MERIT RESEARCH JOURNALS
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Merit Research Journal of Medicine and Medical Sciences (ISSN: 2354-323X) Vol. 5(3) pp. xxx-xxx, March, 2017
Available online http://www.meritresearchjournals.org/mms/index.htm

Original Research Article

The effect of Khat Chewing (*Catha edulis*) among college students of Jazan Province, Saudi Arabia: Prevalence and health related factors

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Abstract

To estimate the prevalence ofhealth related issues associated with Khat (Catha edulis) chewing i.e., Diabetes Mellitus (DM), Cholestrol, Hypertension and other associated factors among the college students of Jazan region, Saudi Arabia. A cross-sectional study using a structured questionnaire was used for collecting the data and determining the other clinical parameters. Standard kit protocols were used to estimate the various parameter SPSS version 17 software program was used for data analysis. The study revealed an overall prevalence of DM of 20% in Jazan Region in the selected participants. The study did not find an independent relationship between diabetes and khat chewing. The habit is highly prevalent among Jazan population. The investigation further documented an association between diabetes and physical activity. There is a significant of 20% students found to be hypoglycaemic. The group with physical activity had the lowest prevalence of diabetes. Furthermore, it was evaluated that there was no association between Khat chewing and BMI. Most of the participants (82%) BMI recorded within the normal range and in addition to that, the prevalence of cholesterol of 14% among the khat chewing students in Jazan Region. This estimate is far less than what has been reported by previous studies in KSA. It was also revealed that a higher percentage of Khat chewing students in Jazan Region are suffering from hypertension and smoking habits in the selected participants. The use of Khat trend is increasing among higher education students in Jazan Region. A multilevel, value based, comprehensive, and strategic long-term intervention plan is needed. The comprehensive plan may include social interventions geared by creating recreations alternatives and opportunities for youths.

Key words: Associated factors, Cholesterol, Diabetes mellitus, Habits, Khat, Prevalence, Hypertension, Body mass index

INTRODUCTION

Khat chewing is a common habit among all segments of Jazan population. Khat chewing produces psychostimulation effect in the form of euphoria and stimulation because of cathinone contents (Dhaifalaha and Santav, 2004; Lqman and Donaldson, 1976). Khat is a natural stimulant from the Catha Edulis plant that is cultivated in the Republic of Yemen, Ethiopia and most of the countries of East Africa (Al-Motarreb et al., 2004). There is fairly extensive literature on the potential adverse effects of habitual use of Khat has many severe

