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IS BORDER INSTABILITY AFFECTING KHAT CONSUMPTION IN GIZAN, SAUDI ARABIA? EVIDENCE FROM A CROSS-SECTIONAL SURVEY AMONG MALE UNIVERSITY STUDENTS

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Abstract:

Background: *Khat chewing is known to be highly prevalent among the Jazan population. The movement of khat across the border with Yemen is probably the most decisive factor shaping the availability and pattern of use of khat. This assumption is tested in this article in the light of sudden changes brought about by political tension across the border. This study intends to explore the perceptions of male students of the University Jazan about the effect of the new situation on their habit.*

Methods: *A descriptive cross-sectional study was conducted among a representative sample of 425 male students selected by stratified random sampling. A self-administered questionnaire was used for data collection. Descriptive statistics and a chi-squared test were used to analyze the data.*

Results: *The overall khat chewing prevalence among male university students was found to be 25.8% (95% CI = 22.0–29.8). 83% of khat chewers admitted that the situation across the border had affected their khat chewing habit. 42% of chewers had noticed an increase in khat price. There was a significant difference in the pattern of khat use ($p = 0.0063$), duration of sessions ($p = 0.0003$), and amount consumed ($p < 0.0001$) before and during the war.*

Conclusions: *The khat use trend is decreasing among male university students in the Jazan region during the war. Circumstances brought by the war helped that change. Our findings suggest that if the restriction on khat importation from Yemen should increase, then the price will rise, and it will lead to lower amounts of khat in the Jazan region.*

Keywords: *Khat, Kat, Qat, Qhat, Jazan, University.*

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INTRODUCTION:

Khat is a flowering plant whose chewing practice dates back thousands of years in the Horn of Africa and the Arabian Peninsula, where it is widely cultivated and known by a variety of names, including Qaat, Jaad, Chat, and *Catha edulis* (Al-Mugahed, 2008).

Although the practice of khat chewing is still primarily restricted to its original area of cultivation around the Red Sea, the khat plant has over the years found its way to other areas, mainly through the migration of chewers (Al-Mugahed, 2008).

Khat chewing is a common habit among Jazan city population, maybe because it lies in the southwest corner of Saudi Arabia and directly north of the border with Yemen, which is known as one of the major producers of khat around the world. Although it is banned by the Saudi government, khat chewing is deeply rooted in the sociocultural traditions of all segments of the Jazan region, including university students (Alsanosy, Mahfouz, & Gaffar, 2013b).

Although khat is cultivated in some mountainous areas of Jazan, the main source is khat smuggled across the border with Yemen. This movement across the border witnessed a dramatic and abrupt change when political tension escalated to military actions.

There is a need for scientific evidence to inform policymakers about the factors that shape the scope and strategies of control measures directed at reducing potential harm that can be inflicted by khat abuse (Odenwald & Al'absi, 2017).

The authors have made and tested the following assumptions: first, that the main source of khat comes from Yemen; second, that the current situation has hindered the movement and smuggling of khat; and third, that the scarcity of khat has affected its consumption pattern. The objective of this study is to explore these assumptions through the perceptions of male students at Jazan University. This will hopefully provide more evidence to inform policymakers.

MATERIAL AND METHODS:

Study ethics

The study was approved by the Faculty of Medicine at Jazan University. Permission was obtained from colleges before data collection. The purpose of the study, its benefits, and its risks were clearly explained to the participants, and written consent to participate in this study was obtained from all the participants prior to enrollment. The confidentiality of all information collected was ensured and was used only for the stated research purposes.

Study design, population and setting

An observational, analytical, cross-sectional study design was used for this study. The study was conducted among Jazan university students. The study included all undergraduate students registered for the academic year 2016/2017, who were 18 years of age or above and accepted to take part in the study. Jazan University is one of the 25 state universities in Saudi Arabia, which was established in 2005. It has a main central campus in Gizan town located by the Red Sea the southwest of Saudi Arabia and other tributary campuses.

Sampling procedure

A representative sample of 500 students was calculated based on an estimated prevalence of khat chewing in the Jazan region of 33.2% (Alsanosy, Mahfouz, & Gaffar, 2013b), with a 95% confidence level and error not more than 5%. The required sample size was increased by 30% to compensate for potential incomplete or missing data.

Male students at Jazan University were selected by stratified multistage sampling by dividing Jazan University into three main categories (sciences, health sciences, and arts), selecting two colleges from each category, and then selecting the students from each college randomly.

