

# Association Between Chewing (Khat/Miraa) and the Occurrence of Dental Caries and Periodontal Disease Among Youth in Igembe, Meru County, Kenya

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## Abstract

Globally approximately 10 million people chew (Khat /Miraa) and majority are mainly from Eastern Africa and Middle East. Studies have showed that khat/Miraa use are associated with dental caries and periodontal disease among the youth. The aim of the study is to determine the association between chewing (khat/miraa) and the occurrence of dental caries and periodontal disease among youth in Igembe, Meru County, Kenya. This is a cross-sectional study among 340 study participants, cluster sampling was utilized. Semi-structured questionnaires were used to collect the data. Data was analyzed using SPSS version 25, Chi-square test were used to determine associations between chewing (khat/miraa) and the occurrence of dental caries and periodontal disease. Ethical approval was obtained from KNH-UoN Ethics and Research Committee. The prevalence of Miraa chewing among the youth was found to be 12% (41). The prevalence of dental caries and periodontal diseases in the population was 62% and 47% respectively. There was a significant association between Chewing Miraa with sweeteners and the risk of developing dental caries and periodontal diseases ( $p < 0.001$ ). The prevalence of Miraa chewing in Igembe was high. Dental caries and periodontal disease are common in this population. Miraa chewing was significantly associated with the prevalence of dental caries and periodontal disease. Intervention enhancing reduction of Chewing Miraa with sweeteners should be encouraged by public health officers to reduce dental caries and periodontal disease among the population.

**Keywords: Miraa, Dental caries, Periodontal disease, Youth**

## **I. INTRODUCTION**

Khat (Miraa) is an amphetamine like psychostimulant plant chewed by over 10 million people globally, mainly in Eastern Africa and Middle East<sup>1</sup>. The prevalence of khat chewing among youth students in Ethiopia was 42.0%<sup>2</sup>. In Kenya, the prevalence of khat chewing was 36.8%<sup>1</sup>. Meru is one of the largest khat growing regions besides Embu in Kenya. The focus mainly being on Khat as a cash crop<sup>2</sup>. The inhabitants of Meru have therefore unlimited access to Khat. Various studies have shown association between Khat use and dental disorders<sup>4,2</sup>. A study has suggested that high consumption of sugary drinks and numerous use of sugar to counteract the bitter taste of Khat in the mouth during Khat chewing could predispose to increased dental caries<sup>7</sup>. The use of sugary components together with Miraa could explain the higher number of missing teeth found among Khat chewers<sup>10</sup>. Increased dental discolouration has often been reported in chronic khat chewers<sup>7</sup>. The staining was noted to specifically affect teeth on the chewing side and adjacent to the point where the chewed Khat that forms a quid is held against the cheek on one side of the mouth (Khat bolus) compared with the non-chewing side<sup>8</sup>. In another study, over 90% of the khat chewers had dental staining whereas no staining was found in the control group, indicating a significant association between Khat chewing and staining of teeth<sup>9</sup>. Khat in itself is considered to be non-cariogenic<sup>7</sup>. Khat has been used for relieving fatigue and stress, boosting energy to enhance ability to work, staying alert to enhance performance of work, reducing hunger and enhancing self-esteem<sup>6</sup>. Khat is therefore used by workers who desire to keep awake and alert during the night. Khat is also thought to have nutritional and medicinal properties and is known to enhance social bonding among user communities<sup>3</sup>. This study aimed to determine the prevalence of Khat chewing and the occurrence of dental caries and periodontal disease among the youth in Igembe, Meru County.

## **II. MATERIALS AND METHODS**

This study was conducted at Igembe which covers Igembe North, Central and South sub

counties in Meru County in Eastern Kenya. Mostly Miraa is the main cash crop in the area and youth in the study area chew Miraa. This is a cross-sectional study among 340 study participants, cluster sampling was utilized. Semi-structured questionnaires were pre-tested among Miraa chewers at Igembe North and the results were not included in the data analysis of results. After pre-testing the errors on questionnaires were corrected before administered. Data collection was done among Youth (persons aged 18-35 years) residing in Igembe in Meru County from April to June 2019 who consented in writing to participate in the study. Data was collected by two trained dentists who had at least 5 years of experience in dental practice on dependent variable chewing (khat/miraa) and the independent variable (occurrence of dental caries and periodontal disease) among youth. Data was analyzed using Statistical Package for Social Sciences (SPSS) version 25, Chi-square test were used to determine associations between chewing (khat/miraa) and the occurrence of dental caries and periodontal disease. Ethical approval was obtained from KNH-UoN Ethics and Research Committee. The filled questionnaires were all kept under lock and key to ensure high level of confidentiality and privacy. Data was disseminated to the School of Public Health, Kemri, JKUAT and Meru County Public Health Office.