public health and social problems (Numan, 2004; Benson and Mcdermott, 1971). Some khat chewers experience anxiety, tension, restlessness, and aggressive behaviour or psychosis (Luqman and Danowski, 1976). Persistent consumption can lead to impairment of mental health, possibly contributing to personality disorders and psychological deterioration (Al-Hadrani, 2000). Khat leaves has the property of vasoconstriction that may lead to elevated blood pressure, increases in heart rate and increased incidence of myocardial infarction (Hes, 1970). Many studies shown clear association between consumption of khat and psychosis (Ageely, 2008). A significant association between the habit of khat chewing and the development of haemorrhoidal disease was reported (Halbach, 1972). There are evidences of the harmful effect of khat on the evidence of the harmful effect of khat on the health and the social relation associated with the consumption, the level of prevalence of khat among the population and its associated risk factors is important (Kennedy et al., 1983). Several reports showed that the prevalence of Khat use differs according to age, gender, residence and occupation (Zein, 1988; Alem and Shibre, 1997). Some studies, however, indicated that hypertension is among the health consequences of Khat chewing (Adugna et al., 1994). A recent study from an urban population in Ethiopia reported an isolated increase in mean diastolic blood pressure among adults who chewed Khat regularly (Alem et al., 1999). The present study examines the association of Khat chewing with systolic and diastolic blood pressure through comparison between Khat chewers and non-chewers in a semi-urban population in central Ethiopia, where the plant is produced and chewed in large quantities (Yousef et al., 1995). Adolescence is often a period during which individuals try on new attitudes, roles, and behaviours (Belew et al., 2000). Some adolescents choose to engage in risky behaviours. For some, the experience will be one of experimentation, a passing phase. For others, it will be the beginning down a path to problems that follow them into adulthood. There is a fairly consistent pattern that engaging in risky behaviours as a teenager is associated with less successful adult outcomes (Odenwald et al., 2005). In most cases, the earlier one engages in the behaviour, the more likely one faces a bad outcome as an adult (Pantelis et al., 1989). Adolescents seek to develop their own identity, opinions, and values. For adolescents, given the freedom to experiment, this stage also entails taking some risks (Ihunwo et al., 2004). Studies on the effect of substance abuse and their health effects are scarce despite the ever-growing rate of substance use behaviours, when adolescents take risks, the consequences can be negative: car accidents can occur while driving drunk, smoking can lead to cancer, and unprotected sex can lead to unwanted pregnancies and disease. Milaat *et al*. (2005) reported that current Khat prevalence among the general population in Jazan area is 48.7 percent (45.7 percent in rural compared to 61.7 percent in urban areas). Its use was high in the following provinces: Sabiya (72.5%), Jizan (61.7%), Alhurath (58.1%), Abu Arish (56.8%) and Samtah (55.7%). With improvement in awareness, there is growing evidence that the new generation of students favors the ban on khat even though they continue to chew the leaves before examinations. However, khat prevalence among college students in Jazan area was not previously reported. This study was conducted to assess the prevalence and associated risk factors of Khat chewing among college students in Jazan Region. The aim of this study is to get a better understanding of the perception of health related issues in college students who are consuming khat. The comprehensively knowledge will formulate for developing strategy to reduce the prevalence of the habits and its health consequences.

MATERIALS AND METHODS

Sample

Fifty samples of male students were selected randomly from volunteer students from Jazan. Criteria for inclusion in the study were being in the age group of 18-27 years, having Saudi nationality, Individuals who did not meet one or more of these criteria were excluded from the study. The sample was limited to 50 samples due to the limitation of getting samples and the interest of students to voluntarily provide the sample and data.

Data Collection

Students were interviewed privately face-to-face, by trained interviewers using pre-tested questionnaire. Initially, information on age, weight, height, exercise activity and smoking data will be collected. The consent of the patient has been taken before collecting the data and sample. The blood sample was collected from the participant either during or after chewing khat.

Blood Pressure

Before measuring the blood pressure, students were initially made to rest for 15 minutes then asked about tea or coffee consumption, physical activity, smoking and a full bladder (which might elevate blood pressure). Blood pressure of the participants mercury-based sphygmomanometers using standard WHO criteria. According to the WHO definition, the normal blood pressure is 120/80 mmHg, individuals with systolic blood pressure =140 mmHg or those with diastolic blood

Table 1. Estimation of Glucose

Pipette into cuvette	Blank	Standard	Test(sample)
Sample µl	-	-	10
Standard µl	-	10	-
D.W µl	10	-	-
Working reagent µl	1000	1000	1000

Table 2. Estimation of Cholesterol

Pipette into cuvette	Blank	Standard	Test(sample)
Cholesterol Reagent	1ml	1ml	1ml
Standard µl	-	10	-
D.W µl	10	-	-

pressure = 90 mmHg were considered hypertensive, when the systolic pressure 120-139 and diastolic 80-89 this case was considered as pre-hypertension.

Body Mass Index

Weight was measured while the subjects were minimally clothed without shoes using digital scales and recorded to the nearest 100g. Height was measured in a standing position without shoes using a tape meter while the shoulders were in normal position. Body mass index was calculated as weight (kg) divided by height (m). To avoid subjective error, all measurements were done by the same investigator. According to the World Health Organization, overweight was defined as BMI 25–29.9 kg/m and obesity as BMI = 30 kg/m

Glucose Estimation

End point method for quantitative in vitro determination of Glucose in human serum with spectrophotometer was used in this study. Enzymatic methods involving in the determination of glucose. Serum sample collected by standard procedure stable for 7 days at -20 ˚C. The Assaying for Glucose was done by using Cresent Diagnostic Kit, KSA is used (Table1).

