# Prevalence of Relapse and Associated Factors in Khat Chewers and Non-Chewers among Persons with Serious Mental Illness at Amanuel Mental Specialized Hospital, Addis Ababa, Ethiopia

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## ABSTRACT

People with serious mental illness using illicit drug like amphetamine exhibit poorer outcomes. But until now little is known about the impact of khat on relapse of disease in people with serious mental illness. This study assessed prevalence and factors associated with relapse between khat chewers and non-chewers among persons with serious mental illness. This was a cross sectional study involving 405 khat chewers and 400 non chewers with serious mental illness. The study was undertaken at Amanuel Mental Specialized Hospital on May, 2021. Patients were selected using systematic random sampling. The study involved interview (patients and care givers) and chart review. The study used Oslo Social Support Scale; Alcohol, Smoking, Substance Involvement Screening Test and a structured questionnaire The study established that prevalence of relapse was higher among khat chewers compared to non-chewers (22% Vs 13%, p=0.001) with serious mental illness. Additionally, the prevalence of relapse was positively correlated with the amount of khat used in the group of chewers. In the khat chewer group, previous hospitalization history and presence of stressful life situation were the main factors associated with relapse. On the other hand, treatment interruption, sleep disorder and previous hospitalization episodes were the key factors associated with relapse among non khat chewing persons with serious mental illness. The study found that khat chewing poses increased risk of relapse among persons with serious mental illness. Patient care should consider khat chewing as one of the critical components for intervention.

**Key words:** *Khat chewing, Serious Mental Illness, Prevalence of Relapse*

## BACKGROUND

Serious mental illness (SMI) are among the top twenty conditions that result in the greatest burden of disability worldwide(Murray et al., 2012) and also in Ethiopia (Abdulahi H, hailemariam D, 2001).Acute state of schizophrenia is the most disabling disease state of all Global Burden of Disease (GBD) causes (Salomon et al., 2015)injuries, and risk factors using

disability-adjusted life-years, which need a set of disability weights to quantify health levels associated with non-fatal outcomes. The objective of this study was to estimate disability weights for the GBD 2013 study. Methods: We analysed data from new web-based surveys of participants aged 18-65 years, completed in four European countries (Hungary, Italy, the Netherlands, and Sweden. SMI are among the top ten burden of disease in Ethiopia (Abdulahi H, hailemariam D, 2001). In Ethiopia, the life-time prevalence of schizophrenia, depression and bipolar disorder is reported to be 0.5% (Alem, D Kebede & Negash, 2003), 9.1% (Hailemariam et al., 2012) and 0.5% (Negash et al., 2005) respectively. Schizophrenia was also the number one diagnosis for admission to mental hospital in the country (Fekadu et al., 2007). Also there is a high mortality rate (Mogga et al., 2006;Teferra, Shibre, et al., 2011)and risk for suicide (Teferra, Shibre, et al., 2011; Gvion & Apter, 2012)among people with SMI. Mental disorders are costly to individuals, families, communities and societies(A Zergaw, D Hailemariam, A Alem, 2008).

Khat *(Catha edulis F)* is an evergreen shrub that is believed to have originated from Ethiopia. It grows in many Eastern and Southern African countries and the Arabian Peninsula. Its fresh leaves are chewed and the juice is swallowed to exert its stimulating effect (Alem A, Kebede D, 1999). Cathinone is the major active constituent in khat. Cathinone induces release of dopamine and serotonin thus increase the activity the neurotransmitter pathways (Anteneh M. Feyissa, 2008). Dopamine and serotonin are neurotransmitters thought to be severely affected and causing SMI.

Some khat chewers experience tension, restlessness and hypnagogic hallucinations during chewing process (Cox & Rampes, 2003). After chewing session insomnia, numbness, lack of concentration and low mood are common (Cox & Rampes, 2003). Khat chewers display a range of experiences, from minor reactions to the development of a psychotic illness(Cox & Rampes, 2003).

There is an ongoing international debate about a causal relationship between khat use and mental illness (Odenwald et al., 2007). Although there are many studies on khat in the general population, there are only few studies in people with mental illness. Moreover, there are very few studies on association of khat chewing with reemergence of the disease symptoms in serious mental illness.