Data collection and study tool

A self-administered questionnaire was used that consisted of 21 questions arranged in two sections; the first contained questions about the participants' sociodemographic characteristics, while the other was about use patterns, perceptions about pricing, availability, quitting ability, and reasons for quitting. The questionnaire was pretested on 57 male students of a college that was not selected during sampling. The study used the following definitions for the study variables: a non-khat chewer was a participant who had never used khat, while a current khat chewer was a student who had chewed khat within 30 days preceding the study, and lifetime chewers included any individual who had chewed, even if only once in his lifetime—this included current users and ex-khat users.

Data Analysis and Management

Collected data were entered and analyzed using SPSS (version 20.0) software. Descriptive statistics, as well as inferential statistics, were used for data analysis. Simple tabulation frequencies and percentages were

used, then presented in pie charts and bar graphs to give a general overview of the data. The prevalence of khat chewing was presented using 95% CIs, and the Chi-squared/Fisher exact test was performed to determine the associations between individual categorical variables and the outcome (khat chewing). A p-value less than 0.05 was used as the cut-off level for statistical significance.

RESULTS:

The overall response rate for distributed questionnaires was 95.4% (477 from the target of 500). The mean, median, and mode of students' ages were 22.01, 22.0, and 21, respectively, with SD = 1.431.

Most of the students were single (96.6%), and more than half of them (55.7%) were from urban areas. The monthly income distribution of the respondents revealed that 61.6% of the students had income of less than 1,000 SR. As their income source, 50.6% depended on the university salary (table not provided).

Table 1 provides the status of khat chewing according to some selected background characteristics. Three categories are depicted: (current) khat chewers, ex-khat chewers, and non-khat chewers. These categories provide insight into the use patterns and allow for comparisons with similar studies. The table shows that there are statistically significant differences in khat chewing status according to students' age groups and income sources (p-value = 0.000 and 0.016, respectively).

Table 1: Background characteristics of the study participants according to khat chewing status

Characteristics	Khat Chewers Frequency (%)	Ex-Khat Chewers Frequency (%)	Non-Khat Chewers Frequency (%)	*p* value
Age groups (*n* = 472)				
18–19	49 (77.8)	14 (22.2)	0 (0.0)	0.000
20–22	68 (20.2)	46 (13.7)	222 (66.1)	
23–26	1 (1.4)	1 (1.4)	71 (97.3)	
Residence (*n* = 463)				0.395
Rural	46 (22.4)	29 (14.1)	130 63.4)	
Urban	71 (27.5)	30 (11.6)	157 (60.9)	
Marital Status (*n* = 463)				0.941
Single	117 (25.9)	58 (12.8%)	277 (61.3)	
Married	4 (30.8)	1 (7.7)	8 (61.5)	
Divorced	1 (50.0)	0 (0.0%)	1 (50.0)	
Widow	0 (0.0)	0 (0.0)	1 (100)	
Monthly Income (*n* = 474)				0.651
less than 1,000 SR*	71 (24.3)	37 (12.7)	184 (63.0)	
1,000–1,999 SR	32 (26.0)	18 (14.6)	73 (59.3)	
2,000–2,999 SR	9 (28.1)	2 (6.3)	21 (65.6)	
More than 3,000 SR	10 (37.0)	4 (14.8)	13 (48.1)	
Income source (*n* = 475)				0.016
University reward	59 (22.2)	33 (12.4)	174 (65.4)	
University reward & others	43 (26.1)	25 (15.2)	97 (58.8)	
Only others	20 (45.5)	3 (6.8)	21 (47.7)	
Overall	123 (25.8)	61 (12.8)	293 (61.4)	

One Dollar equivalent 3.75 SR

Table 2 shows the prevalence of khat chewing according to the study participants' background characteristics. The main group of *khat chewers* is selected to demonstrate the relationships. Regarding place of residence, there was a slight difference in prevalence according to residence in favor of urban dwelling. There was a significant association between the college type and khat use prevalence: The engineering college had the highest and the pharmacy college the lowest prevalence rates of the habit. Income had no significant effect on prevalence. There is also a slight, but not significant, increase in the prevalence of khat use as income increases. However, the increase is only minor and is not significant. Academic year (reflecting age probably) had a slight effect on the prevalence of khat use: The more advanced the academic year (the older the student), the higher the prevalence, but the increase is marginal and not statistically significant.