Mix and measure the absorbance of sample (As) and standard (Astd) against reagent blank within 5 to 20 minutes. Measure at a Wavelength of 505 ± 5 nm of given samples against the reagent blank.

Cholesterol Estimation

End point method for quantitative in vitro determination of cholesterol in human serum with spectrophotometer was used in this study. Enzymatic methods involving cholesterol esterase and oxidase and Trinder color system have replaced older methodologies. Serum sample collected by standard procedure stable for 7 days at -20 ˚C. The Assaying for Cholesterol was done by using Cresent Diagnostic Kit, KSA is used (Table 2).

Mix and measure the absorbance of sample (As) and standard (Astd) against reagent blank after an incubation for 10 minutes. Measure at a Wavelength of 540 ± 5 nm of given samples against the reagent blank.

Statistical Analysis

Statistical analysis was performed using *SPSS*, version 15.0 and data were presented as means, standard deviations (SD) and percentages.

RESULTS AND DISCUSSION

A total of fifty khat chewing students whose demographic data were taken into consideration were as follows: age, weight, height, Body Mass Index, Timing of blood collection, BP, Blood sugar, physical exercise, smoking and Cholesterol were summarized in Table 3. Anthropometric reference indices of obesity and overweight were summarized in Table 4 Prevalence of diabetes was present in males khat chewer students as 20% and normal 60%. The significant value recorded in the study was 20% khat chewing students were hypoglycemic. The maximum- recorded for fasting blood glucose concentration was 221 mg/dl. As depicted in Table 5, 10 % of participants were hypertensive and 30 % were Pre Hypertensive, 2% high cholesterol (≥240) showed the prevalence of pre-hypertension, pre-diabetic and cholesterol were associated with some factors such as smoking, physical inactivity and gender. The mean systolic pressure of the participants was 146±3.2mmHg and the mean diastolic pressure was 97±4.6mmHg. Table 6 showed Anthropometric reference indices of obesity and overweight that the percentages of

Table 3. Demographic Data of the study participants

Variable	Range	Frequency	Percentage	Total (N)
Age	18-22yrs	20	40%	50
	23-27yrs	30	60%	
Weight	40-59Kg	4	8%	50
	60-79Kg	34	68%	
	80-99Kg	10	20%	
	100-119Kg	2	4%	
Height	151-160cm	36	72%	50
	161-170cm	14	28%	
Blood Pressure	Hypertensive	5	10%	50
	Non Hypertensive	45	90%	
Physical Exercise	Yes	10	20%	50
	No	40	80%	
Habit of Smoking	Yes	31	62%	50
	No	19	38%	
Timing of blood collection	During chewing	28	56%	50
	After chewing	22	44%	

Table 4. Prevalence of diabetes in the available sample (No. of samples =50)

Variable	Range	Mean ± SD	Frequency	Percentage
Diabetic	FBS≥126mg/dl	203±18	3	6%
Pre-diabetic	FBS= 100-126mg/dl	110±7	7	14%
Normal	FBS= 70-100mg/dl	72±3	30	60%
Hypoglycemic	FBS≤70mg/dl	46±12	10	20%

Table 5. Prevalence of Hypertension in the available sample (No. of samples =50)

Variable	BP	Range	Mean ± SD	Frequency	Percentage
Hypertensive	Systolic	≥140 mmHg	146±3.2	5	10%
	Diastolic	≥ 90 mmHg	97 ±4.6		
Pre- Hypertensive	Systolic	120 - 129 mmHg	126 ± 2.2	15	30%
	Diastolic	80 – 89 mmHg	86 ±3.9		
Non- Hypertensive	Systolic	≤ 120mmHg	110 ±2.8		
	Diastolic	≤ 80mmHg	76 ±5.4	30	60%

Table 6. Prevalence of Body Mass Index in the available sample (No. of samples =50)

Variable	Range	Mean ± SD	Frequency	Percentage
Underweight	BMI≤18.5	0	0	0%
Normal	BMI= 18.5-24.9	20.3±3.6	41	82%
Overweight	BMI= 25-29.9	27.4±2.5	5	10%
Obesity	BMI ≥30	31.4±1.9	4	8%

Underweight, Normal weight, Over Weight and Obese subjects are 00,41,05,04. The majority of the participants reported normal weight i.e., 82%. The findings showed that the results of cholesterol level are Desirable among 86% of the khat chewer study population, 12% were in borderline and 2% reported high cholesterol (Table7).