Relapse in SMI is broadly recognized as the reemergence or the worsening of the disease symptoms. More specifically, certain criteria are used to define relapse; they include aggravation of symptoms, hospital admission in the past 6 months, and need for more intensive case management and/or a change in medication(Almond et al., 2004;Kazadi et al., 2008).

Relapse in SMI causes worsening of symptoms, progressive cognitive deterioration, impaired functioning and reduced quality of life and families are affected by the emotional stress and financial

burden of living with and caring for the patient(Olivares et al., 2013). Relapse may result in hospitalization, treatment resistance, personal distress, incarceration, and interference with rehabilitation efforts(Kazadi et al., 2008). Relapse increases the economic burden on health care systems because of its associated morbidity and re-admissions to hospital (Kazadi et al., 2008). Extended relapse duration and treatment intensity associated with relapse intensify the decrease in both general and regional brain measures(Olivares et al., 2013).

The main drivers of relapse in SMI are non-adherence to medication (Kazadi et al., 2008)), substance abuse(Haro et al., 2006)), stressful life event (27-29), treatment discontinuation(Emsley et al., 2013). Others include delayed treatment initiation(Post, 2013), existence of depression symptoms(Weret & Mukherjee, 2014), poor insight into the illness, younger age (Olivares et al., 2013), hospitalization or relapse history (Ascher-svanum et al., 2010) (Post, 2013), poor social support(Kazadi et al., 2008), residual symptoms (Ostacher et al., 2006), careers' criticism, and poorer premorbid adjustment (Emsley et al., 2013).

Many studies indicate that SMI patients using illicit substances, like cannabis, alcohol, amphetamine, exhibit poorer outcomes in a variety of domains: symptom severity, psychiatric relapse, hospitalization, suicide, reduced compliance with medication(Marta Torrens, 2015)(Berihu & Asfeha, 2015). But there is no large study on khat in people with SMI. Case reports (Alem A and shibire T, 1997) and qualitative study (Teferra, Hanlon, et al., 2011) noted that patients with serious mental illness who used khat had their illness exacerbated by the use of it. El-Sayed and Amin's small size comparative study of khat chewing patients with schizophrenia indicated that khat chewing attenuates all used treatment medications, aggravates the disease symptoms and also deteriorates all biochemical markers(Kotb El-Sayed and Amin, 2015). Khat chewing is associated with disturbance of mood and behavior, aggravation of delusional symptoms, diminished response to antipsychotic therapy (Hassan & Gunaid, 2002).

Even though the above few studies indicate that khat could complicate the course of the illness, until now there are very few studies focusing on the association of khat chewing with relapse in serious mental illness. In Ethiopia, where mental health service is poor compared to other African countries (WHO-AIMS, 2006), and where only few number of patients attend mental health services (WHO-AIMS, 2006), khat chewing could have additional enormous negative impact on treatment and outcome in psychiatric patients. Relapse prevention is one of the key therapeutic goals in the treatment of serious mental illness. But until now the effect of khat chewing on this key outcome domain is not explored.

The main aim of this study is to assess prevalence of relapse in khat chewing and non-chewing persons with SMI. Specifically; to compare the prevalence of relapse in khat chewers and non-chewers and to assess the

factors associated with relapse in both khat chewers and non-chewers with SMI

## MATERIALS AND METHODS

The study was conducted at Amanuel mental specialized hospital (AMSH) which is the only specialized public mental hospital in Ethiopia which provides services for persons with mental illness, some neurological conditions and rehabilitation services for persons with substance addiction. AMSH is located at Addis Ketema Kifle Ketema, Addis Ababa, Ethiopia and has 280 beds. The hospital provides services for around 500 patients per day who are referred from around the country.

Institutional based cross-sectional study was conducted in patients with serious mental illness was conducted using interview and chart review. The study was conducted for one month from May 1 to May 30/2021 G.C

All persons with serious mental illness attending AMSH outpatient were the source population. Out of the source population those who came during the study period, selected randomly and who fulfilled the inclusion criteria were taken as study population.

People who had follow up treatment for at least one year prior to the study and age > 18 years met the inclusioncriteria. Exclusion criteria included people with SMI who have no capacity to understand purpose of the interview and not able to respond properly; people with persistent severe symptoms of illness and those who were not volunteer to be interviewed. Also those who were chewing khat before three months were excluded from the study.

