

Khat Chewing as a Risk Factor of Cigarette Smoking in Ethiopia Systemic Review and Meta-Analysis

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Abstract

Background: Tobacco use is a major public health issue and strongest lifestyle related with increase probability of cardiovascular disease (CVDs). The objective of this systemic review and meta-analysis was to determine whether khat chewing is risk factor of cigarette smoking in Ethiopia.

Methods: Eligible studies were identified by searching different databases like PubMed, Google Scholar and Web of science for published and unpublished articles; Data were extracted from the eligible studies using data abstraction form by two independent authors. Publication bias was assessed using the visual funnel plot and Egger's test. Meta-analysis was performed by using random-effects models with the Der Simonian and Laird method.

Results: Eight studies were found to be eligible and included in the meta-analysis. Out of 3839 respondents 751(19.56%) were cigarette smokers.

The proportion of cigarettes smoking among khat chewers and non khat chewers were 40.43% and 11.54% respectively.

The final pooled effect size after trim and fill was found to be 1.93 (95%CI: 1.71, 2.14). This showed the presence of a significant association between khat chewing and cigarette smoking.

Conclusion: Khat chewing were found to be significantly associated with cigarette smoking Therefore, effective khat chewing prevention and intervention programs are required to reduce smoking among People in Ethiopia.

Keywords: Khat Chewing; Meta-Analysis; Cigarette Smoking; Systematic Reviews

Introduction

Tobacco use is a major public health issue and strongest lifestyle related with increase probability of cardiovascular disease (CVDs) [1]. Globally, nearly a third of the world's population greater than aged 15 years is smokers [2].

The prevalence continues to rise in developing countries [3]. Nearly 80% of smokers worldwide live in low- and middle-income countries [4].

It was found that khat chewing were significantly associated with cigarette smoking in studies done in Northern Ethiopia [5] and in Addis Ababa [6].

Previous systemic review done on Epidemiology of Tobacco Use among Khat Users recommends further research to be done on the level of tobacco use among khat users and khat non users to develop prevention activities by identifying at risk population [7].

There are no studies done in Ethiopia on the association between khat chewing and cigarette smoking.

The study will give useful data by evaluating evidence on the association of khat chewing and cigarette smoking. Thus, help for general smoking cessation interventions and fill evidence gaps by identifying at risk of smoking population.

Objective of the Study

The objective of this systemic review and meta-analysis was to determine whether khat chewing is risk factor of cigarette smoking In Ethiopia.

Methods

Reporting and search strategy

The reviewers done this systematic review and meta-analysis using preferred reporting items for systematic review and meta-analysis [9].

Eligible studies were identified by searching different databases like PubMed, Google Scholar and Web of science for published and unpublished articles.

Selection of studies

All studies were searched and after that duplicated studies were removed.

The title and abstract of 82 of articles screened were assessed independently by two reviewers.

Disagreements were resolved by discussion.

Eligibility criteria

- (i) Reviewers were selected studies published from 2011 to 2019 according inclusion criteria.
- (ii) The article must have included the frequency of smoking status among khat users and khat non users in the multivariable logistics regression table and must be done in Ethiopian.

Studies other than English language were excluded from review.

For the association between khat chewing and smoking status, odds ratio, 95% confidence interval and p value were used.

Outcome measure

Smoking status was dichotomized into non-smokers who did not smoke during their life time and coded "0" (who had never tried a cigarette in his/her lifetime) and smokers who smoked during their life time (intermittent and regular smokers combined and coded "1") (current and former smoker).

Study design

Observational studies (cross-sectional and cohort/longitudinal) were included.

Data extraction

Data were extracted from the eligible studies using data abstraction form by two independent authors. The extracted data include the name of the first author, region, year of publication, study design, sample size, number of smokers and number of khat chewers.

Quality assessment

Four authors appraised the quality of each included study using a Joanna Briggs Institute's critical appraisal tool for analytical cross-sectional studies.

The JBI has eight components needed to qualify: (1) clearly defined inclusion in the sample, (2) study subjects and the setting described in detail, (3) exposure measured in a valid and reliable way, (4) objective, standard criteria used for measurement of the condition, (5) identified confounding factors, (6) Strategies to deal with confounding factors stated, (7) Outcomes measured in a valid and reliable way and (8) appropriate statistical analysis used.

Studies which fulfill all eight components were included [9,10] (Table 1).

