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RESEARCH ARTICLE

ASSOCIATION BETWEEN CHRONIC KHAT (*CATHA EDULIS*) CHEWING AND PLASMA LIPID PROFILE AMONG ADULT MALES FROM AL SHUAIB DISTRICT DHALA GOVERNURATE.YEMEN

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Abstract

This study aims to investigate the association between chronic khat chewing (5 to 30 years duration) and dyslipidemia among healthy males in Al Shuaib District. One hundred participants from different villages agreed to complete the study with us. In this cross sectional study sample objects 230 males were selected randomly and divided according to ages and chewing khat duration, into four groups each (n= 20) and a control group of (n=20) non khat chewers. Data were obtained using a questionnaires and fasting blood sample collected and examined for lipid profile measurements including levels of total cholesterol TC, triglyceride TG, low density lipoprotein cholesterol (LDL-C) and high density lipoprotein cholesterol (HDL-C).The mean levels of TC in groups D (179.5mg/dl) and E (180mg/dl) was higher significantly than control group subjects (156mg/dl). levels of HDL decreased in khat chewers; D and E groups (44.5mg/dl and 41mg/dl) respectively compared to the control group (46.4mg/dl). On the other hand, the average LDL increased in the D and E subject groups (103.4mg/dl) and (112.4mg/dl) respectively compared with control 93.8mg/dl. The level of TG was increased in all study groups A, B, D and E having statistical significance $p < 0.05$ compared with control C. There was a higher dyslipidemia among subjects of khat chewing groups than non khat chewers in relation to increase of mean years of khat chewing. There is a significant association between chronic khat chewing and dyslipidemia especially the decrease in HDL-C level was the main lipid variable followed by TG level. The imbalanced lipid profile might be due to genetic factor or social dietary habits, besides wide spread use of pesticides during cultivation of khat plant which have toxicity in area of study.

Keywords: Chronic, Dyslipidemia, Khat chewing, Lipid profile.

Introduction

The plant (*Catha edulis*- Forsk), commonly known as khat, qat, chat or miraa, [1] is a shrub or small to medium sized evergreen tree that belongs to the *Celastraceae* family. It is cultivated as a bush or small tree, mainly in Yemen and East African Countries [2,3]. Some oral traditions claim that khat originated from Yemen, however the literature indicates that khat originated from Ethiopia, expanded to Yemen [4] and other parts of the world such as Somalia, Sudan, South Africa and Madagascar, Afghanistan and Turkestan [5]. Chewing khat is a social and cultural habit practiced by Yemeni and East African peoples [6].

The tender, reddish-green leaves and the young shoots are chewed for several hours daily to get the desired effects Orlien et al 2018. Generally, people chew khat for its stimulant effects on CNS and reducing fatigue and restore mental and physical activity [7].

The chemical properties of khat are now well documented; the active agent responsible for the physical and mental effects observed is cathinone or alpha aminopropiophenone. When the leaves, which contain the psychoactive substance, cathinone are chewed and the juice is ingested, it produces stimulation of the CNS in man analogous to the stimulation produced by amphetamine [8,9]. Many different compounds are found in khat including alkaloids, terpenoids, flavonoids, sterols, glycosides, tannins, amino acids, vitamins and minerals [6,10-12]. Khat chewing nowadays has become an epidemic over many regions in Yemen from the old to young males and urban and rural places [13]. Moreover, many adolescents have low knowledge towards adverse effects of khat chewing. Though khat chewing has become a common practice among high school, college and university students in Yemen, few studies have assessed the prevalence and associated factors.

Khat chewing is not only a social habit, it also chewed

for other purposes such as relieving tiredness, fatigue and depressed feelings, students for focusing and stay alert. [14]. In Yemen and some east African countries some reported statistics showed that 80% to 90% of adult male consume khat on daily bases [15] Among all cardiovascular diseases (CVD) dyslipidemia is one of the most important factors that might lead to CVD worldwide [13]. The occurrence of dyslipidemia in old age results in high risk of CVD [15].

The consumption of Khat can cause various physiological and socio-economic impacts, which have put a control on its use by several countries. There are a huge number of studies reporting the psychological and physiological effects of khat on different body systems, available data exploring khat effects on lipid profile are insufficient. Taking into consideration that several millions of people globally chew khat on daily basis, it is likely that khat adverse health effects including effects on body systems such as CNS, digestive system, cardiovascular system and reproductive and endocrine systems. lipid profile of khat chewers is disturbed. Chronic consumption of Khat disrupting lipid profile including total cholesterol, high-density lipoprotein cholesterol, low-density lipoprotein cholesterol and triglycerides were not widely well studied.