The minimum sample size required for this study was determined by using Double Population Proportion Formula considering the following assumptions

$$n(eachgroup) = \frac{(p_0q_0 + p_1q_1)(Z_{1-\alpha/2} + Z_{1-\beta})}{(p_1 - p_0)^2}$$

***Where,***

n= minimum sample size required in each group

Z α= standard normal distribution (Z=1.96) with confidence interval of 95% and a =0.05

Zβ= being the power and was taken 80%

p1= the prevalence of relapse in schizophrenia among substance user from previous study,

p1= 55 % (0.55)

q1= the prevalence of relapse in schizophrenia among substance non user, from previous study, q1= 36% (0.36) was used.

p0= 1-p1=1-0.55=0.45 and q0=1-q1=1-0.36=0.64

Using the above formula and entering the values the number of participants in each group was 106 participants and adding 10% for contingency the sample size will be near to 135 in each group i.e. 135 peoples with schizophrenia, bipolar disorder, depression

and khat user; and also 135 people with schizophrenia, bipolar disorder, depression and khat non-user, for a total of 810 people with SMI, on other hand 405 khat chewer and 405 non chewer people with SMI.

Systematic random sampling technique was used to recruit the participants from the outpatient setting. According to the hospital report, on average 4000 patients are served in the mood and psychotic case team in a month in the outpatient setting. The sampling fraction (k) was calculated to be 5. Conveniently, every 5th patient was selected after randomly picking one number as a starting point from 1 to 5 for both the khat user and non-user group.

The minimum sample size required for this study was determined by using Double Population Proportion Formula, 135 in each group were selected i.e. 135 peoples with schizophrenia, bipolar disorder and depression khat user and non-user in each group was used as a sample size for the study.

Systematic random sampling technique was used to recruit the participants from the outpatient setting. Since around 4000 patients are served in the mood and psychotic case team in a month in the outpatient setting. The sampling fraction (k) was calculated to be, 4000/810= 5. Conveniently, every 5th patient was selected after randomly picking one number as a starting point from 1 to 5 for both the khat user and non-user group.

Oslo 3-items Social Support Scale (OSS-3) and Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) were structured questionnaires used to obtain information about social support and substance abuse. The Oslo 3-items Social Support Scale (OSS-3) provides a brief measure of social functioning and is considered to be the best predictor of mental health, covering different fields of social support. The Oslo-3 scale has been used in several studies, confirming the feasibility and predictive validity with respect to psychological distress. It has been validated in both developed (European countries and America) as well as developing countries like Nigeria. A sum index is made by summarising the raw scores, the sum ranging from 3 – 14. A score of 3-8 is “poor support”, 9-11 is “moderate support” and 12-14 is “strong support”.

Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) is a brief screening questionnaire to find out about people’s use of psychoactive substances. It was developed by the World Health Organization (WHO) and an international team of substance use researchers as a simple method of screening for hazardous, harmful and dependent use of alcohol, tobacco and other psychoactive substances. It designed for use by health care workers in a range of health care settings. The ASSIST provides information about: the substances people have ever used in their life time; the substances they have used in the past three months; problems related to substance use; risk of current or future harm; dependence; injecting drug use. Each question on the ASSIST has a set of

responses to choose from, and each response from questions 2 to 7 has a numerical score. It determines a risk score for each substance. The score obtained for each substance falls into a 'lower ', 'moderate' or 'high' risk category. Clients with ASSIST risk scores 'three or less' ('10 or less' for alcohol) are at a lower risk of problems related to their substance use. Clients scoring 'between 4 and 26' ('11 and26' for alcohol) are at moderate risk of health. A score of '27 or higher' for any substance suggests that the client is at high Risk of dependence or is dependent on that substance and is probably experiencing health, social, financial, legal and relationship problems as a result of their substance use.

The questionnaire for interview contained five parts. Part I was aimed at collecting Socio-demographic characteristics and clinical related factors. Part II was questions important to assess medication adherence, questions to assess support and emotion of care giver towards the patient using Oslo social support scale. Part III contains questions to assess substance use behavior using ASSIST. Part IV includes relapse history of patient within the past six months. Questionnaires were translated from English into Amharic and back translated into English for consistency check.

