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Khat chewing and self rated oral health out comes in Bahir Dar, North West Ethiopia

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Abstract: Introduction: Khat, *Catha edulis,* is a plant where its fresh leaves and buds are consumed due to its stimulant ingredient, cathinone. It is found in Ethiopia, Kenya, and Yemen. Bahir Dar is a city in the north western Ethiopia where three percent of Ethiopia's total production of khat is originated. So far there is one community based study that has been done in Bahir Dar city on the effect of khat chewing on self rated general health problems. This study was conducted specifically to examine the association of khat chewing behavior on self rated oral health problem among male khat chewers.Objective: The main aim of this study is to determine effects of khat chewing behaviors (onset, frequency and amount of khat chewing) on self rated oral health status among khat chewers. Methods: In this study, a cross-sectional, sellers to sellers survey on the representative sample of 422 male subjects, aged ≥ 16 years, was conducted in Bahir Dar, North western Ethiopia from January to September 2013. Data were collected after khat chewing. Study individuals were selected using systematic random sampling technique and data were collected using self-administered questionnaire. Data analysis was made using SPSS version 16.0 for windows package. Results: A total of 422 male khat chewers were included in study, 422 respond to the questioners, giving a response rate of 100%. The study found that the mean age of participants with standard deviation was 30.31 ± 1.39 years old. Sixty two percent of participants reported oral health problems. Of the 262 self-reported oral problems; 78.6% had dental decay or tooth discolouration, 21.4% gum problems (inflammation, bleeding). Those who started khat chewing at early age(7-15yrs) was found to be associated significantly with self rated oral health problem (AOR: 2.85, CI 95%:1.26-6.45) and P≤ 0.04. With regard to frequency of khat chewing; frequent khat chewers(≥ 3days) were 7.58 times more likely to be affected by self rated oral health problem compared to those who chewed less frequently (AOR:7.58,95%CI:3.53-16.27). Chewers who chewed 51gm-100gm and ≤ 100gm per session are 1.95 and 4.33 times more likely to be affected by oral health problem compared to those who chewed 25gm-50gm per session and amount of khat chewed per session were found to be significantly associated with self rated oral health (AOR: 1.95, 95%CI: 1.16-3.30), (AOR: 4.33, 95%CI: 2.49-7.53) respectively. Conclusion: There is significant association between Chat chewing behaviors (amounts of khat chewed during khat session, frequency of khat chewing, the level of age khat chewing started) and self rated oral health problem.

Keywords: Khat Chewing, Bahir Dar City, Self Rated Oral Health Out Comes, Amount and Frequency of Khat Chewing

1. Introduction

Khat (Catha edulis) is an ever green shrub that grows at high altitudes of eastern and southern Africa, as well as on the Arabian Peninsula [1]. Khat leaves are crimson-brown and chewing of khat leaves (Catha edulis Forsk) is widely practiced in East Africa and parts of the Middle East, such as Yemen and Ethiopia where it forms a deep-rooted social and cultural function [2, 3]. The pleasure derived from khat chewing is attributed to the euphoric actions of its (-)-S-cathinone, a sympathomimetic amine with properties described as similar to those of amphetamine [3,5,6]. Users of khat report increased levels of energy, alertness and self-esteem, a sensation of euphoria, enhanced imaginative ability and a higher capacity to associate ideas and these effects have been attributed to the khat's cathinone [5,7,8].

In Ethiopia, khat is used for direct consumption, local sale and for export. It is estimated that 85 to 90% of khat production is for sell; the rest is used for local consumption [9].

The habit of khat chewing is believed to affect a large segment of the Ethiopian population, especially the productive age group i.e., it has negative impact on health, socioeconomic and political matters [10].

The description of khat chewing frequency in the literature is varied. For example; a study [11] reported current habitual khat chewing as daily, and more frequently as occasional. Another study also [12] reported khat chewing as once a week or less as occasional (16.2%), 2-3 days as light, 4-6 days frequent and every day as heavy. World Bank survey study result in Yemen [13] reported that khat chewing three and more days per week as 'addictive'. A study also [14] defined the pattern of khat chewing every day as regular and other patterns as once a week and occasional.

