

Effect of Khat and Associated Factors on Nutritional Status among Khat Chewers at Gulelle Sub-city, Addis Ababa, Ethiopia

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Abstract Though community is chewing khat for multiple reasons, it has huge public health impact on mental, physical and social well-being. Community based comparative cross-sectional study had been conducted from March to June, 2015. Cluster sampling and systematic random sampling techniques had been used for khat chewers and non-khat chewers respectively. The data was collected by using interview administered questionnaire, in-depth interview based questionnaire & weight scale measurement. The study revealed that a total of 55(21.48%) underweight and 41(16.00%) overweight khat chewers including 31(12.5%) underweight and 45(18.10%) overweight non-khat chewers. Khat chewers were 1.994 times more likely to be underweight. Khat chewers who had animal and animal products daily as their main meal were 0.218 times less likely to be underweight; while 5.15 times more likely to be overweight. Khat chewers who intook 8 glasses of water per khat chewing session were 0.180 times less likely to be underweight and 0.234 times less likely to be overweight. Khat chewers who not used chabsy were 2.530 times more likely to be underweight. The odd of being underweight of those who chewed khat for the length of less than 3 years was 1.3% times less like. Both underweight and overweight are public nutritional status problems of both khat chewers and non-khat chewers in which khat users are mostly affected to be underweight. Khat chewing pattern and meal pattern including amount of fluid consumed per chewing session and chabsy are factors that affect the nutritional status of the khat chewers. Shorting length of khat chewing years, increasing amount of fluid intake to more than 8 glasses per session, taking minimal amount of chabsy and dietary management with nutritionist advices should be inaction to mitigate nutritional status problems of the khat chews.

Keywords Khat, Nutritional status, Khat chewers, Non- khat chewers, Gulelle sub-city

1. Background

Khat (*Catha edulis*) is an evergreen plant that harvested throughout the year; it grows at high altitudes of 1500-2500 meters mainly in countries bordering the Red Sea and along the east coast of Africa including Ethiopia [1-3]. Khat is an addictive stimulant and highly prevalent drug among individuals [4, 5]. Stimulation is commonly obtained by chewing the leaves privately or in small social gatherings by different sections of the community [1]. Ethiopia is thought to be the country of origin of khat use [2].

Khat was usually chewed in prolonged sessions, producing mild psycho-stimulant effects such as increased energy, reduce fatigue, increase performance, increase alertness and wakeful; Khat was widely perceived to be a

food and beneficial to the user's health [6, 7].

Though community is chewing khat for multiple reasons, it has huge public health impact on mental, physical and social well-being. It also leads to problems like chronic gastritis, upper gastrointestinal malignancy including weight loss [8]; delaying of gastric emptying of semi-solid food, dental caries, gingival bleeding, difficulty in mouth-opening and swallowing solid food [4, 9]. The habit of khat chewing is believed to affect a large segment of the Ethiopian population, especially the productive age group [10].

According to the report in 2011 on the health risks of khat and influences it has on integration issues by using qualitative, snowball sampling technique, in Stockholm and Västerås cities it found that loss of appetite, While the perception of the participants towards long-term use of khat is associated with anorexia that leads users of khat to malnutrition [11].

In other case, gastritis, constipation, loss of appetite, including malnutrition the long term effect of khat chewing are among the adverse effects of khat use as to a review on

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hazards of khat chewing *in 2013* [12].

Even though there are studies which show prevalence of khat chewing, economical effect and health effect of khat chewing has and recommendations on the improving of negative effect of khat chewing by many researchers; there are limitation of studies related to nutritional status assessment specially using anthropometries and associated factors. So the present study will incorporate the anthropometry measurement values to add information about effect of khat chewing on nutritional status khat chewers.

2. Method and Materials

2.1. Study Design, Aim, Area and Period

Community based comparative cross-sectional study had been conducted on the effect of khat and associated factors on nutritional status among khat chewers at Gulelle sub city, Addis Ababa, Ethiopia from March to June, 2015.



Figure 1. Khat ready for chewing

2.2. Study Participants

Adult khat chewers who chewed khat for more than six months and in the khat chewing shops during the study time and adult non-khat chewing people living in the houses around the khat chewing shops during the study period were participated. Severely sick and pregnant women were excluded.