Based on DSM-V criteria for relapse, having reemergence of disease symptom after periods of remission or having hospitalization associated with the reemergence of the symptoms was considered as relapse.

At the same time the patient's chart was reviewed retrospectively by using data abstraction format. The data abstraction form contained diagnosis, duration of illness, relapse and hospital admission history, other co-morbid illness and medication profiles.

Seven masters' psychiatric professionals were recruited as data collectors after given the required training. The training was given to them regarding the data collection method, appropriate use of the data collection instruments focusing on uniform interpretation of questions, explanation of study objectives & getting oral consents from study patients, implementation of sampling technique and confidentiality of the collected data.

## Ethics approval and consent to participate

This study was reviewed by Ethical Review Board (ERB)at School of Pharmacy (SOP) Addis Ababa University and the ERB thoroughly reviewed the study based on its operational guidelines and found it to fulfill all ethical requirement stipulated in the guidelines with approval letter reference number ERB/SOP/90/08/2016.

Prior to data collection, informed consent have been obtained from all the participants and from the legally authorized representative for illiterate participants. Each participant was informed about the objective of the study, procedures of selection and assurance of confidentiality and their names were not registered to minimize social desirability bias and enhance anonymity. They were also informed that they could withdraw from the study at any time and this

would not affect the service they receive. Patients were not forced to participate nor received any monetary incentive and it was solely voluntary based. The collected data was handled and secured with the principal investigator in every data collection session. The study was carried out in accordance with ethical guideline of Addis Ababa University.

The data collection instrument which included the questionnaire and the data extraction format was assessed by a physician and expert in the field of psychiatry and research for clarity and comprehensiveness of contents. Pre-test of the questionnaire was performed on 5% (40 patients) of the sample before conducting the study. The final tool was then developed with some modifications after reviewing the results of the pre-test. Patients who participated in the pretest were excluded in the final analysis. The principal investigator reviewed and checked the data collected for completeness and the necessary feedbacks were provided daily to the data collectors throughout the study period. The quality of data was also checked at data entry, analysis, and interpretation and representation phases.

Data was entered into Epidata exported and analyzed using SPSS v-21. Descriptive statistics including: frequency, percent, mean and standard deviation were used to summarize patients' baseline socio-demographic data and evaluate distribution of responses.

Univariate binary logistic regression analysis was performed to calculate crude odds ratio (COR) for each variable and those variables with p-value < 0.2 during that analysis were selected for multivariate binary logistic regression analysis and the result was expressed as adjusted odds ratio (AOR). A confidence level of 95% was used to determine factors associated with relapse. A p-value of < 0.05 was considered as statistically significant.

Sociodemographic variables like: age, sex, ethnicity, religion, place of residence, address, marital status, educational level, occupation, family income, living arrangement; Clinical and medication related variables including: diagnosis, duration of illness, duration untreated, treatment interruption, perceived stressor, medical illness, psychiatric hospital admission, co-morbid psychiatric illness; Substance use: tobacco, alcohol, cannabis and khat; Medication adherence and Social support were the independent variables assessed. Whereas having history of relapse the last one year was considered as dependent variable

## Results

A total of 405 current khat users and 400 non khat users were included in the study. There was 1.2%, (5 people) non response rate in the non-chewer group. The mean age of the participants was 35.9±10 (SD) and 36.2 ±11 (SD) years for current khat users and never khat users respectively. The majority of the respondents were in the age of 25-34 (40.5% and 33.3 %, current and never khat users respectively). The prevalence of relapse was 22% (CI: 17.8-26.0) for khat users and 13% (CI: 10.1-16.1) among non khat users (x2, p=0.001). Since there was no matching between the two groups ages, sex, ethnicity,

religion, living arrangement, tobacco and alcohol use were not independent between the two groups, khat chewer and non-chewer, on chi square test (table 1)

