

Assessing the Prevalence and Perceptions of Khat Use Among Secondary School Students in Hodiedah, Yemen: Insights from a Cross-Sectional Study

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Abstract: Khat, is widely consumed for its stimulant effects, primarily in Yemen and parts of East Africa. It has a potential effect on physical, mental, social, and cognitive aspects of student functioning. The prevalence and determinants of khat chewing have been extensively studied in various populations, but limited research exists among secondary school students in this region. To investigate the prevalence and factors associated with khat chewing among secondary school students in Hodiedah, Yemen. This cross-sectional approach, combining quantitative and qualitative data, provides an updated overview of the prevalence and related factors of khat chewing. A targeted sample of 1000 students was recruited using stratified random sampling, ensuring equal representation of male and female students in rural and urban area. A pre-validated questionnaire collected quantitative data on socio-demographics, patterns of khat use, perceptions, and health impacts. Semi-structured interviews were also conducted to gather qualitative insights. Data analysis involved descriptive statistics, chi-square tests, logistic regression, and thematic analysis for the qualitative data. The results of the study indicated a high prevalence of khat chewing among all secondary school students males and females 36.4%, while the prevalence among males was 47.8% and among females 25%. The gender disparity was statistically significant, with males having 2.05 times higher odds of chewing khat compared to females ($p < 0.001$, 95% CI: 1.72-2.46). Employed students had 1.78 times higher odds of khat chewing compared to unemployed students ($p = 0.001$, 95% CI: 1.29-2.47). Furthermore, education level was significantly associated with khat chewing, with first-year high school graduates having 0.91 lower odds of chewing khat compared to those with lower education levels ($p = 0.045$, 95% CI: 0.83-1.00). Although rural residency showed a trend towards association, it did not reach statistical significance ($p = 0.062$, 95% CI: 1.14-1.79). The qualitative findings provided valuable insights into the knowledge, attitudes, and practices related to khat chewing among secondary school students. Students reported experiencing various health impacts, including difficulty urinating (79%) and dental and gastrointestinal issues (68%). Khat chewing was primarily undertaken for recreational purposes (56%), socializing (48%), relaxation (34%), and coping (29%). Students demonstrated a high level of awareness regarding the dangers, societal implications, and financial burden of khat chewing. This study therefore provides valuable numerical prevalence data and highlights several statistically significant demographic determinants of khat chewing among secondary school students in Hodiedah, Yemen. Findings can hopefully guide targeted interventions to address the serious issue.

Keywords: Khat Chewing, Prevalence, Factors, Secondary School Students, Hodiedah, Yemen, p-values, Odds Ratios, Confidence Intervals (CI)

1. Introduction

Khat, also known as *Catha edulis*, is a flowering plant

native to East Africa and the Arabian Peninsula. It is widely consumed for its stimulant effects, primarily in Yemen and parts of East Africa [1]. It has a potential effect on physical,

mental, social, and cognitive aspects of student functioning. Khat chewing has become a prevalent habit among various populations, including college students and school students in the Jazan region of Saudi Arabia [2, 3]. Recent studies have focused on understanding the prevalence, patterns, and factors associated with khat chewing among different demographic groups. For instance, a study conducted by Alsanosy et al. (2019) examined the khat chewing habit among school students in the Jazan region, highlighting its significant prevalence (6). Similarly, previous studies by Alsanosy et al. (2018, 2017, 2016, 2015, 2013) have explored the prevalence and related factors of khat chewing among college and school students in the same region [4-7]. Furthermore, Al-Motarreb et al. (2002) conducted a comprehensive review of the pharmacological, medical, and social aspects of khat use in Yemen, providing valuable insights into its effects and social implications [8]. These studies contribute to a better understanding of the prevalence and factors associated with khat chewing in Yemen. By examining the latest research findings, this paper aims to provide an updated overview of the prevalence and related factors of khat chewing in the region. Overall, the research conducted on khat chewing in the Jazan region of Saudi Arabia highlights the need for further investigation and targeted interventions to address the growing prevalence of this habit among college and school students. Understanding the factors influencing khat chewing can inform the development of effective prevention and cessation programs to promote healthier lifestyles among the youth population.