Author	Year of Publication	Design	Sample Size	Prevalence smoking (%)
Eticha T., <i>et al.</i>	2014	Cross sectional	193	29.5
Duko B., <i>et al.</i>	2019	Cross sectional	564	11
Tadesse A	2011	Cross sectional	398	21.6
Lodebo T., <i>et al.</i>	2017	Cross sectional	640	23.6
Kassa., <i>et al.</i>	2014	Cross sectional	586	11.9
Gebrehananna., <i>et al.</i>	2014	Cross sectional	3872	4
Tsegay G., <i>et al.</i>	2014	Cross sectional	845	10
Abera E., <i>et al.</i>	2018	Cross sectional	333	24

Table 1: Characteristics of 8 studies reporting cigarette smoking among khat chewers and non khat users in Ethiopian included in systematic review and meta-analysis of 2021.

Data synthesis and statistical analysis

The extracted data from the eligible studies were entered into a Microsoft Excel Database and were converted to event/ total and entered into RevMan software version 5.1 for analysis. Meta-analysis was performed by using random-effects models with the DerSimonian and Laird method.

The extent of heterogeneity between studies was measured by the index of the heterogeneity (I^2 statistics) test.

I^2 values of 25%, 50% and 75% was used as low, medium, and high heterogeneity, respectively.

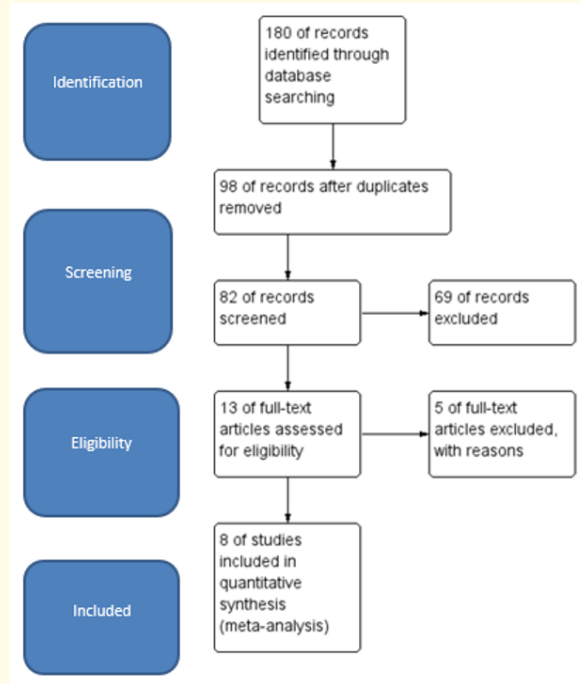


Figure 1: Flow diagram of the studies included in the meta-analysis.

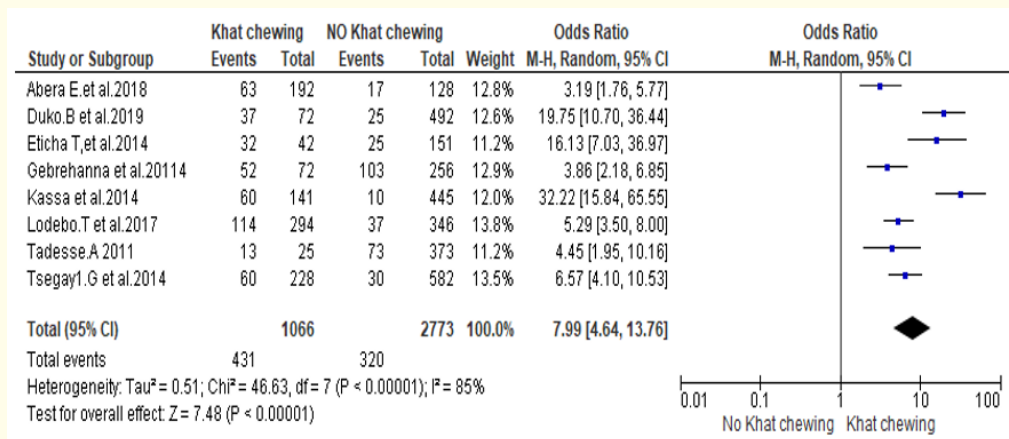


Figure 2: Forest plot of the pooled effect size for the association between khat chewing and cigarette smoking in Ethiopia.

Source of heterogeneity

According to the Meta regression analysis in the random effect model, sample size and effect size showed significant difference ($B = 0.00$, $P\text{-value} < 0.028$) (Figure 3).