## **III. RESULTS**

### **A. Characteristics of the study Respondents**

The total respondent was 340 youth. Majority of the study respondents 54% (184) were male. Miraa chewing among respondents were 12% (41). Among those who chewed Miraa they used it with other substance; Majority chew Miraa with sweets (candy) 34% (115) while others chew with sugary tea/coffee 30% (102). Majority 62% (211) of the study respondents had not visited the dentist for dental checkup within the last 12 months and only 7% (24) had practice of brushing teeth more than once a day. The prevalence of dental caries was 62% (211) while periodontal disease was 47% (160) among the study respondents. Table 1.

**Table 1: Characteristics of the study Respondents**

Variables	Frequency (n = 340)	Percent
<b>Gender of respondents</b>		
Male	184	54
Female	156	46
<b>Miraa (Khat) chewing</b>		
Yes	41	12
No	299	88
<b>Substance used while chewing miraa</b>		
Chewing gum	67	20
Sweets (candy)	115	34
Soda/soft drinks	47	14
Sugary tea/coffee	102	30
None	9	2
<b>Teeth brushing practices</b>		
Yes, once a day	105	31
More than once a day	24	7
Sometimes	173	51
Never	38	11
<b>Dental consultation</b>		
Yes	129	38
No	211	62
<b>Prevalence of Dental carries</b>		
Yes	211	62
No	129	38
<b>Prevalence of periodontal diseases</b>		
Absence of periodontal disease	180	53
Shallow pocket (4-5mm)	92	27
Deep pocket (6mm)	68	20
	340	100

**B, Association between chewing Miraa and development of dental caries among respondents**

Chi-square test has shown there is statistical significant association between Miraa chewing with sweeteners (P<0.001), age p<0.004 and gender p<0.002 and development of dental caries among the study respondents (Table 2).

**Table 2: Association between Miraa chewing and development of dental caries among respondents**

Factor	With Dental caries	Caries free	P-value
<b>Age</b>			
18-22 years	21(6.1%)	13(3.9%)	0.004
23-27 years	149(43.9%)	27(8.1%)	
28-32 years	32(9.4%)	70(20.6%)	
33-35 years	9(2.8%)	17(5%)	
<b>Gender</b>			
Male	136(40%)	48(14%)	0.002
Female	75(22%)	82(24%)	
<b>Miraa Chewing</b>			
Miraa chewing with sweeteners	174(51.1%)	11(3.3%)	<0.001
Miraa chewing with no sweeteners	23(6.7%)	91(26.7%)	
Did not chew Miraa	15(4.4%)	26(7.8%)	

**C, Association between chewing Miraa and development of periodontal disease of among respondents**

Chi-square test has shown there was statistical significant association between Miraa chewing with sweeteners (P<0.001), age p<0.003 and gender p<0.002 and development of periodontal disease among the study respondents (Table 3).

**Table 3: Association between chewing Miraa and development of periodontal disease of among respondents**

Factor	With Periodontal disease	No Periodontal disease	P-value
<b>Age</b>			
18-22 years	21(6.1%)	13(3.9%)	0.003
23-27 years	149(43.9%)	27(8.1%)	
28-32 years	32(9.4%)	70(20.6%)	
33-35 years	9(2.8%)	17(5%)	
<b>Gender</b>			
Male	136(40%)	48(14%)	0.002
Female	75(22%)	82(24%)	
<b>Miraa Chewing</b>			
Miraa chewing with sweeteners	115(33.9%)	45(13.3%)	<0.001
Miraa chewing with no sweeteners	34(10%)	91(26.7%)	
Did not chew Miraa	11(3.3%)	38(11.1%)	

**DISCUSSION**

The study found that the prevalence of dental caries and periodontal disease were 62% and 47% respectively among the respondents. In this study, the prevalence of miraa chewing was found to be 12% (41) among respondent. This finding is lower than the overall prevalence of Khat chewing in Kenya which was reported as 36.8%<sup>1</sup>.

**A, Chewing Miraa with sweeteners**

There was a significant association between Chewing Miraa with sweeteners and the risk of developing dental caries and periodontal diseases. In our study Majority of our respondents chew Miraa with sweets (candy) while others chew with sugary tea/coffee Table 1. In this study, the high prevalence of dental caries and periodontal diseases among the khat users could be explained by the fact that majority of the respondents, 51.1% with dental caries and 33.9% with periodontal diseases among the khat chewers used sweeteners (cariogenic foods) to chew Miraa with so as to counteract the bitter taste of Miraa in the mouth. These finding are

consistent with study finding by<sup>7</sup> who reported people who chew khat Miraa with no cariogenic foods and regularly brushed teeth were found to have better oral health as compared to the respondents who chewed Miraa with cariogenic foods.<sup>13</sup> In a meta-analysis, Khat use was highly associated with higher rates of poor oral hygiene, periodontal diseases<sup>4</sup>. Studies have also reported that khat is associated with several oral and dental conditions, including keratotic white lesions, mucosal pigmentation, periodontal disease, tooth loss<sup>11</sup>. Brushing of teeth among the study respondents was generally poor. These are probably because the youth did not consider the importance of their oral health. Poor oral hygiene status was also realized in a higher proportion of khat-chewers than in non-chewers<sup>12</sup>. These findings also concur with a study carried out in Yemen by AL-Maweri (2017)<sup>14</sup> who reported regular teeth brushing in only 6% among Khat chewers compared to 38% in a control group.