2.3. Sample Size Determination

This study assumed the prevalence of under nutrition 50% among khat chewers and 31.8% among non-khat chewers [17]; with 95% certainty, 5% confidence limit, 10% non-response rate and 80% power of detection to calculate required sample size. Then 253 participates were obtained by applying two population proportion formula using EPI.INFO version 7. Because of design effect the calculated sample size was multiplied by 2 and 506 individuals were planned to participate the study with the ratio of non-khat users to khat users 1:1(i.e.253:253).



Figure 2. Some of Khat selling shops

2.4. Sampling Procedure

First three woredas had been selected by lottery method among the ten woredas found in Gulelle sub city. Then khat chewing shops had been selected by lottery method from each selected woredas. Cluster sampling and systematic random sampling techniques were used for cases and non-case respectively.

2.5. Operational Definitions

Nutritional status - in this study it is the state in which body weight is underweight ($BMI < 18.5$), normal weight ($18.5 \leq BMI \leq 24.9$) or over weight ($BMI > 24.9$).

Chabsy- alcohol used post khat chewing for calming down the stimulation effect of khat.

Chronic khat chewers - who used khat for more than five years, chew for more than four hours per session and use over 100g of khat per session.

2.6. Data Collection Methods

Quantitative and qualitative Structured and Semi-structured interview administered English language translated to Amharic language questionnaire and anthropometry measure by trained data collector nurses had been used. In-depth interview had been triangulated to identify the effect of khat chewing on nutritional status among khat chewers. All questioners are formulated based on the literature review done.

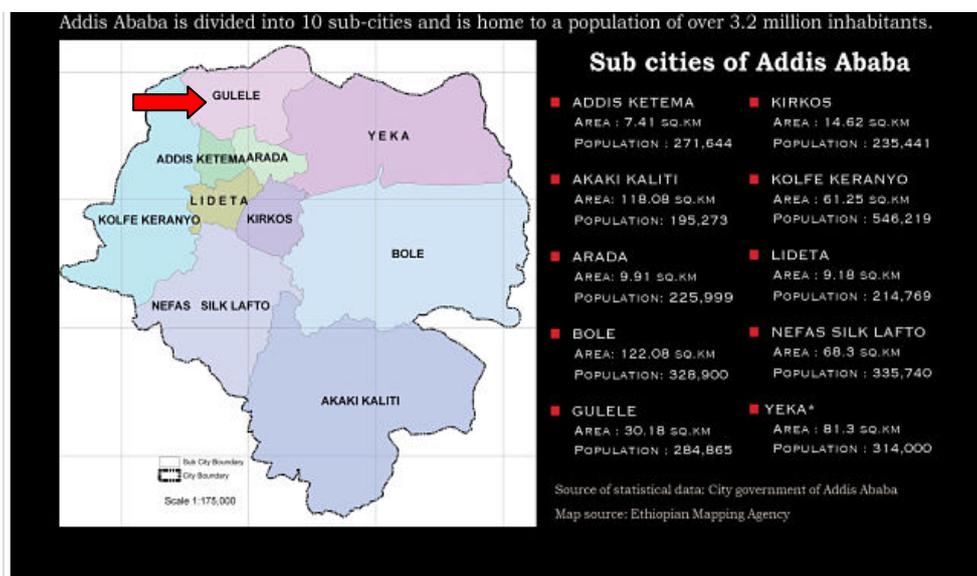


Image from page 10 the book "Addis Ababa: the new flower of Africa" (Photograph: Courtesy of the author)

Figure 3. Map of Addis Ababa city with its ten sub-cities of which one is Gulelle sub-city

2.7. Data Analysis

Data had been analyzed by using SPSS version 20.0 with applying multivariate logistic regression. Selection and filtration of the comparative groups were applied by splitting into khat chewer and non-khat chewer participants alternatively. Crude odds ratio (COR) and adjusted odds ratio (AOR) with 95% CI had been calculated to determine the strength of association between dependent variable and independent variables. P-value less than 0.05 had been used to see the significance.

2.8. Ethical Consideration

Ethical clearance was obtained from Ethical review committee of university of Gondar and permission letter had been obtain from Gulelle sub-city administrative office. Then the participants had been informed about the purpose of the study, the importance of their participation, full confidentiality, withdraw at any time and verbal consent had been obtained prior to data collection.

