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Al-Razi University Journal of
Medical Sciences**The Effect of Khat Chewing on Blood Pressure and the Correlation between Body Mass Index and Blood Pressure among Yemeni People in Sana'a City**Hussein S. Gumaih^{1*}, Bushra H AL-Khateeb¹, Wael A. Hadi¹¹Department of Zoology, Faculty of Science, Sana'a University, Yemen.**Abstract**

Background: Khat leaves is chewed habitually by among of Yemeni people for its efficacy on the body energy. **Aim:** to determine the percentage effect of Khat chewing on blood pressure, and the role of BMI on blood pressure in Khat chewers. **Methods:** In this study, twenty randomly individuals chewing Khat were selected to measure their blood pressure pre and post Khat chewing session for 20 days. **Results:** showed about 10% of blood pressure increased above the normal rate after chewing Khat. On the other hand, there was no relationship between the effect of body mass index (BMI) and Khat chewing together on blood pressure. **Conclusion:** BMI had role on the physiological functions of the body that cause changing in normal blood pressure and gradually become close to hypertension people.

Keywords: Khat, Blood pressure, body mass index, cathinone, Yemen**Introduction**

Khat chewing *Catha edulis* is a widespread habit among Yemeni and African population and spread to west by immigrants. Khat consumed due to its stimulant effect that results from its cathinone contents. Khat leaves is chewed habitually by among of Yemeni people for its efficacy on the body energy. Khat chewing effect

directly on blood pressure after 1 hour of chewing in all people as an excessive systolic and diastolic blood pressure [3,7,9,16,17]. These symptoms had reported in Khat chewing volunteers [11,12,20] as well as in animals [2,3,19,20]. Cathinone is considered as the main effective constituent of Khat. It is structurally

and functionally closely similar to amphetamine and acts as indirect sympathomimetic through releasing catecholamine from central and peripheral intraneuronal sites [14]. Moreover, the different studies demonstrated the effects of cathinone on cardiovascular system either in animals [14] or in human [3,11,20] that reported the significant rise in systolic and diastolic blood pressure with increasing of heart rate. Khat is a high cash income crop and is profitable to the huge number of people involved in its production and marketing including farmers, distributors and

merchants [1].

Khat leaves containing cathinone, a psycho stimulant that is similar in structure and pharmacological activity to amphetamine. Due to these similarities, cathinone has been called a 'natural amphetamine. Cathinone has been characterized as an amphetamine-like sympathomimetic amine with a half-life of approximately 3 hours in humans.

Cathinone reaches a maximum plasma level 1–2 hours after oral administration; the effect of cathinone on the user occurs more rapidly than the effect of amphetamine, roughly 15 min as compared to 30 min. In addition to cathinone, cathinone or d-nor pseudoephedrine has been identified as an additional psychoactive ingredient in Khat, and cathine has also been noted to have psycho stimulant properties [13].

Cathinone and amphetamine cause release neurotransmitters (noradrenaline, dopamine and serotonin from presynaptic neuronal terminals and inhibit their reuptake from the synaptic gap [6].

According to several early studies, an average around 100–300g of Khat can be chewed in a 3–4 hours Khat session. The mucosa of the mouth is thought to be the first absorption segment. The second absorptive segment of the mouth is the stomach and small intestine [8].

Blood pressures are elevated for about

3 hours after 1 hour of chewing of 0.6 g/kg, about one quarter of the amount consumed in a traditional Khat session [23].

Cathamines are excreted in breast milk and detected in the urine of breast-fed babies 2–4 hours after ingestion [8]. When cathinone is broken down in the body, it produces chemicals including cathine and norephedrine, which have a similar structure to amphetamines and adrenaline [4].

It was considered as a risk factor for acute myocardial infarction (MI) [18]. Moreover, Khat chewing leads to a high blood pressure, an established risk factor for cardiovascular disease (CAD) [5,15,22]. On contrary, BMI concluded that had not effected on the Khat-chewing efficacy [3,5]. .

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Aim of the study: The aim of the study was to determine the percentage effect of Khat chewing on blood pressure, and the role of BMI on blood pressure in Khat chewing.