Variables	Total	Khat chewers	Prevalence (%)	95% CI	*p* value
Residence type (*n* = 463)					0.395
Rural	205	46	22.4	17.3–28.6	
Urban	258	71	27.5	22.5–33.5	
College name (*n* = 477)					0.000
Pharmacy	18	3	16.7	6.1–39.6	
Health sciences	59	13	22.0	13.4–34.2	
Engineering	74	27	36.5	26.4–47.9	
Sciences	47	9	19.1	10.4–32.7	
Business	122	38	31.1	23.6–39.9	
Computer	157	34	21.7	15.9–28.8	
Monthly income (*n* = 474)					0.682
less than 1,000 SR*	292	72	24.7	20–29.9	
1,000–2,000 SR	123	32	26.0	19–34.4	
2,000–3,000 SR	32	9	28.1	15.5–45.5	
More than 3,000 SR	27	10	37.0	21.5–55.9	
Academic Year (*n* = 475)					0.064
Second	33	7	21.2	10.7–37.9	
Third	321	80	24.9	20.5–29.8	
Fourth	121	36	29.8	22.1–38.4	
Overall prevalence	123	477	25.8	22.0–29.8	

Table 2: Current prevalence of khat chewing

*One Dollar equivalent 3.75 SR

Table 3 shows a significant association between the change in khat consumption and mild (once or twice per week) versus heavy (5–7 days/week) use. The shift follows a gradient, with the number of heavy users decreasing sharply but the number of mild users increasing. Duration of khat session shows a significant decrease, with a notable decrease in sessions of more than 5 hours. There is also a significant decrease in the amount consumed. Here too, a gradient is displayed, with a decrease in the amount consumed in the category of "½ to 1 bundle" and an even higher decrease in the category of "1 bundle or more." This is in favor of increasing the category of the smallest amount of "less than half a bundle."

Table 3: Change in khat consumption before and after border war

- Absolute % of change = %After – %Before
- Relative % of Change = Absolute % of change/Before * 100

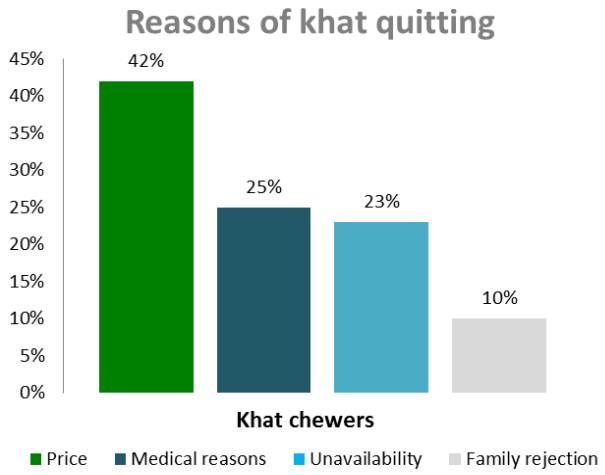
Characteristics	Before (*n* =180)	After (*n* = 179)	Absolute % of change*	Relative % of change#	p-value
Pattern of use					0.0011
Mild users.	128 (71.5)	155 (86.6)	15.1	21.1	
Moderate users.	20 (11.2)	13 (7.3)	-3.9	-34.8	
Heavy users.	31 (17.3)	11 (6.1)	-11.2	-64.7	
Duration of khat session					0.0001
1–3 hrs.	20 (11.0)	48 (27.1)	16.1	146.4	
3–5 hrs.	63 (34.8)	71 (40.1)	5.3	15.2	
5–7 hrs.	71 (39.2)	39 (22.0)	-17.2	-43.9	
More than 7 hrs.	27 (17.9)	19 (10.7)	-7.2	-40.2	
Amount Consumed					0.000
1/4–1/2 bundle.	61 (33.9)	99 (55.6)	21.7	64.0	
1/2–1 bundle.	60 (33.3)	50 (28.1)	-5.2	-15.6	
1 bundle.	46 (25.6)	21 (11.8)	-13.75	-53.7	
More than bundle.	13 (7.2)	7 (3.9)	-3.3	-45.8	

Table 4 presents participants' views on the border war's impact on khat chewing. The majority of the study participants 83.2% thought that the war had affected khat consumption, while 82.5% reported that there had been a remarkable increase in the khat price. Figure 1, on the other hand, shows that 42% of the study participants who had quit khat did so as a result of the increased khat prices.

Table 4: Khat chewers' perception of border war's impact on khat chewing

Items	Khat chewers	
	N	%
Is war affecting your khat consumption? (*n* = 119)		
Yes	99	83.2
No	20	16.8
Price change (*n* = 120)		
Slightly decreased	5	4.1
Remarkable decreased	2	1.6
Slightly increase	14	11.6
Remarkable increase	99	82.5
Magnitude of price change (*n* = 121)		
50–99.99 SR for bundle	8	6.6
100–149.99 SR for bundle	8	6.6
150–199.99 SR for bundle	28	23.1
200–299.99 SR for bundle	19	15.7
≥ 300 SR for bundle	58	47.9
Khat accessibility during war (*n* = 120)		
Easy	24	20.0
Much easier	3	2.5
Hard	69	57.5
Much harder	24	20.0

Figure 1: Reasons for quitting Khat chewing



DISCUSSION:

Since 2015, the Saudi–Yemeni border has witnessed considerable tension, including military actions across the border. The resultant situation is assumed to affect the ease with which khat can be smuggled across the border, perhaps considerably. The authors intend to explore these assumptions and to study the war's effect on the pattern of khat use.

