



**Assessment of Qat Consumption on Blood parameters in Yemeni Individuals in Sana'a City – Yemen**

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**ABSTRACT**

This work was a cross sectional hospital based study aimed to determine the effect of Qat chewing on CBC parameters. The subjects were 328 (289 mals and 39 females) Qat chewers selected from adult Yemeni healthy individuals attending the blood bank in Police Hospital in Sanaa, with an age between 18-65 years. After obtaining informed consent from each participant, 5 ml of venous blood was collected into an EDTA container then Hb, PCV, RBC, WBC, Plts, MCV, MCH, MCHC, RDW and WBC differential count were measured using blood auto analyzer. The results showed that the means of Hb, PCV, RBC, WBC, Plts, MCV, MCH, MCHC, RDW, neutrophils, lymphocytes, monocytes and eosinophils were 15.63 gm/dl, 47.02%,  $5.40 \times 10^6$  cell/cmm,  $6.40 \times 10^3$  cell/cmm, 289.32 mm<sup>3</sup>, 84.61 fl, 28.61 pg, 32.83 g/dl, 14.32%, 49.93%, 38.83%, 6.70%, 4.28%, respectively. In regard to control, these results indicated that platelets count was significantly reduced ( $p \leq 0.05$ ) while other CBC components were not affected by Qat chewing ( $p \geq 0.05$ ). The results also showed that, the effect of Qat hat on CBC parameters in this study was not associated with duration of Qat chewing, the dose of Qat consumed or gender of the subject. Based on the results, this study concluded that, Qat consumption may predispose thrombocytopenia.

**المستخلص**

هذه الدراسة القطعية تمت في مستشفى لتعيين قياسات الدم لاصحاء يتعاطون القات يوميا، تتراوح أعمارهم ما بين 18-65 سنة، تم اختيارهم من المتطوعين للتبرع بالدم 328 (289 رجل، 39 امرأة) في مستشفى الشرطه النموذجي بقسم بنك الدم بصنعاء. أخذت موافقة المشاركين وتم سحب 5ملى من الدم الوريدي من كل منهم اجري اختبار قياسات الدم وفقا لأستمارة معدة لذلك. أوضحت النتائج أن متوسط كل من الهيموجلوبين (15.63)، والهيمتوكريت (47.02) ، كرات الدم الحمراء (5.40)، كرات الدم البيضاء (6.40)، الصفائح الدموية (289.32)، MCV (84.61)، MCH (28.61)، MCHC (32.83)، RDW (14.32)، خلايا العدلات (49.93)، الخلايا اللمفاوية (38.83)، خلايا الوحيدات (6.7)، خلايا فرط الحمضات (4.28). أوضحت النتائج أن قيم قياسات الدم عند الذين يتعاطون القات لا تختلف اختلافا معنويا عن الناس الذين لا يتعاطون القات (المجموعة الضابطة) ( $P > 0.05$ )، باستثناء الصفائح الدموية حيث أختلفت اختلافا معنويا عن المجموعة الضابطه ( $P < 0.05$ ). خلصت الدراسة الى أن الناس الذين يتعاطون القات معرضين لنقص تعداد

الصفائح الدموية أكثر من الذين لا يتعاطون القات. وان النقص لايعتمد على النوع، العمر او كمية القات المتناول.

**KEYWORDS:** Blood, CBC, Qat chewing, thrombocytopenia.

## INTRODUCTION

The process that leads to the production and regulation of blood cells is called hematopoiesis. It consists of mechanisms triggering differentiation and maturation of hematopoietic stem cells. Located in the bone marrow, hematopoietic stem cells are undifferentiated cells, unobservable directly, with unique capacities of differentiation and self-renewal. Under the action of growth factors (molecules acting like hormones playing an activator/inhibitor role), hematopoietic stem cells produce differentiated cells throughout cell divisions until blood cells (White cells, red blood cells, and platelets) are formed and ready to enter the bloodstream. Blood is a life-sustaining fluid which circulates through the heart and blood vessels. It carries oxygen and nutrients to the tissues and waste products to the lungs, liver and kidneys, where they can be removed from the body<sup>(1)</sup>. In the first few weeks of gestation the yolk sac is the main site of haemopoiesis. These common precursors of endothelial and haemopoietic cells are believed to seed the liver, spleen and bone marrow and from 6 weeks until 6-7 months of fetal life the liver and spleen are the major haemopoietic organs and continue to produce blood cells until about 2 weeks after birth. The bone marrow is the most important site from 6 to 7 months of fetal life. During normal childhood and adult life the marrow is the only source of new blood cells<sup>(2)</sup>. Hematological parameters like Red Blood Cell count, Haemoglobin concentration, packed cell volume, Platelet count and Total Leucocyte count were estimated by using Sysmex