Study results shown the effect of khat chewing on body organ systems. For instance, the effect that accounts for the popularity of khat is its central nervous system stimulation, believed to be induced by cathinone, an active ingredient of khat leaves [15]. Several studies showed that the psychostimulant effects induced by chewing khat include a moderate degree of euphoria and mild excitement resulting in promotion of social interaction and loquacity and these effects were found to be a maximum between 1.5-3.5 hours after starting to chew and they were progressively replaced by mild dysphonic, anxiety, reactive depression, insomnia and anorexia (loss of appetite) [16, 17].

In recent years khat induced psychosis (serious mental illness) including mania, paranoia and schizophrenia has become more common [18]. Furthermore khat chewing seems to complicate the management of pre-existing serious mental illness [19].

Recent work on Yemeni and Bahir dar,Ethiopia provided evidence that khat chewing produced a significant rise in arterial systolic and diastolic blood pressure and pulse rate and these changes run parallel with the changes in plasma cathinone levels during and after khat chewing [8,20,37]. It could be expected, therefore, that khat chewing carries a potential cardiovascular risk especially in patients with hypertension and heart disease, and might precipitate the occurrence of cardiovascular accidents (stroke) and myocardial infarction (heart attack) in susceptible individuals [21].

khat chewers often complain of symptoms suggestive of inflammation of the mouth, esophagus, stomach and these effects were believed to be caused mainly by tannins in khat. The study also showed that chewing delays gastric emptying of a semi-solid meal, probably as a result of the sympathomimetic action of cathinone in khat [22].

A common complaint of khat chewers is constipation, probably caused by a combination of the astringent properties of the chemical in khat, called tannins and the sympathomimetic properties of cathinone [23].

Studies again reported about the effect of both khat and nicotine dependence on self-reported oral problems were discoloration of teeth, cuts, trouble eating and experiencing mouth infection after khat chewing and oral cancer (squamous cell carcinoma) [24-26]. And in this study the effect of khat chewing on self rated oral health conditions were assessed.

2. Methods and Materials

A study was conducted in Bahir Dar town, North West Ethiopia, from January to September 2013, using a cross-sectional design. The source population of this study was all Bahir Dar town khat chewers and the study population was sampled khat chewers of the town. Systematic random sampling technique was employed to select samples of khat sellers and cluster sampling technique was used to select study participants.

The sample size (n) was calculated by considering 95% confidence level, p = 0.5, margin error (d) 5% (0.05) and the estimated sample size of the study were 422. All voluntary khat chewers in the sampled khat sellers were included in the study.

The sample for this study was drawn from places of khat sales and systematic procedures were carried out to select the eligible khat chewers for the study, these were; identifying the kebeles/villages which sellers were highly populated, identifying or recruitment of khat sellers from a given kebele/village and selection of khat chewers from the recruited khat sellers. Sampling was conducted through sellers to sellers survey in which, every second khat sellers was selected through systematic random sampling and all kat chewers in selected sellers were included as the study participants. All volunteers in the sampled sellers were included in the study.

For data collection, a pretested questionnaire pertinent to the study objectives were developed and used. The questionnaire was translated into Amharic and distributed to all sampled khat chewers. Four trained personnel including one nurse were involved in data collection, and supervision was carried out by the principal investigator.

Data entry, clearing and analysis were made using SPSS. A bivariate and multivariate logistic regression analysis were made to determine the association between khat chewing behaviours and self rated health status.

Ethical clearance and permission were first obtained from the Ethical Review Boards of Bahir Dar University. The study participants were informed about the objective of the study and asked their consent to be involved in the study.

Confidentiality was also maintained.

3. The Following Operational Definitions Were Used in This Study

Grams of khat: the amount of khat leafs sold to chewers in the study area during khat session.

Frequent chewers: those who chew khat for three and more days a week.

Less frequent khat chewers: those who chew khat less than three days a week.

Physiological parameters: are those that specify the work of heart and respiratory system.

Levels of physiological parameters: physiology books state the level of physiological parameters for systolic and diastolic pressure is 120 and 80mmHg respectively; breathing rate:12-16breath/minute; body temperature: 37°C; body mass index: <18 kg/m2 under weight, 18-25 kg/m2 normal and26-30 kg/m2 overweight; heart rate: 60-100 beat/minute.

Self rated health status: is a reliable and valid way of diagnosing patients when compared with physician-reported medical histories.

Dental problems: comprised of dental caries (decay), and dental abscess as well as teeth discoloration.

Khat sellers: those who prepared a special place and setup for chewers and sold grams of khat for users during khat session.