3. Result

3.1. Socio Demographic Features of the Study Participants

A total of 253(50.79%) khat chewer and 251(48.81%) non-khat chewer participants were participated with the total responding rate of 99.60%. Among the entire khat chewer participants 242(48.02%) and 14(2.78%) of them were male and female khat chewers respectively. Whereas 25(4.96%) of the total were female non-khat chewers. Of the total Khat-users, 141(55.08%) and 94(36.72%) of them were categorized in the class of age 18-30 and 31-40 years old sequentially. Most of the khat users which were 158(31.35%)

and 175(34.72%) of them were single in marital status and orthodox Christianity religion followers respectively. Similarly most of non-khat users which were 135(26.79%) and 195(38.69%) of them were single and orthodox Christianity followers orderly. Comparing their occupational types, most of the participants were merchants with the total of 145(27.98%) among which 72(28.13%) and 73 (29.44%) of them were khat users and non-khat chewers respectively; followed by drivers with the total of 70(13.89%) of which 46 (17.97%) and 34(13.71%) of them were khat chewers and non-khat chewers orderly. Most of the khat chewers 101(39.45%) were working for more than 8-12 hours per day; whereas most of the non-khat users 111(44.76%) were working for less or equals to 8 hours per day.

3.2. Distribution of Nutritional Status of the Study Populations' with its Affecting Factors at Gulelle Sub-city Addis Ababa, Ethiopia 2015

Even though the probability of both being overweight and underweight were observed to be decreased both in khat users and non-users as age increased from class of 18-30 years to greater than 50 years, the probability of being underweight was higher among khat chewers but the probability of being overweight was higher among non-khat chewers.

In case of khat users, the most probability of being underweight is observed among merchants followed by students and drivers; whereas the most probability of being overweight is identified among merchants followed by drivers and construction workers. But in case of non-khat chewers, the most probability of being underweight is observed among students followed by merchants; while the most probability of being overweight is identified among merchants followed by drivers and teachers sequentially.

Of the total khat chewers 41(16.20%) and 9(3.55%) of

them are underweight and overweight plant and plant products users as their main daily meal component respectively. Whereas of the total non-khat users 15(5.97%) and 31(12.35%) of them are observed to be underweight and overweight plant and plant product users as their main daily meal components sequentially. Of the entire khat chewers

who use animal and animal products as their main daily meal 14(5.53%) and 32(12.35%) of them are underweight and overweight respectively; in other case, 14(5.58%) and 8(3.19%) of non-khat chewers are observed to be underweight and overweight respectively.

Table 1. Scattering of the Nutritional Status of Khat Chewers with Their Specific Socio-Demographic Features at Gulelle sub-city Addis Ababa, Ethiopia 2015

