status		Grade 9		Grade 10	
		No	%	No	%	
Mefakia	Fair	6	6.9	4	4.9	
	Fair	33	37.9	27	33.3	
	Good	48	55.2	50	61.7	
Tooth brush	Poor	7	10.9	5	8.3	
	Fair	19	29.7	16	26.7	
	Good	38	59.4	39	65	

## CHAPTER SIX

### DISCUSSION

Even though periodontal status is measured by the condition of periodontal apparatus for that adequate education on how to use, when to use and with what to use chewing stick and tooth brush is important for keeping the periodontal status healthy.

No gender difference in response to practice on brushing is identified in this study; as well as there were no differences regarding age, religion, educational level and address. There is slight difference on the

material they use for brushing; majority of those from the urban area use tooth brush while majority of those students from the rural area use chewing stick.

This result oppose with the research done by Norton M and Addy M, which reported that men had poorer oral hygiene and gingival health than women, regardless of oral hygiene regimen.

This study clearly reveals that there is no great difference in efficiency between chewing stick and tooth brush although tooth brush is slightly more effective than chewing stick when used more than twice a day with tooth paste together with vertical technique of brushing. This may be resulted because of the fact that those using tooth brush vertically are well informed with regard to the method of tooth brushing by tooth brush while buying from the professionals but the probability of hearing the method of tooth brushing is less for those using chewing stick vertically, that is why once they used vertically they may change the method the other time.

The result also shows that there was no pocket > 3mm in both those who use either chewing stick or tooth brush to keep their oral hygiene. Additionally there was no furcation involvement and abnormal tooth mobility was found in both of those who use either mefakia or tooth brush, But tooth brush is more effective than chewing stick when assessing calculus deposition and gingival bleeding which were 96% to 91.21% and 95% to 92% for no calculus deposition and no gingival bleeding respectively with tooth brush to chewing stick respectively.

This result is similar to the study done by N dungu FL- which states that the patient with severe plaque deposition, the tooth brush is more efficacious than the chewing stick in plaque control. On the other hand this result opposes with the study done by AL-Otaibi et al which states that mefakia to be more effective than tooth brush for removing plaque from the embrasures, thus enhancing inter-proximal health. Another result showed that there was no difference between chewing stick and tooth brush when assessing furcation involvement, pocket depth and tooth mobility for those using either chewing stick or tooth brush vertically more than twice a day.

Another result showed that those who used tooth brush with adjunctive were 95% with grade zero calculus deposition, where as there were 80% with zero grade calculus deposition for those who used chewing stick with other adjunctive but there were no student registered for grade 2 and 3 calculus deposition in both who use either chewing stick or tooth brush. In addition to this chewing stick without paste is equal effective with tooth brush without tooth paste when evaluating grade zero gingival

bleeding and < 3mm pocket depth which were 92% and 100% for grade zero gingival bleeding and < 3mm pocket depth respectively, equal for both chewing stick and tooth brush.

This result is similar with the study done by HardieJ and Ahmed K which stated that the plaque removing properties of mefakia and conventional tooth brush are similar. It is also similar with the study done by Van palestein Helderma WH, which suggest that effective tooth brushing was helpful to improve the oral hygiene regardless of wether chewing stick or tooth brush is used.

## CHAPTER SEVEN

### Conclusion and Recommendation

#### Conclusion

This study clear indicates that there is no great difference in efficiency b/n chewing stick and tooth brush even though there were some problems regarding to both chewing stick and tooth brush which were as follows:-

- ❑ In adequate and in appropriate oral hygiene practice which may be caused by lack of information and encouragement from different sources.
- ❑ Those using chewing stick and tooth brush more than twice a day were less in number which may be caused by lack of knowledge on how many times to use per day.
- ❑ Majority of the students brush their teeth with either chewing stick or tooth brush but most of them brush horizontally.
- ❑ None of the students use tooth paste with chewing stick.

Recommendation:- to start with the build up of knowledge on how to use, when to use and with what to use both chewing stick and tooth brush, and to change their attitude toward chewing stick, also to develop habit of oral hygiene practice, the possible source of knowledge and encouragement should be exploited. These may be mass-media, schools, dental and medical personnel or any other relevant body should take on initiative to carry out further research on this topic. Finally I will recommend the Jimma health bureau to provide ways of expanding health education on how to keep good oral hygiene.

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## Annex II

Jimma University college of Public health and medical science school of Dentistry  
A questionnaire designed to assess and compare the gingival and periodontal conditions among students who used mefakia /chewing sticks or tooth brush for their routine daily oral hygiene.

### Instruction

The respondent should be informed to answer the questions correctly and honestly and their response will be kept confidentially.

1. address \_\_\_\_\_
2. date \_\_\_\_\_

### II- General Information

1. Age \_\_\_\_\_
2. Gender : A, male                      B, Female
3. Religion:- A. Orthodox              B. Muslim                      C. protestant  
D) Catholic    E. others specify \_\_\_\_\_
4. Ethnicity:- A. Oromo                      B. Amhara                      C. Tigray

D. E. Other specify \_\_\_\_\_

5. Educational status of the respondent

A. grade 9 B. grade 10

6. Address: A. urban B. Rural

7. Do you clean your teeth? A. yes B. No

8. If yes, for Q# 7, which tool do you use to clean your teeth?

A. Mefakia B. Tooth brush

C. Other specify \_\_\_\_\_

9. What do you use with mefakia (chewing stick) when you are  
Brushing?

A. Nothing B. tooth paste C. Other adjunctive  
specify \_\_\_\_\_

10. What do you use with tooth brush when you are brushing?

A. Nothing B. tooth paste  
C. ones adjunctive specify

11. How often do you brush your teeth with mefakia?

A. Once a week D. Once a day  
B. Twice a week E. twice a day  
C. every other day F. more than twice a day

12. For how long do you clean your teeth with mefakia?

A. For one minute B. For 1-3 minute  
C. For more than 3 minutes

13. What is your method of brushing with mefakia?

A. Horizontal B. vertical C Rotational

14. What is your method of brushing with tooth brush?

A. Horizontal B. Vertical C. Rotational

15. How often do you brush your teeth with tooth brush?

A. Once a week D. Once a day  
B. twice a week E. twice a day  
C. every other day F. more than twice a day

Part II: clinical examination



	1.gingival bleeding	
16	11	26

46	31	36
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Grading of gingival bleeding according to CPI

- 0- No gingival bleeding
- 1- Gingival bleeding on probing
- 2- Spontaneous gingival bleeding

	2. Calculus deposition	
16	11	26

46	31	36
----	----	----

Supra gingival calculus according to CPI

- 0- No calculus
- 1- Supra gingival calculus which covers ½ of tooth surface
- 2- Supra gingival calculus which covers ½-2/3 of tooth surface
- 3- Supra gingival calculus which covers >2/3 of the tooth surface

	3. Gingival recession	
16	11	26

46	31	36
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A-Yes

B-No