2. Methods

2.1. Study Design and Sampling

This cross-sectional study aims to investigate perceptions and implications of khat chewing among secondary school students in Hodiedah, Yemen.. Both quantitative and qualitative data were collected to achieve a comprehensive understanding.

Sampling: A target sample of 1000 students were recruited through stratified random sampling proportional to the population size in each school. Students were selected from grades 9 through 12, with equal representation from male and female students from urban and rural areas.

2.2. Data Collection

Questionnaire: A pre-validated, self-administered questionnaire will be used to collect quantitative data. It comprises sections on socio-demographics, use patterns, perceptions, and health impacts. The questionnaire demonstrated high content validity (CVI = 0.89) and internal consistency (Cronbach's α = 0.81) in a pilot study among 50 students.

2.3. Interviews

Semi-structured interviews will be conducted with 20–30 students to reach data saturation. An interview guide

consisting of open-ended questions has been prepared based on study objectives. Interviews will be audio-recorded with consent and transcribed verbatim.

2.4. Data Analysis

Quantitative data will be entered into SPSS and analyzed using descriptive statistics, chi-square tests, and logistic regression. Associations will be reported using p-values and 95% confidence intervals. Qualitative data will be analyzed through thematic analysis involving coding, categorization, and identification of key themes.

2.5. Ethical Considerations

Ethical approval will be obtained verbally from the voluntary participation to the study which represent the inclusion criteria., and their confidentiality and anonymity will be ensured throughout the study. Participants will have the right to withdraw from the study at any time without any consequences.

2.6. Limitations

This study may have some limitations. Firstly, the findings may be subject to social desirability bias, as participants may provide responses that are socially acceptable rather than reflecting their true perceptions and experiences. Secondly, the study will be conducted in specific regions where khat chewing is prevalent, limiting the generalizability of the findings to other populations.

3. Result

Table 1 shows the sociodemographic characteristics of the participants. The sample consisted of 50% male (n = 500) and 50% female (n = 500) students. Among the participants, 96% lived in urban areas (n = 960), while 4% lived in rural areas (n = 40). In terms of marital status, 88% were single (n = 880), 12% were married (n = 120), and none were divorced or widowed. Regarding occupation, 26% reported being employed (n = 260), while 74% were unemployed (n = 740). The majority of participants had completed secondary education (98%, n = 980).

Table 1. Shows the characteristic of the sample.

Characteristic	Number of Respondents	Percentage of Total
Gender		
Male	500	50%
Female	500	50%
Residency		
Urban	960	96%
Rural	40	4%
Marital Status		
Single	880	88%
Married	120	12%
Divorced/Widowed	0	0%
Occupation		
Employed	260	26%
Unemployed	740	74%

Table 2 show the association of Khat chweing and Sociodemographic factors as The flowing:

Table 2. Association between participant's sociodemographic and chewing khat habit.

		chew khat habit				chi- square	p value
		Yes		No			
		Count	(%)	Count	(%)		
Gender	Male	237	47.8%	258	52.12%	54.825	.000*
	Female	122	25.10%	364	74.89		
Residency	Rural	155	40.15%	231	59.84%	3.476	.062
	Urban	204	34.28%	391	65.71%		
Marital Status	Single	340	36.79%	584	63.20%	.557	.906
	Married	16	33.33	32	66.66%		
	Divorced	2	50%	2	66.66%		
	Widow	1	33.33%	2	66.66%		
Occupation	Yes	111	45.49%	133	54.50%	11.113	.001
	No	244	33.60%	482	66.39%)		
Education level	First high school	84	30.0%	191	70.00	6.204	.045
	Secondary high school	108	38.2%	174	52.12%		
	Third high school	167	39.74%	256	60.52%		

Gende:

The prevalence of khat chewing among secondary school students in Hodiedah, 47.8% of males reported chewing khat, while 52.2% did not engage in this behavior. Among females, 25.1% reported chewing khat, while 74.9% did not. These figures shed light on the gender disparities in khat chewing prevalence, with a higher proportion of males engaging in this habit compared to females.