automatic analyzer<sup>(3)</sup>. Qat is an evergreen shrub of the Celastraceae family, normally reaching 6m in height, but in an equatorial climate it might grow to 25cm. There are three main alkaloids present in Qat leaves S-(-)-cathinone (S- - alpha-minopropropriphenon) nor pseudoephedrine (cathine) and nor ephedrine. There are also small amounts of ethereal oil, sterol and triterpenes, together with 5% protein which has significant nutritional value. Ascorbic acid is also present in the leaf<sup>(4)</sup>. Chewing of Qat leaves in Yemen has become a habit of about 80% of adult males and extended to women, too. The WHO (2003, 2006) reported that Qat consumption has become a common problem that affects the health aspects of life in Yemen and other parts in the world<sup>(5)</sup>. The studies concerning Qat effect on blood parameters in Yemen were rare accordingly this work has been conducted to assess the effect of Qat consumption on CBC components. The (El Hadrani et. al, 2000), that reported Qat consumption has no effect in all CBC parameters<sup>(6)</sup>. Pharmacological studies have shown that, Qat contains active ingredients that induce narcotic analgesic action and euphoria accordingly some researchers classify Qat as an amphetamine like agent. Also, one of the Qat constituents attenuates the anti-platelet aggregating properties of aspirin, there by interfering with platelets function<sup>(7)</sup>.

## MATERIALS and METHODS

Three hundred and twenty nine, healthy volunteer's men and women aged between 18- 65 years were enrolled for this study. Out of them,

177 individuals were Qat chewers and the rest who were Qat chewers with smoking have been excluded from this study. In addition to Qat chewers, there were 60 healthy individuals (non- Qat chewing and non smokers) considered as control group. About (5ml) of venous blood was withdrawn from the brachial vein of each participant and poured into 5 ml EDTA container of blood, CBC components were determined using the automated machine Sysmex kx21 (Sysmex corporation, Mundelein, Illinois, Sysmex America, Inc) following the instruction provided by the manufacturer.

#### STATICAL ANALYSIS

The collected data was and analyzed to obtain the mean, standard deviation and frequency, independent sample test (T test) and one-way anova test using statistical package for social sciences computer program.

## RESULTS

### Characteristics of study population

The age distribution was similar among the cases and the controls. The bulk of the cases and of controls belonged to the young age range 18–23 years, constituted 59.5% of cases and 51.7% of controls. Both genders participated in this study, males constituted 158/177 or (90%) and females constitute 19/177 or (10%) of Qat chewers.

### Effects of Qat on CBC components

The results of the present study showed that, the values of CBC components, except platelet count, in association with Qat consumption were not different from that of control ( $p>0.05$ ) (table 1). But platelets count was significantly decreased ( $289.32\pm 80.93$ ) compared to that of control ( $312.26\pm 67.31$ ) ( $p<0.05$ ) (Table 1).

Table 1: CBC Components of Qat chewers compared to that of control

CBC components	Cases	NO.	Mean±std	p-value (T-test)
Hp (gm/dl)	Qat chewers	177	15.63±1.59	0.561
	Control	60	15.50±1.05	
Pcv (%)	Qat chewers	177	47.02±4.62	0.646
	Control	60	46.73±3.53	
RBCs (/mm <sup>3</sup> )	Qat chewers	60	5.40±0.78	0.501
	Control	60	5.47±0.39	
WBCs(mm <sup>3</sup> )	Qat chewers	177	6.40±2.04	0.281
	Control	60	6.72±1.77	
PLTs(mm <sup>3</sup> )	Qat chewers	177	289.32±80.93	0.049
	Control	60	312.26±67.31	
Nutro. %	Qat chewers	177	49.93±12.44	0.793
	Control	60	50.41±11.34	
Lymph. %	Qat chewers	177	38.83±11.52	0.548
	Control	60	39.85±10.77	
Mono. %	Qat chewers	177	6.70±2.41	0.295
	Control	60	6.33±2.10	
Eosn. %	Qat chewers	177	4.28±3.31	0.32
	Control	60	3.26±2.63	
MCV( femolite)	Qat chewers	177	84.61±4.15	0.751
	Control	60	84.41±3.84	
MCH (pg/cell)	Qat chewers	177	28.61±1.61	0.977

	Control	60	28.61±1.16	
MCHc(gm/dl)	Qat chewers	177	32.83±0.89	0.980
	Control	60	32.83±0.61	
RDW %	Qat chewers	177.	14.32±0.88	0.416
	Control	60	(14.22±.67)	

**Effects of Qat chewing on male and females**

The CBC components on both sexes were not affected by Qat consumption (Table 2).