**Table 1: Socio demographic and patient behavioral characteristics of current Khat user and non-user participants and the chi square test of the participants at Amanuel Mental Specialized Hospital, Addis Ababa, 2021**

| VARIABLE | | CURRENT KHAT USER N(%) | NEVER KHAT USER N (%) | P |
|---|---|---|---|---|
| Age | ≤24 | 29 (7.2) | 58(14.5) | 0.003 |
| | 25-34 | 164(40.5) | 133(33.2) | |
| | 35-44 | 138(34.1) | 120(30) | |
| | >44 | 74 (18.3) | 89(22.2) | |
| Sex | Male | 365(90.1) | 208(52) | <0.001 |
| | Female | 40 (9.9) | 192(48) | |
| Education | Illiterate | 47 (11.6) | 52(13.0) | 0.123 |
| | Primary | 135(33.3) | 130(32.5) | |
| | Secondary | 123(30.4) | 142(35.5) | |
| | College | 100(24.7) | 76(19.0) | |
| Address | Rural | 127(31.4) | 109(27.2) | 0.194 |
| | Urban | 278(68.6) | 291(72.8) | |
| Ethnicity | Amhara | 96(23.7) | 134(33.5) | 0.002 |
| | Oromo | 133(32.8) | 142(35.5) | |
| | Tigre | 24(5.9) | 23(5.8) | |
| | Gurage | 134(33.1) | 83(20.8) | |
| | Others | 18 (4.4) | 18(4.5) | |
| Religion | Orthodox | 202(49.9) | 252(63.0) | 0.001 |
| | Muslim | 184(45.4) | 76(19.0) | |
| | Protestant | 17 (4.2) | 62(15.5) | |
| | Others | 2(0.5) | 10(2.5) | |
| Marital status | Single | 191(47.2) | 188(47.0) | 0.553 |
| | Married | 178(44.0) | 170(42.0) | |
| | Divorced | 33(8.1) | 35(8.8) | |
| | Widowed | 3(0.7) | 7(1.8) | |

| | | | | |
|---|---|---|---|---|
| Occupation | Unemployed<br>Employed | 164(40.5)<br>241(59.5) | 155(38.8)<br>245(61.2) | 0.632 |
| Living arrangement | Alone<br>With family<br>With spouse<br>In charity | 52(12.8)<br>228(56.3)<br>120(29.6)<br>5(1..2) | 28(7.0)<br>267(66.9)<br>103(25.8)<br>2(0.4) | 0.006 |
| Tobacco use | Yes<br>No | 235(58)<br>170(42) | 27(6.8)<br>373(93.2) | <0.001 |
| Alcohol use | Yes<br>No | 135(33.3)<br>270(66.7) | 38(9.5)<br>362(90.5) | <0.001 |

Previous hospitalization history and having perceived stressor were associated with relapse in khat chewers' people with serious mental illness (table 2).

The odds of getting relapse in khat chewers was six times (AOR= 6, CI: 3-12.5) more in those having previous hospitalization episodes compared to those who had never experienced previous hospitalization. Patients having stress were two times (AOR=2, CI: 1.1-3.7) more likely to relapse than those without stress

Treatment interruption, sleeping disorder, hospitalization history and diagnosis were the factors associated with relapse in non-chewers with serious mental illness peoples (table 2).

The odds of getting relapse among having treatment interruption for never khat users was nearly three times (CI: 2.7, 1.2-5.9) higher as compared to no treatment interruption (table 2).

**Table 2: factors contributing to relapse among ever khat users and non-users in Amanuel mental specialized hospital, 2021**

| Variables<br>COR(95% CI) | | Relapse among current khat user | | Relapse among Never khat user | |
|---|---|---|---|---|---|
| | | AOR(95% CI | COR(95% CI) | AOR(95% CI | |
| Marital status | Single<br>Married<br>Others** | 1<br>0.6 (0.3-0.9)*<br>0.9(0.4-2.1) | 1<br>0.6(0.3-1.2)<br>0.6(0.2-1.7) | 1<br>1.7(0.9-3.2)<br>1.8(0.7-5.0) | 1<br>2(0.9-4.3)<br>2.3(0.7-7.4) |
| Occupation | Unemployed<br>Employed | 1<br>0.5(0.3-0.9)* | 1<br>0.7(0.4-1.3) | 1<br>1.2(0.7-2.2) | 1<br>1.4(0.7-2.9) |
| Treatment interruption | Yes<br>No | 2.85(1.8-4.6)*<br>1 | 1.6(0.9-2.9)<br>1 | 2.7(1.5-5.0)*<br>1 | 2.7(1.3-5.5)*<br>1 |