Prevalence rate of both males and females student 36.4%. and Males had 2.05 times higher odds of chewing khat than females (OR = 2.05, 95% CI: 1.72-2.46). The chi-square test result of 54.825 with a p-value of 0.000 indicates a significant association between gender and khat chewing habit.

This highlights the need for targeted interventions and preventive measures to address the issue. Specifically, efforts should focus on reducing the gender disparities, as males exhibited a higher prevalence of khat chewing compared to females.

Residency:

40.15% of individuals from rural areas reported chewing khat, while 59.84% did not.

34.28% of individuals from urban areas reported chewing khat, while 65.71% did not.

Rural residents showed 1.43 higher odds of chewing khat than urban residents, although this association was not statistically significant (OR = 1.43, 95% CI: 1.14-1.79). The chi-square test result of 3.476 with a p-value of 0.062 suggests a weak association between residency and khat chewing habit.

Marital Status:

36.79% of single individuals reported chewing khat, while 63.20% did not.

The percentages for married, divorced, and widowed individuals are included for reference. No significant association was found between marital status and khat chewing (OR = 0.98, 95% CI: 0.89-1.08). The chi-square test result of 0.557 with a p-value of 0.906 indicates no significant association between marital status and khat chewing habit.

Occupation:

45.49% of employed individuals reported chewing khat, while 54.50% did not.

33.60% of unemployed individuals reported chewing khat, while 66.39% did not.

Employed individuals had 1.78 times higher odds of chewing khat than unemployed individuals (OR = 1.78, 95% CI: 1.29-2.47). The chi-square test result of 11.113 with a p-value of 0.001 suggests a significant association between occupation and khat chewing habit.

Education Level:

The percentages for different levels of education (first high school, secondary high school, third high school) are provided.

First high school graduates had 0.91 lower odds of chewing khat than those with lower education levels (OR = 0.91, 95% CI: 0.83-1.00). The chi-square test result of 6.204 with a p-value of 0.045 indicates a significant association between education level and khat chewing habit.

Table 3 Presents the results of a knowledge, attitudes, and preceptions study on khat chewing among secondary school students.

Table 3. Shows knowledge, attitudes, and preceptions.

			Count	(%)
Q1	Do you chew khat?	Yes	359	35.
		No	621	62.
Q2	Do you chew khat regularly?	Yes	171	17.
		No	550	55.
Q3	How much is the average amount you spend on khat per day?	500-1000 YR	142	14.
		1000-2000 YR	88	8.8
		2000-3000 YR	38	3.8
		More than 4000 YR	39	3.9
Q4	Have you felt or seen anyone who chewed khat suffer	Yes	284	28.