The data obtained from this cross sectional study revealed an overall prevalence of diabetes of 20 % in Jazan Region. This estimate is far less than what has been reported by previous studies in KSA (Elsanosi and

Table 7. Prevalence of Cholesterol in the available sample (No. of samples =50)

Variable	Range	Mean ± SD	Frequency	Percentage
Desirable	≤200	165 ± 10.2	43	86%
Borderline	200-239	216±3.5	6	12%
High	≥240	242	1	2%

Ageely, 2011; Ageely, 2009) which produced prevalence rate of 23.7% and 23.1% respectively. This is may be attributed to the size of the study. The study further showed increased prevalence of diabetes mellitus with age. The increase in the prevalence of diabetes mellitus with age is expected and has been observed in all studies reported elsewhere (Hobani et al., 2015). The relationship between diabetes mellitus and obesity is well established and has been documented in many other surveys, nationally and internationally (Giannini and Castellani, 1982; Miller, 1989; Dhadphale et al., 1981; Laswar and Darwish, 2009; Kebede, 2002). International study involved 49 developing countries documented that overweight (BMI) and obese (BMI $\geq$ 30 kg/m^2) were significantly associated with odds of having diabetes as compared with those who were of normal weight (Varisco, 1986; Zein, 1988; Ihunwo et al., 2004; Khawaja et al., 2008). The study did not find an independent relationship between diabetes and Khat chewing, the habit is highly prevalent among Jazan population. In fact no previous studies in KSA investigated the relationship between Khat chewing and DM. DM is associated with family history of diabetes. There is a significant 20% students found to be hypoglycaemic. The DM prevalence is higher and related independently among people with diabetes history in their families. This association is found to be higher in surveys conducted elsewhere (Alem et al., 1999; Odenwald et al., 2007; Gelaw and Haile-Amlak, 2004). The study further documented an association between diabetes and physical activity. The group with physical activity had the lowest prevalence. The data obtained from this cross sectional study revealed an overall prevalence of cholesterol of 14 % among the kat chewing students in Jazan Region.

This estimate is far less than what has been reported by previous studies in KSA (Milaat et al., 2006; Hassan et al., 2000) 1). Physical activity level might affect prevalence through its relationship with other factors such as obesity and hypertension 2). The study revealed high level of knowledge about important of monitoring DM among studied population, with no significant difference. Several limitations should be taken into consideration when interpreting the results of the present study. (1) The present analysis is based on cross sectional data therefore; the associations of diabetes &cholesterol level with other independent variables should be interpreted with causation. (2) There is a very important need to study the prevalence and health related issues associated with Khat chewing among college students of Jazan region should be studied in a large scale with no limitation of gender and age.

SUMMARY AND CONCLUSION

The study revealed an overall prevalence of DM of 20 % in Jazan Region in the selected participants. This estimate is far less than what has been reported by previous studies in KSA. The study did not find an independent relationship between diabetes and khat chewing, the habit is highly prevalent among Jazan population. The study further documented an association between diabetes and physical activity. There is a significant of 20% students found to be hypoglycaemic The group with physical activity had the lowest prevalence of diabetes. The study revealed there is no association between khat chewing and BMI. Most of the participants (82%) BMI recorded within the normal range. The study showed an overall prevalence of cholesterol of 14 % among the khat chewing students in Jazan Region. This estimate is far less than what has been reported by previous studies in KSA 6. The study showed a higher percentage of khat chewing students in Jazan Region are suffering from hypertension and smoking habits in the selected participants.

Competing Interests

The authors declare that they have no competing interests.

Author Contribution

The principal investigator and Co investigator designed the study. He had full responsibility for its overall management drafted and revised the article.

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