Subjects and Methods

This study was conducted in Sana'a city, Yemen on 20 individual volunteers who chew Khat, their ages ranged from 18-40 years old whereas, BMI ranged between 18 and 33 kg. They undergo to test their blood pressure before and after Khat chewing session.

The measuring of blood pressure take before Khat chewing session which starts about 2:00-3:00 pm and take in the end of Khat session at 6:00-7:00 pm every day for 20 days .

Sphygmomanometer was used to measure blood pressure and stethoscope was used to detect the pulse whereas, scale was used to determine the weight and stripe meter was used to determine the length.

Blood pressure was measured before and after Khat chewing session every day for 20 days. Furthermore, weight and length of all experimental individuals were measured to get BMI. The average of systolic blood pressure (SBP) and diastolic blood pressure (DBP) were calculated pre and post Khat chewing session every day for 20 days.

Statistical analysis of data performed with a personal computer using the

Minitab 17 (2014) and SPSS 17 (2008) - by t-paired test.

Results

These results show a progressive, significant increased about 10% of the normal value of blood pressure for all experimental individuals but the BMI had not related with the Khat chewing whereas, the normal average of most healthy people in study is 110/70mm/hg and normal BMI not above 22 kg. Moreover, the effect of Khat is highly deleterious effect in obese and hypertension people because their alternative factors that synergy to get blood pressure high.

As shown in the table, there was no relationship between Khat chewing and BMI, but the chewing Khat had a significant effect on BP value and cause hypertension.

If the session of Khat starts about 2:30 pm, the optimal of Khat effects begin about 4:30 and continue to about 6:30, then the effects come back to normal range gradually until 7:30 pm and completely to the normal value at 8:00

pm if the person not refresh chewing Khat or restart the session .

Generally, in healthy people, the effects of Khat do not pass 5 hours of starting session, but the hypertension people need double time to help body

to reset the normal BP value and degrades the Khat substances from the body.

This study record other factors other chewing Khat which lead to increase the BP more than 15% as additional value as:

- Smoking Cigarettes and Tobacco

- High Temperature of room without fresh air.
- Nervous status, Attention, and Stress .
- Diet
- Energy drinks and excessive drinking water.
- The amount and types of Khat that chews.

Table 1: The effect of Khat chewing on blood pressure and the correlation between body mass index and blood pressure

Sample Average	SBP-Pre	SBP-Post	% of Effect	DBP-Pre	DBP-Post	% of Effect	BMI
Normal	111.63	120.23	7.80	71.54	79.81	11.56	20.1
Obese	125.16	136.81	9.31	83.67	92.62	10.70	29.65
Hypertension	127.83	147.30	15.23	88.88	101.72	14.45	20.52
Normal	115.28	125.28	8.67	74.99	83.63	11.52	21.57
Average	119.97	132.405	10.25	79.76	89.45	12.06	22.96