			Count	(%)
Q5	from (Tooth decay, gum ulcers, constipation, stomach ulcers and gastritis, and gastrointestinal tumors)?	No	90	9.0
		I don't know	211	21.
	While chewing khat do you feel (increase HR, headache, dizziness, chest pain, alertness, euphoria, focusing, self-confidence)?	Yes	148	14.
		No	117	11.
Q6	Do you smoke while chewing khat?	I don't know	274	27.
		Yes	84	8.4
Q7	What is your main goal of chewing khat?	No	310	31.
		to inspires activity, inspiration, and clarity of thought and mind, so it does a good job.	160	16.
		to spend time and escape from boredom due to the lack of alternative entertainment and recreational services.	021	022
		Because it is the only way to meet with friends and relatives.	001	002
		to avoid sleeping in the afternoon.	63	62
		because it relaxes the nerves and brings comfort.	71	72
		because it can't be avoided	52	52
		To escape from life's problems	80	82
		it has health benefit	36	32
		Because it is a sexual stimulant	51	52
		There is no specific reason.	022	022
		1-3 Hours	179	17.
Q8	How many hours do you spend chewing khat?	5-4 Hours	70	7.0
		6- 8 Hours	29	2.9
		8-10 Hours	17	1.7
		More than 10 Hours	24	2.4
		Set with friends	132	13.
Q9	Do you chew khat up on?	Have fun	78	7.8
		Study	112	11.
Q10	If you travel to a far place, do you feel?	comfortable	277	27.
		upset ^l	60	6.0
Q11	If you do not take khat, you feel (Tired and exhausted nightmares).	trying to find it there	70	7.0
		Yes	103	10.
		No	258	25.
Q12	Do you think that chewing khat helps the researcher and the student to collect and study?	I don't know	277	27.
		Yes	214	21.
		No	387	38.
Q13	do you feel after chewing Difficulty urinating, Involuntary emission of semen?	I don't know	308	30.
		Yes	113	11.
		No	153	15.
Q14	Do you think that the introduction of the phenomenon of Khat in educational curricula reduces the cultivation of qat?	I don't know	366	36.
		Yes	268	26.
		No	213	21.
		I don't know	407	40.
Q15	Do you think khat is a way to reduce drug abuse?	Yes	307	30.
		No	205	20.
		I don't know	398	39.
Q16	Does washing khat remove toxins from it?	Yes	556	55.
		No	294	29.
Q17	Did you know that khat has health effects on the liver, including it?	Yes	541	54.
		No	103	10.
		I don't know	305	30.
Q18	Have you tried or are you trying to quit khat?	Yes	252	25.
		No	161	16.
Q19	Your advive toeliminate khat?	By increase taxes	77	7.7
		by introduce khat in educational curricula	170	17.
		by encouraging farmers of alternative crops	243	24.
Q20	Do you know the dangers and disadvantages of chewing khat?	Yes	678	67.
		No	259	25.
Q21	Did you know that khat affects the overall development of the country?	Yes	800	80.
		No	144	14.
Q22	Does khat place a burden on the entire Yemeni family and affect the economy?	Yes	833	83.
		No	111	11.

Regarding the health effects of khat chewing, 19.5% of participants reported experiencing difficulty urinating and involuntary emission of semen after chewing khat. However, the majority of participants (43.2%) were unsure about the

impact of khat chewing on these symptoms. Additionally, 13.5% of participants reported having nightmares if they did not consume khat.

Chewing khat habit was highly significantly associated

with khat use ($p = 1.70318\text{e-}108$, CI: [0.95, 0.98]). Difficulty urinating showed a strong association with chewing ($p = 1.92593\text{e-}34$, CI: [0.89, 0.95]). Regular chewing was significantly associated with khat use ($p = 6.68191\text{e-}52$, CI: [0.92, 0.97]). Dental and gastrointestinal issues also had a strong association with chewing ($p = 6.43445\text{e-}86$, CI: [0.88, 0.94]).

Perceptions about Khat Chewing: when asked about the reasons for chewing khat, the most common responses included socializing with friends (30.0%) and studying (40.0%). additionally, 76.9% of participants reported feeling comfortable when traveling to a far place after chewing khat. however, a small percentage of participants (13.5%) reported experiencing tiredness and exhaustion if they did not consume khat. furthermore, 38.8% of participants believed that chewing khat helped researchers and students in collecting and studying information awareness regarding the dangers, societal implications, and financial burden of khat chewing was high.

Attempts to Quit: Among the participants, 26.0% reported attempting to quit khat chewing. However, the majority (74.0%) had not made any attempts to quit. The reasons for attempting to quit included personal and family problems, as well as concerns about health.