| | | | | | |
|---|---|---|---|---|---|
| Perceived stressor | Yes | 2.9(1.8-4.7)* | 2(1.1-3.7)* | 2.5(1.4-4.5)* | 1.5(0.7-3.1) |
| | No | 1 | 1 | 1 | 1 |
| Sleeping disorder | Yes | 2.2(1.3-3.5)* | 1.3(0.7-2.4) | 3.4(1.9-6.2)* | 4(1.8-8.2)* |
| | No | 1 | 1 | 1 | 1 |
| Hospitalization History | Yes | 7.2(3.8-13)* | 6(3-12.5)* | 6.9(3.3-14.4)* | 4.9(2-12.2)* |
| | No | 1 | 1 | 1 | 1 |
| Social support | Poor | 1 | 1 | 1 | 1 |
| | Medium | 0.5(0.3-0.9)* | 0.7(0.4-1.4) | 1.1(0.6-2.1) | 1.4(0.7-3) |
| | Strong | 0.8(0.4-1.4 | 1.2(0.6-2.6) | 0.5(0.2-1.3) | 0.7(0.2-2) |
| Adherences | Non adherent | 1 | 1 | ----- | |
| | Adherent | 0.4(0.2-0.7)* | 0.6(0.3-1.3) | ---- | |
| Alcohol use | Low | 1 | 1 | 1 | 1 |
| | Moderate | 1(0.6-2) | 0.8(0.4-1.6) | 3(1-8.9)* | 1.5(0.4-6) |
| | High | 2.7(1.2-6) | 1.1(0.4-3) | 1.8(0.2-16.4) | 0.5(0.04-7.7) |
| Tobacco use | Low | 1 | 1 | 1 | 1 |
| | Moderate | 1.1(0.6-2.0) | 0.9(0.4-1.9) | 2.2(0.5-10.8) | 2(0.3-13) |
| | High | 2.3(1.5-4.0)* | 1.3(0.7-2.6) | 4.9(1.8-13.3)* | 3.8(0.9-15.5) |
| Diagnosis | Schizophrenia | 1 | 1 | 1 | 1 |
| | Bipolar | 1.1(0.6-1.8) | 1.03(0.5-2) | 0.9(0.5-1.8) | 0.5(0.2-1.1) |
| | Depression | 0.5(0.3-0.9)* | 0.5(0.2-1.03) | 0.4(0.2-0.8)* | 0.3(0.12-0.7)* |

Based on ASSIST classification as risk of problems related to khat use increase, the relapse rate also increases when compared with non-users of khat. 31.9% of people in the high risk category have relapse history but only 12.9% of the people in the lower risk group have relapse (Figure 1).

Figure 1: percentage of relapse in different category of khat use risk among people with serious mental illness at AMSH, 2021.

## DISCUSSION

In this study the prevalence of relapse was significantly higher in khat chewers than in non-chewers (22% versus 13% between chewer and non-chewer respectively with P<0.001). The study found that like other illicit substance; amphetamine, alcohol and cannabis; khat chewing causes increased relapse of the disease in SMI. This is in line with the case studies (Alem A and shibire T, 1997)(Grofu & Gorfu, 2006); qualitative studies(Teferra, Hanlon, et al., 2011) and few quantitative studies (Hassan & Gunaid, 2002),(Odenwald et al., 2005),(Duko B, Ayano G, Bekana L, 2016). Cathinone; similar substance with amphetamine and the main active constituent of khat through

its activity on enhancing dopaminergic and serotonin activity and its decreasing effectiveness of antipsychotics could result in increase of relapse rate in serious mental illness.

Stressors and having previous hospitalization were the factors for increased relapse rate in khat chewer people with serious mental illness. In different studies stressful life event is among the factor for relapse(Nw et al., 2018)(Sariah et al., 2014). Studies of khat chewing in the general population described some chewers' experience unpleasant effects during the chewing process, describing anxiety, tension, restlessness and hypnagogic hallucinations; the cumulative effect of khat chewing and subsequent stress could over folds relapse rate in this already debilitating disease.