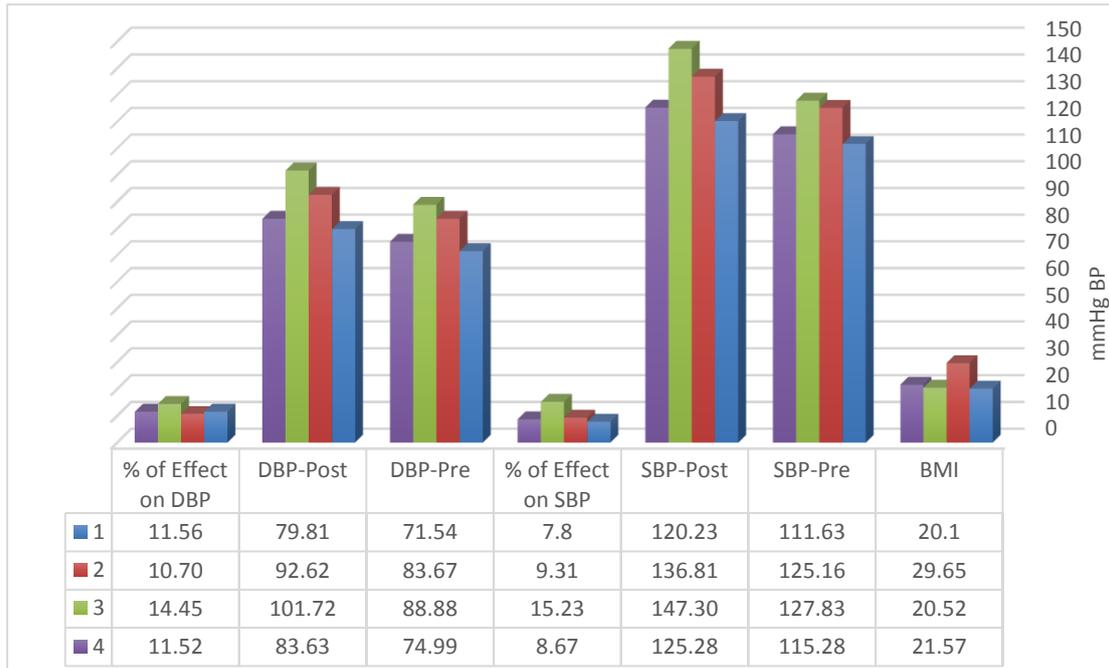


Figure1: Percentage effect of SBP and DBP with BMI of Khat chewing.

Discussion

The effects of Khat chewing on different body systems had been studied extensively, however its percentage effect of Khat chewing on blood pressure was not determined so, this study performed this goal.

There was a significant and progressive increased in SBP and DBP started at 1h of Khat chewing, and reached the peak at 3h of Khat chewing, then started to decline at 1h after spitting out for Khat chewing compared to the data of pre-measuring of BP of Khat chewing that showed a significant variation through data analysis and the BP increased with 10%. These results coincided with the results obtained by previous studies of Nenicin [20], Hassan *et al.* [11] and Al-Tahami [3], who reported that blood pressure increased after Khat chewing. Also, the increased in SBP, DBP, over the time were similar to observations by Tesfaye *et al.* [22], and Birhane *et al.* [5], who reported that the change in SBP, DBP started at 1hrs

of Khat chewing, reached the peak at 3hs of Khat chewing and started to decline at 1h after spitting out. These increased synchronized with the peak plasma level of cathinone that was reported by Halkat [10], who demonstrated that the peak plasma level of cathinone is about 1.5-3.5 hs from starting chewing Khat and by Wilder [24], who observed the maximal plasma level of cathinone after 2.5 hrs. These findings confirmed the hypothesis that cathinone, is considered the main active constituent in Khat leaves which is responsible for the cardiovascular changes during Khat chewing . This elevation returned to baseline 24hs after starting Khat chewing for rare Khat chewers that coincided with previous study that stated all cardiovascular effects of Khat found to disappear after 18hs of spitting out [20], and synchronized with the plasma level of cathinone that become undetectable after 24hs of stopping Khat chewing [10]. Whereas, for regular Khat chewers these changes

did not return to baseline that may be explained by anxiety and restlessness that occurring before obtaining Khat .

The elevation in SBP and DBP were more pronounced in regular Khat chewers than rare Khat chewers in contrast with previous study by Nenicin [20], and Tahami [3], who reported that the cardiovascular changes more pronounced in subjects unaccustomed to Khat chewing than in chronic users, due to a certain degree of tolerance develop to sympathomimetic effect of Khat. These studies may be attribute to that the Khat chewing had ability to increase BP. On other hand, our study indicated that no correlation between the BMI and the essential effects that related to chewing Khat. This result agreed with Laswar *et al.* [15]; who concluded that, no evidence of an increase in systolic or diastolic blood pressure in Khat chewers and the

prevalence of obesity is very low. This can be expressed as the BMI value refer to changing in the physiological functions disorder of the body that effect on the normal blood pressure value which, detected in pre-measuring in this study and the increasing in BMI flow with the normal BP.

Conclusion

We conclude that, Khat chewing considered as a risk factor for heart diseases individuals and obese people. BMI had role on the physiological functions of the body that cause changing in normal blood pressure and gradually become close to hypertension people.

Recommendations

Persons with heart diseases and obese should be avoided chewing Khat leaves.

Conflict of interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

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