4. Results

4.1. Health Outcomes and Related Behaviors

Table 1. *Health outcomes among male khat chewers in Bahir dar city, 2014.*

Variables	Frequency (N)	Percentage (%)
Illness history		
Yes	14	3.3
No	408	96.7
Self-rated health status		
V.good	71	16.8
Good	30	7.1
Fair	133	31.5
Bad	92	21.8
V. bad	96	22.7
Oral and dental health problem		
Tooth decay	206	48.8
Gum bleeding	56	13.3
No problem on both	160	37.9
Visit dentist before		
yes	14	3.3
No	408	96.7

Almost all (96.7%) study participants had no self rated previous history of illness. With regard to self rated health condition, twenty four percent of participants self-rated very good and good health and sixty six percent rated fair, bad and very bad general health state.

Sixty two percent of participants reported oral health problems. Of the 262 self-reported oral problems; 78.6% had dental decay or tooth discoloration, 21.4% gum problems (inflammation, bleeding).

4.2. Factors Associated with Self Rated Oral Health Problem

Bivariate and multivariate logistic regression was done to asses factors and self rated oral health problem. First all factor were analyzed by bivariate analysis, of them only three factors that had significant effects on self rated oral health problem, which had a P-value ≤0.2, then those significant variables entered into multi variety logistic regression analysis. All three predictors were found to be statistically significant in multivariate logistic regression.

The multivariate analysis indicated that those male chewers who started khat chewing at age from 7-15 years old were 2.85 times more likely to be affected by oral health problem compared to those who started khat chewing at age 22 years old and above (AOR:2.85,CI 95%:1.26-6.45).

With regard to frequency of khat chewing; those male chewers who chewed frequently (more than or equal to 3 days per week) were 7.58 times more likely to be affected by oral health heath problem compared to those who chewed less frequently (less than 3 days per week) (AOR: 7.58, 95%CI: 3.53-16.27).

Those male chewers who chewed 51gm-100gm and more than or equal to 100gm per khat session were 1.95 and 4.33 times more likely to be affected by oral health problem compared to those male chewers who chewed 25gm-50gm per session (AOR:1.95,95% CI:1.16-3.30), (AOR: 4.33,95% CI:2.49-7.53) respectively(Table 2)

Table 2*. Factors associated with oral health problem among male khat chewers, in Bahir Dar city, 2013.*

Variable	Oral health problem		COR(95%CI)	AOR(95%CI)	P-value
	Yes	No			
Age of starting khat chewing					
From 7-15 years	45	11	2.93(1.36-6.31)	2.85(1.26-6.45)*	0.04*
From 16-18 years	62	44	1.01(0.58-1.75)	0.96(0.53-1.76)	
From 19-21 years	95	62	1.01(0.66-1.82)	0.95(0.55-1.64)	
22 years to older	60	43	1.00	1.0	
Khat chewing frequency per week					
< 3 days	12	35	1.00	1.0	0.001**
≥3 days	250	125	5.83(2.93-11.63)	7.58(3.53-16.27)**	
Amount of khat chewed					
25gm-50 gm	52	66	1.00	1.00	
51gm-100gm	91	52	2.22(1.35-3.66)	1.95(1.16-3.30)**	0.001**
≥100gm	119	42	3.59(2.17-5.96)	4.33(2.49-7.53)**	

** Highly significantly variables (p<0.001)

* Significantly variables (p<0.05)

4.3. Factors Associated with Self Reported Health Status

Bivariate and multivariate logistic regression was done to assess factors and self reported health status. First all factor were analyzed by bivariate analysis, of them only three factors that had significant effects on self rated oral health problem, which had a P-value ≤0.2,then those significant variables entered into multi variety logistic regression analysis. Among these, two predictors were found to be statistically significant.

With regard to number of children; those male chewers' who has one to three children 0.4 times less likely to be compromised in their health status compared to those who has no children(AOR:0.40,95%CI:0.24-.69).

Those male khat chewers who had oral health problems 1.67 times more likely to be compromised on their health status compared to those who had no oral health problems (AOR:1.67, 95%CI:1.03-2.69) (Table 3).