Hospitalization history is the other main factor for relapse in khat chewers of serious mental illness people. This is also the case with other studies (Ascher-svanum et al., 2010)(Juola, 2015). Aggravation of symptoms of the disease is among the main reason for readmission to psychiatric hospital, substance use like khat are among the main reason for readmission in this hospital, where this study was conducted(Bimerew et al., 2007) this indicates khat could be among the main reason for increased previous and subsequent relapse and hospitalization.

Treatment interruption, sleeping disorder, hospitalization history were the factors associated with relapse in non-chewers with serious mental illness peoples. In line with this study finding treatment interruption or discontinuation is among the reasons for relapse in different studies (Nw et al., 2018). This indicates the need for longer maintenance treatment rather than interrupting treatment. Comparative study of guided antipsychotic discontinuation verses maintenance treatment showed that relapse rate was 52% and 16% in the treatment discontinuing and maintenance treatment, respectively(Emsley et al., 2013).

Sleep disorder is the other factor associated with relapse. It is common to hear that many of the admitted patients in this hospital, where this study was undertaken, complain that they have disturbed sleep and is one reason for their readmission to the hospital.

Even though it is not revealed in this study, khat causes sleep disturbance (ECDD, 2006) and treatment interruption(Teferra et al., 2013) this could potentially increase relapse in patients with serious mental illness.

From the ASSIST classification of risk of different health and social problems from the use of khat, as the risk of problems was increasing from the use of khat the risk of developing relapse of the disease was also increasing. The amount of khat use is among the main reason for increasing risk in the ASSIST classification. So, relapse of disease is the other additional risk incurred from the use of khat excessively. Other studies also found that it is the amount of khat which matters most in relation with increase of psychiatric morbidity in the general population (Odenwald et al., 2005) (Damena et al., n.d.).

Khat chewing practice is expanding alarmingly every time in Ethiopia and restriction on the use of it in public places is getting weaker. It is common to see many people gather and chew khat in street of cities in Ethiopia. People with mental illness may not be able to restrict themselves from using khat due to their condition and, as the availability is increased and the restriction on its use is weaker there will be higher tendency to chew khat. Khat chewing poses addition burden on people with SMI by increasing relapse, hospitalization, decreased patients and families quality of life because of repeated relapse.

## CONCLUSION

The study indicates that the prevalence of relapse was higher in khat chewers when it was compared with non-chewers' peoples with serious mental illness. And also as the risk of problems from khat chewing increased the relapse rate was also increased. Khat chewing imposes additional burden for the already debilitating disease. Additionally, previous hospitalization history and presence of stressors were the factors for increase of relapse in khat chewers. Previous hospitalization, treatment interruption and sleep disorders were the factor associated with relapse in non khat chewers of serious mental illness patients.

Amanuel Mental Specialized Hospital and other stake holders need to make educating the patients and care givers about the impact of khat chewing on SMI. Prevention and treatment of khat chewing should be integral part of intervention for relapse prevention in patients with SMI. Complete treatment interruption without discussion with patient and physician is commonly seen in the hospital. Through close follow up using different intervention strategies, interruption of treatment should be minimized. Sleep disturbance also need to be adequately managed

Limitation of the study include: The interview for khat chewing was dependant on response from the patients and care-givers which may compromise the reliability of the data collected due to social desirability issue and other factors. They may perceive that they might not be well treated if they reveal their khat chewing habit. This could affect to assess the real khat chewing behavior of the respondents. The lack of common measuring tools for relapse could also affect the result. Relapse measure in this study was dependant on respondents and review of their medical record rather than using instruments for measuring the psychopathology of the respondents; cross sectional nature of the study design could also hinder from assessing long term outcome of chewing on relapse and disease process.

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## AUTHORS' CONTRIBUTIONS

All authors discussed on the methodology of the study and has planned on the collection

of the data. FH analyzed and interpreted the study and write the first draft of the manuscript. All authors read and approved the final manuscript.

## AUTHORS' INFORMATION

All authors had long experience of working in Amanuel Mental Specialized hospital before they join their current institutions.

The authors declare there is no conflict of interest

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