Variables	Nutritional status			
	Under Weight N (%)	Normal Weight N (%)	Over Weight N (%)	Total N (%)
Length of khat use				
Less than 3 years	7 (2.73)	19 (7.42)	5 (1.95)	31 (12.11)
3-5 years	16 (6.25)	30 (11.72)	5 (1.95)	51 (19.92)
More than 5 years	16 (6.25)	45 (17.58)	10 (3.91)	71 (27.73)
More than 10 years	13(5.08)	54 (22.27)	20 (7.81)	87 (35.16)
More than 15 years	3 (1.17)	9 (3.52%)	1 (0.39)	13 (5.08)
Total	55 (21.5%)	157 (62.5%)	41(16.02)	253 (100)
Length of chewing session				
<2 hours	9(3.52)	35(13.67)	9(3.52)	53(20.70)
2-3 hours	24(9.38)	72(28.13)	20(7.82)	116(45.31)
4-5 hours	18(7.03)	38(16.02)	9(3.52)	65(26.56)
≥6 hours	4(1.56)	12(4.69)	3(1.17)	19(7.42)
Total	55(21.48)	157(62.50)	41(16.02)	253(100)
Khat chewing frequency per week				
Less than 3 days	13(5.08)	37(14.45)	24(9.38)	74(28.91)
more than 3 days	19(7.42)	40(15.63)	11(4.30)	70(27.34)
Daily	23(8.98)	80(32.42)	6(2.34)	109(43.75)
Total	55(21.48)	157(62.50)	41(16.02)	253(100)
Amount of khat used per session				
< 50gm	18(7.03)	40(15.63)	11(4.30)	69(26.95)
100 gm	23(8.98)	79(32.03)	15(5.86)	120(48.05)
150 gm	10(3.91)	20(7.81)	6(2.34)	36(14.06)
>200 gm	4(1.56)	18(7.03)	6(2.34)	28(10.94)
Total	55(21.48)	157(62.50)	41(16.02)	253(100)
Khat chewing starting age				
≤ 15-20 years	29(11.33)	66(25.78)	8(3.12)	103(40.23)
21-25 years	21(8.20)	58(22.66)	20(7.81)	99(38.67)
26-30 years	5(1.95)	34(13.28)	11(4.30)	50(19.53)
> 30 years	0(0.00)	2(0.78)	2(0.78)	4(1.56)
Total	55(21.48)	157(62.50)	41(16.02)	253(100)
Khat chewer feeding habit				
meal before chewing	38(14.84)	110(44.14)	33(12.89)	181(71.88)
meal after chewing	5(1.95)	16(6.25)	3(1.17)	24(9.38)
meal when get hungriness	12(4.69)	23(8.98)	2(0.78)	37(14.45)
Lack of appetite	0(0.00)	9(3.52)	2(0.78)	11(4.30)
Total	55(21.48)	157(62.50)	41(16.02)	253(100)

3.3. Scattering of Nutritional Status of Khat Chewers with Specific Socio-demographic Characteristics at Gulelle sub-city Addis Ababa, Ethiopia 2015

Among the total khat chewers, the most probability of being underweight was revealed among who chewed khat for more 3 years to 15 years. While the least probability of being overweight was observed among who chewed khat for less than 5 years. The most khat chewing session length in which most of the participants were identified to be underweight was chewing for more than 2 hours per session. The most khat chewing session length in which the least of the participants was identified to be overweight was chewing for more than 6 hours per session. The most frequency of khat chewing in which most of the participants were identified to

be underweight was daily khat chewing. Similarly, the most frequency of khat chewing in which the least of the participants were identified to be overweight was daily khat chewing.

The highest probability of being underweight of the khat chewers was observed among khat chewers who chewed 100gm of khat per chewing session. But, the least probability of being overweight of the khat chewers was observed among how chewed more than 150gm of khat per chewing session. The study identified that most of the khat chewers who use meal before chewing are observed to be in nutritional status problem; while only few number of khat chewers who use meal after chewing are observed to develop the problem (from table 1).

Table 2. Factors Associated with Nutritional Status of Khat Chewers among Khat Chewers at Gulelle sub-city Addis Ababa, Ethiopia 2015

Variables	Nutritional Status			95% Confidence Interval		
	Under Weight	Normal Weight	Over Weight	COR	AOR	P-value
Khat chewing						
Yes	55	157	41	1.95[1.168-3.113]	1.994[1.145-3.475]	0.015
No	31	175	45	1.00	1.00	
Length of khat chewing in years						
<3 years	7	19	5	1.105[.230-5.301]	.013[.000-0.373]	0.025
3-5 years	16	30	5	1.600[.379-6.757]	.123[.006-2.451]	
>5-10 years	16	45	10	1.067[.256-4.438]	.140[.007-2.864]	
>10-15 year	13	57	20	.709[.168-2.992]	.093[.006-1.524]	
>15years	3	9	1	1.00	1.00	
Amount of fluid intake per chewing session						
< 4glasses	12	25	3	.840[.277-2.545]	1.032[.253-4.205]	
8 glasses	15	86	14	.305[.109-.853]	0.180[.051-0.640]	0.008
12 glasses	20	34	12	1.029[.368-2.882]	1.064[.437-2.590]	
>12 glasses	8	16	11	1.00	1.00	
Chabsy						
No	37	87	19	1.725[.906-3.282]	2.530[1.021-6.267]	0.045
Yes	18	73	22	1.00	1.00	
Meal frequency						
Once	3	16	3	4.000[.575-27.82]	1.594[.088-28.992]	
Twice	20	38	11	1.818[.539-6.137]	4.456[1.035-19.19]	0.046
Three	28	91	20	1.155[.357-3.734]	2.110[0.535-8.324]	
> 3 times	4	15	7	1.00	1.00	
Interval of animal and animal products gaining per week						
Twice	22	62	18	.708[.163-3.063]	0.349[0.037-3.253]	
Once	12	26	5	.889[.190-4.162]	0.429[0.043-4.336]	
Daily	14	51	14	.556[.124-2.488]	0.218[0.022-0.127]	0.034
per 2 weeks	2	5	0	.500[.063-3.998]	0.750[.045-12.574]	
>15 days	3	22	0	1.00	1.00	