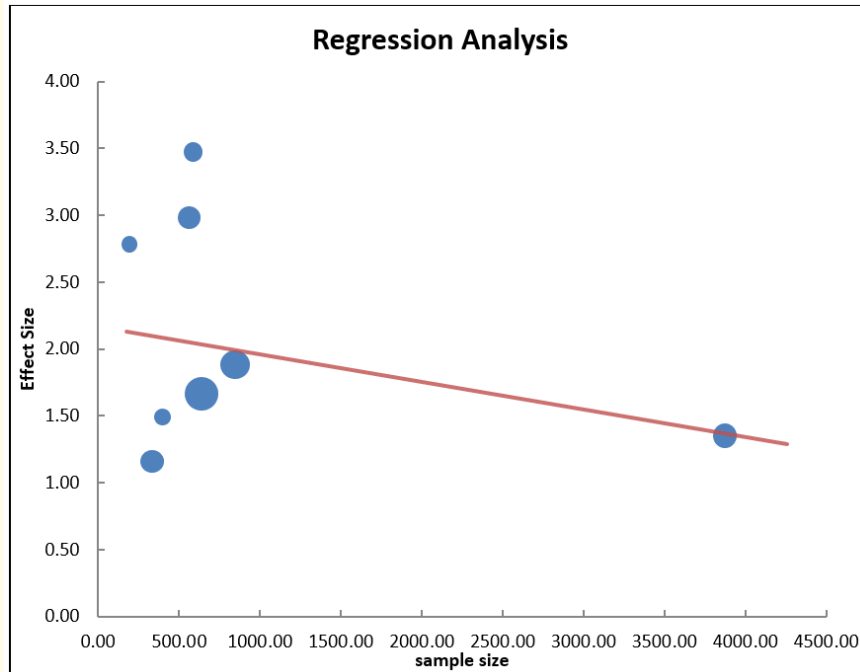


Figure 3: Meta regression analysis of sample size and effect size of cigarette smoking in Ethiopia, 2021.

Moderator analysis was done using prevalence of khat chewing as moderator to know source of heterogeneity.

Publication bias was assessed using the visual funnel plot and Egger’s test.

P value < 0.05 was considered as statistically significant publication bias.

Moderator analysis

We assess interactions between risk of cigarette smoking in khat chewer’s vs non khat chewers, as expressed with odds ratios and a moderator or covariate of interest is prevalence of khat chewing in each study.

Accordingly, the moderator analysis indicated that as prevalence of khat chewing increase the effect size of cigarettes smoking increases ($B = -0.02$, $P\text{-value} < 0.001$) (Figure 4).

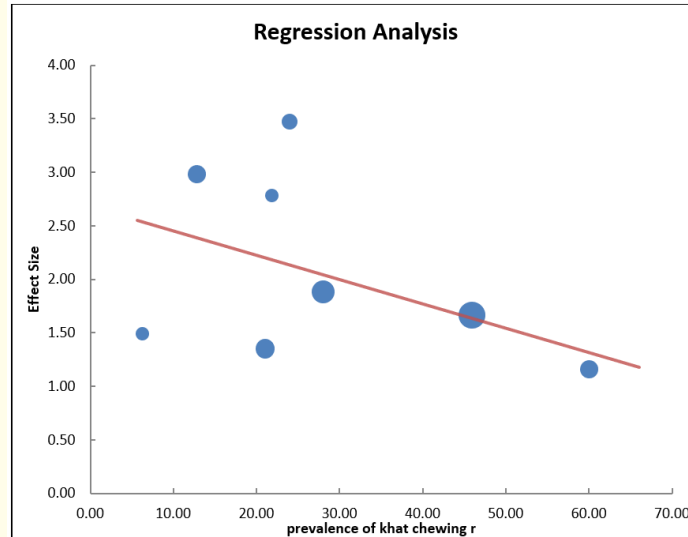


Figure 4: Moderator analysis of khat chewing and cigarette smoking in Ethiopia, 2021.

Results

Description: All records identified through database searching were published from 2011 to 2019.

Out of 180 studies, 8 were considered for analysis. The researchers excluded 172 studies using PRISMA 2009 Flow Diagram [11] (Figure 1).

Study characteristics: In this study, a total of 3839 study participants were included from 8 studies.

All of the studies included were cross-sectional with a sample size ranging from 193 to 3972 (Table 1).

Based on the JBI, all the included studies had no methodological defect.

Prevalence of cigarette smoking

Out of 3839 respondents 751 (19.56%) were cigarette smokers.

The proportion of cigarettes smoking among khat chewers and non khat chewers were 40.43% and 11.54% respectively.