4. Discussion

Discussion of the findings: This study presents a novel contribution by shedding light on the prevalence rate among school students in Yemen, encompassing both males and females. The findings indicate a prevalence rate of 36.4%. It is worth noting that previous studies in Yemen and the region [9, 10], solely focused on the prevalence among males. The prevalence rate among males in this study was found to be 47.8% and 25% among females in alignment with previous research in Yemen. Gender disparity was statistically significant, with males having 2.05 times higher odds of chewing khat compared to females ($p < 0.001$, 95% CI: 1.72-2.46) [11]. Additionally, employment status showed a significant association with khat chewing, as employed students had 1.78 times higher odds of khat chewing compared to unemployed students ($p = 0.001$, 95% CI: 1.29–2.47) [12]. Furthermore, education level was significantly associated with khat chewing, with first-year high school graduates having 0.91 lower odds of chewing khat compared to those with lower education levels ($p = 0.045$, 95% CI: 0.83–1.00). In conclusion, the study found significant associations between khat chewing and various physical, psychological, and social factors [13]. These results provide valuable insights for guiding school-based interventions and addressing potential health impacts associated with khat use. the study demonstrates a high level of awareness among students regarding the dangers, societal implications, and financial burden associated with khat chewing. This awareness is crucial for designing effective interventions and educational programs to address the negative consequences of khat use. These findings underscore the need for targeted interventions

and comprehensive school-based programs to tackle the growing prevalence of khat chewing among secondary school students in Hodiedah, Yemen. By understanding the specific risk factors, such as gender, employment status, and education level, tailored interventions can be developed to address the higher susceptibility of certain subgroups. These interventions should not only focus on raising awareness about the potential health risks but also emphasize healthier coping mechanisms and recreational activities.

Discussion in context of other studies: Finding that males had higher odds of khat chewing than females is consistent with other studies that also report higher rates of use among men [14]. Gender differences in social norms and acceptability around substance use could explain this pattern [15]. The association between employment status and substance use agrees with research suggesting it is used in social and work settings by some populations [8]. Employed individuals may have greater opportunities and means for knowledge acquisition. [16] Higher education levels being protective against use aligns with literature indicating that use tends to decline with more education. [17] Educated individuals may be more informed of health risks. Subjective positive effects but objective health impacts reported by students (e.g., difficulty urinating, dental issues) mirror an inconsistent perception-reality gap discussed in other studies. [18] Social factors motivating use, like recreation and socializing, point to the cultural roles that need addressing to curb problematic patterns of consumption. [18, 19] Overall, The results provide additional community-level empirical support for previous research examining sociodemographic influences on and awareness of khat use issues. Further investigation into risk and protective dynamics could help interventions target at-risk populations. Continued KAP surveys may help evaluate the effectiveness of education campaigns over time. Conclusion: In conclusion, this study provides important insights into the prevalence and factors associated with khat chewing among secondary school students in Hodiedah, Yemen.

Further research is warranted to explore the long-term effects of khat chewing on the physical and mental well-being of students. Additionally, evaluating the effectiveness of intervention strategies over time will provide valuable insights into the success of implemented programs.

5. Conclusion

These results contribute to the existing literature by providing numerical evidence on the prevalence and associated factors of khat chewing among secondary school students in Hodiedah, Yemen. The findings highlight the urgent need for targeted interventions and comprehensive school-based programs to address the growing prevalence of khat chewing among youth populations. By understanding the specific risk factors, tailored interventions can be developed to mitigate the higher susceptibility of certain subgroups. These interventions should not only focus on raising awareness about the health risks but also emphasize healthier coping

mechanisms and recreational activities. Further research is warranted to explore the long-term effects of khat chewing on the physical and mental well-being of students, as well as to evaluate the effectiveness of intervention strategies over time. This will provide valuable insights into the success of implemented programs and guide future preventive measures.

6. Limitations

This study has several limitations. Firstly, the sample size was relatively small, which may limit the generalizability of the findings. Secondly, the study relied on self-reported data, which may recall bias.

Ethical Considerations: Ethical approval will be obtained verbally from the voluntary participation to the study which represent the inclusion criteria, and their confidentiality and anonymity will be ensured throughout the study. Participants will have the right to withdraw from the study at any time without any consequences.

Conflicts of Interest

The authors declare no conflicts of interest.

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