3.4. Factors Associated with Nutritional Status of Khat Chewers among Khat Chewers at Gulelle sub-city Addis Ababa, Ethiopia 2015

The study identified that khat chewers were 1.994 times more likely to be under weight. Similarly, as triangulated from qualitative data most of the participants' weight was decreasing or maintain constant measurement value and there was no result that reported as increased body weight by comparing time to time body weight measurement results, even for those overweight khat chewers. In the other case, it was found that as khat chewing decreases the risk of developing overweight. But, according to the quantitative part of the current study being overweight had no association with khat chewing. The odds of being underweight of those who chewed khat for the length of less than 3 years were 1.3% times less likely. As the data from qualitative part of the study, khat chewing causes weight loss and prevent weight gain especially for those who constantly using khat with high dose and long session of chewing per session. Khat chewers who intook about 8 glasses of water per khat chewing session were 0.180 times less likely to be underweight. It was revealed that khat chewers who not used chabsy were 2.53 times more likely to be underweight. This idea was supported by the data from qualitative responds as chabsy was used to increase appetite, increase recover from the stimulation gained by chewing khat to the normal level and to minimize the probability of exaggerated weight loss. Not only these but also khat chewers who not used chabsy were more likely loss their appetite and develop insomnia that contribute to weight loss in its term. Khat chewers who had meal twice per day were 4.456 times more likely to be underweight. Whereas those khat chewers how used animal & animal products as main daily meal component were 0.218 times less likely to be underweight (from table 2).

Khat chewers how used animal and animal products as their main daily meal component of food were 5.15 times more likely to be overweight comparing with those khat chewers how had these meals with the interval of more than every 15 days at p-value of 0.030 and AOR=5.15, CI of [1.173-22.59]. Khat chewers who used about 8 glasses of water per chewing session are 0.234 times less likely to be overweight comparing with those who took more than 12 glasses of fluid at p-value of 0.014 and AOR=0.234, CI of [0.073-0.747].

4. Discussion

According to the report in 2014 on khat use prevalence, causes and its effect on mental health, Bahirdar, North West Ethiopia using causal comparative study design, with quantitative and qualitative found that appetite loss, insomnia and feeling of being busy are among the effect of khat use [5]. The findings of qualitative data of the current study also support the ideas, indicating that as later cause loss of weight. This might be because of similarity of the study design, live style of the two cities' population and

study time proximity.

Khat was usually chewed in prolonged sessions, producing mild psycho-stimulant effects such as increased energy, reduce fatigue, increase performance, increase alertness and wakeful [6, 7]. The current study also identified that khat is used in prolonged sessions mostly. This could be because of the similarity of peak time of session in which stimulation obtained.

The concurrent consumption of large volumes of sugary drinks and sweets to counteract the bitter taste of khat, coupled with reduced appetite and poor nutrition as the study report on the health impacts of khat using a qualitative study among khat chewer Somali-Australians, 2011, [6]. There is no observed effect on nutritional status of the khat users with using of soft drink to counteract the bitter taste of khat. This may be because of the study population, study time and study design differences.

The habit of khat chewing is believed to affect a large segment of the Ethiopian population; especially the productive age group [10]. Similar to this, the current study also found that most of the khat chewers were in the productive age group. This could be due to the assumption of using khat as the means of enjoyment.

According the study report on age-related factors influencing the occurrence of under nutrition in northeastern Ethiopia using community-based cross-sectional study in Harbu Town, northeastern Ethiopia in 2013; prevalence of under nutrition was 21.1% among adults [17]. This is higher to the current study finding, which is 86(17.1%) of the total participants are identified to be underweight. This could be because of different study area and different study population.