Meta-analysis

From the pooled effect size of eight studies, those who had history of khat chewing were 7.99 times more likely to smoke cigarettes as compared to non khat chewers (7.99 (95% CI: 4.64 - 13.76; $I^2 = 82\%$).

Assessment of reporting biases

Thus, the results of the test suggested no existence of a significant publication bias ($p = 0.320$) in Egger’s test) but the funnel plot was asymmetric and Eggers test showed there is change in the trim and fill analysis.

Because of this, we have done trim and fill analysis to adjust the final pooled effect size. This method indicated that two studies are missing on the left side of the mean size based on random effect model.

So, the final pooled effect size after trim and fill was found to be 1.93 (95%CI: 1.71, 2.14). This showed the presence of a significant association between khat chewing and cigarette smoking (Figure 5).

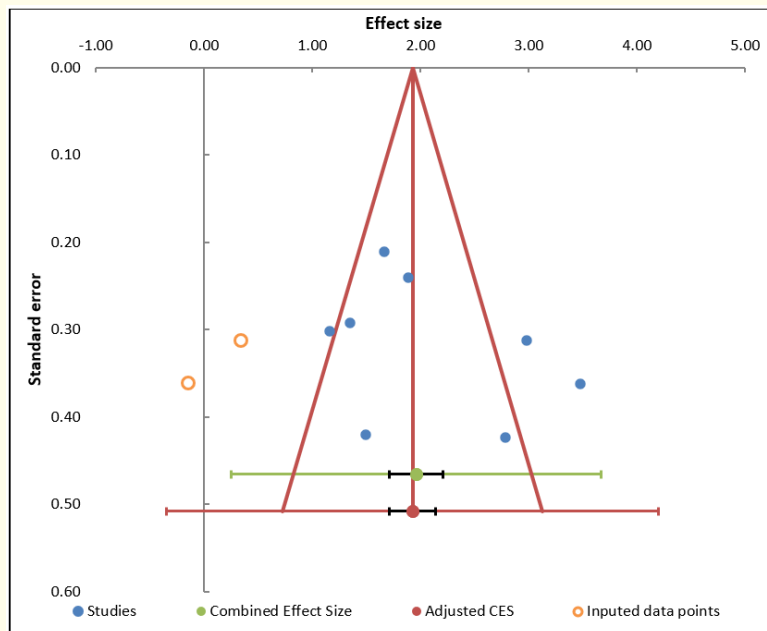


Figure 5: Funnel plot of right studies to show khat chewing as risk factor of cigarette smoking in Ethiopia, 2021.

Discussion

The purpose of this systematic review and meta-analysis was to estimate the pooled effect size for the association between khat chewing and cigarette smoking in Ethiopia.

The final pooled effect size after trim and fill was found to be 1.93 (95%CI: 1.71, 2.14). The odds of cigarette smoking are 1.93 times higher among khat chewers compared to those who do not chew khat.

Our findings are comparable with a study in Zimbabwe [12], China [13], India [14], Axum Town, North Ethiopia [15], Dire-dawa university, eastern Ethiopia [16], Jigjiga university [17], Halaba Kulito town, southern Ethiopia [18], Bahir Dar Town, Ethiopia [19], Ethiopian University Students A Systematic Review and Meta-analysis [20] and Addis Ababa University in Ethiopia [21].

This may be because cigarettes and khat are commonly interrelated.

This might be true due to the high relationship between Khat and smoking. Starting with one substance might initiate the use of combined substances.

Since most khat chewers use cigarette to enhance their level of excitement, the proportion of smokers observed among khat chewers were high.

Tobacco use is embedded within the culture of khat chewing [22]. The habit of tobacco use among khat users is substantial [7].

These study findings were inconsistent with a study on university Students in Ethiopia which states no association between khat chewing and cigarettes smoking [23].

The explanation for this difference may be difference in sample size, study characteristics and variation in prevalence of khat chewing.

Conclusion

Khat chewing were found to be significantly associated with cigarette smoking.

Therefore, effective khat chewing prevention and intervention programs are required to reduce smoking among People in Ethiopia.

Data Availability

All data are included in the paper.

Authors' Contributions

Kaleab Tesfaye Tegegne was responsible for conceptualization, project administration, software, supervision, and development of the original drafting of the manuscript.

Kaleab Tesfaye Tegegne, Andualem Zenebe, Abiyu Ayalew Assefa, and Wosenyeleh Semeon Bagajjo were participated in quality assessment of articles, methodology, validation, and screening of research papers.

All authors contributed with data analysis, critically revised the paper, and agreed to be accountable for their contribution.

Competing of Interest

The authors have declared that there is no competing interest.

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