Table 3. *Factors associated with self reported health status among male khat chewers, in Bahir Dar city, 2013.*

Variable	State of health		COR(95%CI)	AOR(95%CI)	P-value
	Compromise	Not compromise			
Number of children					
None	262	68	1.00	1.0	
1 to 3 children	49	31	0.41(0.24-0.69)	.40(.24-.69)*	.003*
More than 3 children	10	2	1.29(0.28-6.09)	1.16(.24-5.58)	
Oral health problem					
No	111	49	1.00	1.0	.036*
Yes	210	52	1.78(1.13-2.80)	1.67(1.03-2.69)*	
Amount of khat chewed					
25gm-50 gm	85	33	1.00	1.0	
51gm-100gm	102	41	0.97(0.56-1.66)	0.89(0.51-1.57)	.072
≥100gm	34	27	1.93(1.08-3.43)	1.69(.92-3.08)	

*Significantly variables (p<0.05)

5. Discussion

Previous studies shown that, khat chewing had effects on the physical wellbeing of the society. There are few studies done in Ethiopia to determine socio-demographic profiles and effects of khat chewing on body organ systems. However, no study is done here in Bahir Dar to determine the association between khat chewing frequency, amount of khat chewed during khat session, self rated health status and the risk of elevated blood pressure among male chewers.

In this study, a total of 422 male khat chewers were participated with response rate 100% to assess the effect of khat chewing on self rated oral health problems. The mean age of participants with standard deviation was 30.31 $\pm$ 1.39 years old.

Previous studies in Ethiopia have also shown to affect the large segment of the productive age group (10). The study sample was done on male subjects since there was previous study reports [38] that shown the statistically significant association between khat chewing and being male.

In this study, 62.1% of participants reported oral health problem, and out of this, 78.6% had dental decay or tooth discoloration and 22.4% gum problem (inflammation, bleeding). These effects may be due to the presence of chemicals called tannins in khat and using sugar during khat session to minimize the bitterness of khat juice.

Previous studies in Yemeni also showed an increased risk for a number of oral and paraoral lesions such as lesions to the supporting structures of the teeth, namely gingivitis, periodontal pocket formation, gingival recession, tooth mobility and tooth mortality, attrition and staining of teeth and cervical caries, particularly among crystallized sugar consumers (24,25,26).

In this study, multivariate analysis was done to determine the association of khat chewing and oral health status. The result shown that, starting khat chewing at early age were 2.85 times more likely to be affected by oral health problems compared to those who started chewing lately (AOR: 285, 95% CI: 1.26-6.45).

Men who chewed for three or more days were considered frequent khat chewer based on the previous studies (13). In this study, frequent khat chewers were 7.58 times more likely to be affected by oral health problem compared to less frequent chewers (AOR: 7.58, 95% CI: 3.53-16.27) and those who chewed large amount of khat (in grams) during khat session were 4.33 times more likely to be affected by oral health problem compared to those who chewed less amounts (AOR: 4.33, 95% CI: 2.49-7.53).

Previous studies conducted in Yemen [22] also reported that khat chewers were often complained inflammation of the mouth. Because of its route of administration, khat has reported to affect frequently the oral cavity and digestive tract and the effect was found to be clearly dependent on the amount of khat consumed (13_3_, 22).

The study result shown that there is statistically significant association between frequency and amount of khat chewing on oral health problems this may be due to the fact that chewing large amount of khat in gram during khat session and frequently chewing may increase the incidence of exposing chewers with chemicals that are found in khat called tannins and the pharmacological effects of these chemicals will be dominantly seen on frequent chewers and on chewers who chewed large amount during khat session than the rest.

Self rated health has been identified as an important indicator of the multi– dimensional construct, health [27]. The evaluation of health or subjective health is considered a legitimate/lawful indicator of overall health status, providing a valid reliable and cost effective means of health assessment particularly in studies in which other forms of health information are lacking, where questionnaire resources are limited and it is often used as a proxy measure of disease risk instead of more formal, but both invasive and costly, measures of physiological parameters [28-30].

Studies reported that self rated health condition (s) were found reliable and valid when compared with physician-reported medical histories [31-35]. Self reported oral health problem (s) such as periodontal diseases as alternative to the primary collection of clinical data has been reported in the current literature and this approach has been appraised as less time consuming, less expensive, consistent and complete, accessing a more representative sample including respondents who don't access care or don't have insurance [36].

6. Conclusion

In this study, significant association is observed between khat chewing and self rated oral health conditions. The frequency and amont of khat consumed also observed to have an effect on the health outcomes.

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