*Table 2: CBC Components in male and femal with Qat chewers*

CBC components	Gender	NO.	Mean±SD	p-value (T-test)
Hp (gm/dl)	Male	158	15.85±1.47	0.000
	Femal	19	13.81±1.39	
Pcv (%)	Male	158	47.65±4.30	0.000
	Femal	19	41.80±3.94	
RBCs (/mm <sup>3</sup> )	Male	158	5.44±0.74	0.000
	Femal	19	4.61± .70	
WBCs(mm <sup>3</sup> )	Male	158	6.45±2.05	0.411
	Femal	19	6.04±2.02	
PLTs(mm <sup>3</sup> )	Male	158	288.41±78.13	0.667
	Femal	19	296.89±103.59	
Nutro. %	Male	158	49.98±12.29	0.895
	Femal	30	49.57±14.05	
Lymph. %	Male	158	40.15±12.49	0.597
	Femal	19	41.51±12.41	
Mono. %	Male	158	6.67±2.45	0.639
	Femal	19	6.94±2.12	
Eosn. %	Male	158	4.39±3.41	0.202
	Femal	19	3.36±2.24	
MCV( femolite)	Male	158	84.66±4.16	0.617
	Femal	19	84.15±4.19	
MCH(pg/cell)	Male	158	28.63±1.64	0.492
	Femal	19	28.36±1.38	
MCHc(gm/dl)	Male	185	32.86±0.80	0.139
	Femal	19	32.57±0.60	
RDW %	Male	185	14.37±0.86	0.061
	Femal	19	13.86±0.91	

**Association of duration of Qat consumption on CBC**

The duration of Qat consumption ranged from 2 to 36 years, the results of this study showed no correlation between duration of Qat consumption and CBC components.

**Association of dose of Qat on CBC**

The doses were classified into small or one bag which contains about 200gm

of fresh leaves of Qat and large dose or more than one bag of fresh leaves of Qat. The results showed no correlation between Qat dose and CBC components.

**DISCUSSION**

In Yemen, Qat chewing is scheduled for certain times of day within a prescribed setting, and men and women consuming at separate

gatherings<sup>(8,9)</sup>. Hence, in Yemen, as in parts of Ethiopia, both countries with a long history of Qat consumption, women have for centuries been able to chew Qat in gender segregated groups<sup>(10)</sup>. WHO classifies Qat as causing psychological but not physical dependence, with daily consumption causing negative effects on the social and economic life of the user (WHO, 2006). Qat effects cause euphoria, excitability, anxiety, irritability, hyperactivity, restlessness and insomnia<sup>(11)</sup>. The adverse effects of Qat in the central nervous system, as in other systems, are dose-related<sup>(12)</sup>. Regular Qat chewing is associated with elevated mean diastolic blood pressure<sup>(13)</sup>. Qat chewing has also been reported to increase the incidence of acute cerebral infarction<sup>(14)</sup>. Qat chewing during pregnancy has a detrimental effect on the foetus, leading to low birth weight, teratogenic effects and infant mortality<sup>(15)</sup>. The samples included in the study were selected in careful and systematic fashion using well designed questionnaire and physical examination performed by specialized physician. The aim behind this was to exclude individuals with illness and/or physical disorders. The results of the present study showed that the values of CBC parameters tested in association to Qat consumption were not different from that of control. An exception was that platelets were found to be reduced significantly compared to the value of platelets of non-Qat chewers. To our knowledge no study on the effect of Qat on human CBC was reported to compare the results of this work but Alsalahi and his workers have reported that Qat has no effect on CBC of laboratory rats<sup>(16)</sup>. The result of the present study suggests that Qat may have an effect on body parameters other than CBC components. Narcotic and analgesic effect of Qat on CNS

has been largely investigated, but its effects on CBC components were poorly studied. Only few studies were done to assess the effect of Qat on blood; there were reports that Qat may influence platelet properties and function<sup>(17)</sup>. In that study, the workers have found that the bleeding time in myocardial infarction patients taking long-term aspirin (100 mg daily) was significantly reduced in Qat chewers to 2.3 minutes compared with 8 minutes in non-Qat chewers taking the same dose of aspirin<sup>(17)</sup>. In the present study, Qat caused a significant reduction in platelet count in Qat chewers. This result indicated a clear-cut effect of Qat on platelet function and properties and supported the suggestion that a constituent of Qat attenuates the anti-platelet aggregating properties of aspirin, thereby neutralizing the beneficial actions of aspirin<sup>(17)</sup>. Furthermore, this result paved the way for the influence of Qat on predisposition of thrombocytopenia and the coagulation profile of Qat chewers. The effect of Qat on platelet may not be a direct effect for the reason that pesticides were found to reduce platelet count and disturb platelet aggregation, arachidonic acid metabolism and significantly reduce mean platelet volume in farm workers using pesticides<sup>(18)</sup>. Based on duration of Qat chewing, subjects were distributed into three categories (2 to 12, 13 to 23 and 24 to 36 years). The obtained results showed no effect of duration on tested CBC parameters in this study.

Based on dose of Qat chewing, subjects were distributed into two categories (small and large). The obtained results showed no effect of dose on tested CBC parameters in this study.

## CONCLUSIONS

- Qat chewing has no effect on CBC parameters.

- Qat consumption has reduced platelets in the subject of this study.
- Duration of Qat chewing has no effect on all CBC parameter tested in this study.
- Dose of Qat consumption has no effect on all CBC parameter tested.
- This action of Qat was not affected by gender.
- Blood film morphology normal RBC, WBC and Platelets except in some cases showed thrombocytopenia.

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