According to the report in 2011 on the health risks of khat and influences it has on integration issues [11] and a review by 2013 on hazards of khat chewing [12] found that as khat cause loss appetite and malnutrition; According to a review done on the potential adverse effects of habitual use of khat at University of Sana'a, Department of Clinical Biochemistry, Faculty of Medicine and Health Sciences, Republic of Yemen in 2005 it found that delay to intestinal absorption contributes to malnutrition of the khat users [13]. Other study by 2013 on khat chewing practice and its perceived health effects among communities of Dera Woreda, Amhara region, Ethiopia by using community-based cross-sectional both quantitative and qualitative study design was found loss of appetite is among the adverse effect of khat chewing [2] which were similar with the current study finding. The common effect had been observed due to the similar side effect of khat had independently on the nutritional status.

According to the report of the study done on Influence of Khat Chewing on Periodontal tissues and oral hygiene status among Yemenis among patients attending the outpatient dental clinics of the government dental college, Sana'a University, Yemen in 2010 using cross sectional study it found that about 23% of chewers complained of difficulty in mouth opening, 10% of chewers had difficulty in swallowing

solid food, and burning sensation in the soft tissues was also found in a higher proportion of khat-chewers [14]. But the current study do not identified these problems which are directly or indirectly affect the nutritional status of the victim. This was might be due to the study population differences.

The current study revealed that 21.48% of the khat chewer participants were underweight where as the male underweight khat chewers were identified to be 20.31%; which is almost the same to the study done on the effect of Khat (*Catha edulis*) chewing on blood pressure among male adult Chewers, Bahir Dar, North west Ethiopia in 2014 by using community based cross-sectional study among khat chewers of Bahir Dar city identified that about 19.9% are underweight and [15]. This could be because of the two cities are with similar behavior of life style and it may also because of the khat chewing conditions or behaviors are almost similar everywhere ; in addition both studies are conducted using similar study design and within very proximate study time.

According to the study report on nutritional status and associated factors among school adolescent in Chiro town, west Hararge, Ethiopia using Cross-sectional quantitative study design by 2013 was revealed that khat chewers were found to be two times more likely to become underweight than who don't chew khat [AOR=2.45 CI=1.07, 5.64], [16]. which is almost similar with the current study that identified khat chewers become 1.994 times more likely to be underweight compared with those non-chewers (AOR = 1.994 [1.145-3.475]). Even though study participant are different but have common characteristic of style of khat chewing and similar study design was used; probably that is way.

Among those who get two or less meal per day 15(26.3%) were underweight. And consumers of low diet diversity found to be more underweight than high diet diversity consumer (27.9% vs 23%), [16]. Similarly the current study identified that as the main staple specially animal and animal product plus frequency of meal identified as factor of being underweight among khat chewers. These show that as meal frequency and diet diversity have effect on being underweight even for those khat chewers. Even though the study areas and population are different the common effect might be observed due to the similar effect meal frequency and diet diversity had independently on the nutritional status and related conditions of the chewers; in addition both studies are conducted using similar study design.

According to the study in us in 2010 using cohort studies, women who consume alcohol at a small or moderate rate (up to 30 g/day) have a lower risk to gain weight and become obese than those who abstain from it [18]. Even though the study population is different the current study also supports the above finding indicating that using chabsy post khat chewing session had preventive effect on weight loss. This is mostly because of the alcohol's depression effect has by nature; which later help in preventing the side effect khat has on nutritional status of the khat chewers.

5. Conclusions

Both underweight and overweight are public nutritional status problems of both khat chewers and non-khat chewers in which khat users are mostly affected to be underweight. Khat chewing pattern, meal pattern and chabsy including amount of fluid intake per session are among the factors that affect the nutritional status of the khat chewers. To prevent or decrease the risk of nutritional status problem of the khat chewers minimizing amount of khat per session, shorting of khat chewing year length, increasing amount of fluid intake to more than eight glasses per session, increasing the frequency of meal to more than twice per day, using minimal amount of chabsy, increasing the chance of animal and animal product meals obtaining based on the nutritionist advices are among the core points to mitigate the nutritional status problems of the khat chews.

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