The prevalence of khat chewing among the study population was 25.8%, while 38.6% were lifetime chewers. Current users among Jazan University students were reported by a single study (Alsanosy, Mahfouz, & Gaffar, 2013) to be 38.5%, which shows a 33% decrease. Other studies reported only the lifetime users and found results of 43.3% (Mahmoud, Khamis, Mania, & Darbashi, 2017), 40.5% (Alsanosy et al., 2013), and 37.8% (Ageely, 2009), which are close to the level obtained by this study of 38.6%. Elsewhere, students were reported to have a lifetime prevalence of 26.7% in Ethiopia (Yigzaw Kebede, 2002), 31.5% in Uganda (Ihunwo, Kayanja, & Amadi-Ihunwo, 2004), and 54% in Aden, Yemen (Laswar & Darwish, 2009).

Factors whose influence on khat use prevalence was studied included residence, college type, and income level. Rural versus urban residence showed no significant association in this study. Other studies found a significant difference in favor of either rural areas (Ageely, 2009; Mahmoud et al., 2017) or urban areas (Alsanosy et al., 2013a). Perhaps the most remarkable difference is that cited between Farasan Island (an isolated island of Jazan Province in the Red Sea) and villages of the Faifa mountains (a site of khat production that has border with Yemen), where the latter's prevalence is 10 times the former's (Ageely, 2009). Proximity to the site of production remains an important factor to consider as far as residence is concerned.

College type has provided similarly mixed relationships, ranging from a remarkable difference with a range of 21.4% to 44.4% (Ageely, 2009) and a statistically significant relationship with college type (Mahmoud et al., 2017) to no significant difference (Alsanosy et al., 2013). Differences in the identification of colleges and the distribution of the study sample among available similar studies do not allow for sensible comparisons. Monthly income was not shown to affect prevalence in the current study.

Regarding time spent chewing khat, the results of the number of days khat was chewed before the events in the current study (82.7% chewed khat on 2 days or fewer and 17.3% chewed most or all days of the week) coincide with those obtained earlier in the same population of students by Alsanosy et al. (2013), who reported 80.2% for 2 days or less and 18.8% who consumed most days of the week or on a daily basis (Alsanosy, Mahfouz, & Gaffar, 2013). After the restrictions, there was a considerable, statistically significant increase in the category of less than 2 days at the expense of higher categories.

Regarding hours spent in a single session, 45.8% spent less than 5 hours before the events and 54.1%, more than 5 hours, compared to Alsanosy et al. (2013), who reported 24.3% and 75.8% for these two categories respectively. After the unrest at the border, a similar trend of change was observed, with those spending more than 5 hours decreasing to 32.7%, while those spending 3–5 hours increased to 40.1%, and those spending less than 3 hours had the greatest increase, to 27.1%. The absolute and relative percentages of change were both significantly altered ($p < .00001$).

The study showed that the amount consumed has also changed. Those who reported consuming more than half a bundle decreased significantly in proportion ($p < .0001$), while those who consumed less increased. Adverse health and social effects are linked to higher levels of consumption (Odenwald, Warfa, Bhui, & Elbert, 2010). The dose consumed is obviously determined by the length of the session and the rate of consumption.

We can therefore reasonably assume that the situation at the time of our investigation has led to a decrease in the likelihood of adverse effects of khat socially, economically, and on the health of the study population.

The findings of this study can be deduced to indirectly support the opinion that tolerance to the dose, craving, and physical dependence are minimal, as they did not stop the participants from changing their behavior toward lesser consumption or even quitting, as evidenced by a 33% reduction in use prevalence.

The study has some limitations. First, the research is based on a cross-sectional survey design; the direction of relationships and causality between khat chewing and border instability cannot be exactly determined. Second, the study is based on a self-administered questionnaire, and no biological

samples were collected in the investigation, introducing the possibility of erroneous data.

CONCLUSION:

The trend of khat use is decreasing among male university students in the Jazan region during the southern border war. Circumstances brought by the war helped that change. Our findings suggest that if the restriction on khat importation from Yemen should increase, then the price will rise, leading to lower amounts of khat in the Jazan region. We can conclude that restrictions to access to khat can have a significant impact on reducing the amount consumed and time spent chewing and perhaps encourage quitting

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Competing Interests
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Author Contributions
Authors contributed equally to this work.

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