**B, Male gender**

There was a significant association between male gender and the risk of developing dental caries and periodontal diseases. Studies has shown male gender who chew miraa has poor oral hygiene as compared with female<sup>5</sup>

**CONCLUSION**

The study found that the prevalence of dental caries and periodontal disease were 62% and 47% respectively among the respondents. The prevalence of Miraa chewing among the youth was found to be 12% (41). There was a significant association between Chewing Miraa with sweeteners, and the risk of developing dental caries and periodontal diseases. Intervention enhancing reduction of Chewing Miraa with sweeteners should be encouraged by public health officers to reduce dental caries and periodontal disease among the population

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## REFERENCES

1. A.I.Kholani, Influence of Khat Chewing on Periodontal Tissues and Oral Hygiene Status among Yemenis. *Dent Res J (Isfahan)* winter.7(1): p1-6. 2010
2. A.I.Maweri, S.A. Warnakulasuriya, S. Samran, A. Khat (Catha edulis) and its oral health effects. An updated review. *J Investig Clin Dent*; Doi. 10.1111/jicd.12288. 2018
3. G.Ayano, K.Yohannis, M. Abraha, Epidemiology of khat (Catha edulis) consumption among university students. A meta-analysis. *BMC Public Health* ; <https://doi.org/10.1186/s12889-019-6495-9>. 2019
4. E, I.Wajeh, M.H.Thornhill. Khat and its health effects ; *British dental journal*; 206(1): p17-21. 2009.
5. E.Halboub, E,Dhaifullah , R.Yasin . Determinants of dental health status and dental health behavior among Sanaa' University students, Yemen. *Journal of investigative and clinical dentistry*;. 4(4):p257-64. 2013
6. F.N.Hatta, B.Angmar-Mansson. Fluoride content in khat (Catha edulis) chewing leaves. *Archives of oral Biology* ;2009.
7. C.M. Hill, A.Gibson, 2011, The Oral and dental effects of khat chewing. *Oral Surgery, oral medicine and oral pathology*
8. S. Kassim ,R.Croucher .Factors associated with dental and medical care attendance in UK resident Yemeni khat chewers: a cross sectional study. *BMC Public Health* ; 12, 486 <https://doi.org/10.1186/1471-2458-12-486>. 2012.
9. O.Lukandu. Effects of chronic khat use on oral health status. *African journal of oral health sciences*; 2016.
10. I. Nyanchoka, E,Dimba, M.Chindia, P,Wanzala, F.Macigo. The oral and dental effects of khat chewing in the Eastleigh area of Nairobi Kenya. *Journal of the Kenya Dental Association* 1(1); 2008.
11. L.Ongeri, F.Kirui, E.Muniu, V.Manduku, L.Kirumbi, L.Atwoli, S.Agure, P.Wanzala, L. Kaduka , M. Karimi, R.Mutisya , E.Echoka, J.Mutai , D.Mathu , C.Mbakaya. Khat use and psychotic symptoms in a rural Khat growing population in Kenya: A household survey ;. *BMC Psychiatry*, 19, Article 137. <https://doi.org/10.1186/s12888-019-2118-3>. 2019.
12. F.S.Teni, A.S.Surur, A.Hailemariam, A.Aye, G.Mitiku, A.E.Gurmu, B.Tessema. Prevalence, Reasons, and Perceived Effects of Khat Chewing Among Students of a College in Gondar Town, Northwestern Ethiopia: A Cross-Sectional Study. *Ann Med Health Sci Res*; 2015. 5(6):p54-60. doi: 10.4103/2141-9248.177992. PMID: 27057386; PMCID: PMC4804659. 2015
13. N.Yarom, J.Epstein, H.Levi, D.Porat, E.Kaufnam, M.Gorsky. Oral manifestation of habitual khat chewing: a case-control study *Oral surgery, oral medicine, oral pathology, oral radiology and endodontic*, 109(6): p60-6. 2010.
14. S.A. AL-Maweri. M. AlAkhali. Oral hygiene and periodontal health status among khat chewers. A case-control study. *J Clin Exp Dent* doi:10.4317/jced.53520.2017