Al-Shuaib District is located, according to astronomical (UTM) geographical coordinates, between latitudes 13.46° - 13.54° north of the equator, and between longitudes 44.48° - 45.5° east of Greenwich, and it is one of the districts of Al Dhalea Governorate of Yemen. Al Shuaib represents 8% of the total area of Al-Dhalea Governorate, which has an area of about (4,356) km2. Khat plants are widely cultivated and most citizens are working in the fields of khat.

The study aimed to examine the possible association between chronic khat consumption (duration between 5 to 30 years) in healthy adult Yemeni males who come from different villages of Al-Shuaib District, and their lipid profiles.

Materials and Methods

Study population

This study was a cross sectional study carried out during November 2020 to May 2021. All subjects came from different villages of Al Shuaib District. A total of 230 adult males aged between (18 to 60) years old has a history of years of khat chewing participated in this study. Out of this number only 100 males volunteers agreed to complete the study.

Collection of data

First, the questionnaire forms were distributed among participants. The questionnaire provides the necessary demographic data (age, sex, and residence) healthy males khat chewers and non-khat chewers, who had no chronic diseases (hypertension, diabetes mellitus, renal or liver diseases) and those who agreed to complete the study were included. Participants who are taking prescribed medications affecting lipid profiles were excluded**.** A total of 230 subjects were included in this step of the study. After analyzing the questionnaires, only 100 males fit the inclusion criteria, and agreed to complete the study. Participants were informed by the author via mobile phone to fast for 10 to 12 hours before collecting the blood samples. After the blood samples were obtained, the collected samples were transferred to the central laboratory (Al-Waleed laboratory in Al-Awabil region), further analysis were processed in a centrifuge and appropriately stored until further analyses. The blood samples were analyzed for lipid profile measurements including levels of total cholesterol (TC), triglycerides (TGs), low-density lipoprotein cholesterol (LDL-C), and high-density lipoprotein cholesterol (HDL-C).

According to the National Cholesterol Education Program-Adult Treatment Panel III criteria, [16]: dyslipidemia is defined if one or more of the following situations are noted:

Hypertriglyceridemia (TG levels 150 mg/dl), hypercholesterolemia (TC level 200 mg/dl), high LDL cholesterol (LDL cholesterol level 130 mg/dl), and low HDL cholesterol (HDL cholesterol level <40 mg/dl in males).

Statistical analysis

The data were analyzed statistically using the software package of the Statistical Package for the Social Sciences (SPSS) version 23 for windows. The T-test was used to compare parameters mean ± SD, they were compared in one way, analysis of variance or unpaired "t". The statistical tests were examined for significance at the level of P 0.05.

Results

Results of the current study showed (Table 2., Fig.2) the mean levels of total cholesterol (TC) in the blood increased in groups D (179.5mg/dl) and E (180mg/dl) significantly ($p < 0.05$) compared to the control group. As well as in (Table3, Fig.3) showed that levels of HDL in the blood decreased in the D and E groups (44.5mg/dl and 41mg/dl) respectively compared to the control group ($p < 0.05$) with a statistical significance $p = 0.012$ in subjects of group E.

On the other hand, (Table4, Fig.4). Showed the average LDL cholesterol concentration in the serum of khat consumers decreased in groups A and B but not statistical significance p value was >0.05. But in group E the level of LDL increased (E 112.4mg/dl) with statistical significance $p < 0.05$.

While in (Table5) the level of triglycerides TG in the blood of all subject groups showed an increase in subjects of group A(188.6mg/dl) which was statistically significant p<0.05 compared with non-khat chewers control, the same was true for other members in study groups B, D and E:(233.1mg/dl), (175.4 mg/dl) and (188.5 mg/dl) respectively.

Table (1): the study groups and average years of khat chewing.

Group Mean Age	Average years of chewing khat
A 24.5±3.14	5.1
B 34.85±3.1	12.8
D 44.45±3.1	21.8
E 54.45±3.	29.5

Table (2): Statistical analysis of cholesterol serum level in study groups

Total Cholesterol TC							
Groups	N	Mean	± SD	± SE	t- value	p-value	Sign*
Control (18-60)Yrs	20	156.000	17.35087	3.87977			
A (18-29)Yrs	20	154.050	22.94954	5.13167	0.303	0.763	N**
B (30-39)Yrs	20	168.900	32.11640	7.18145	1.580	0.125	N
D (40-49)Yrs	20	179.500	34.41007	7.69432	2.727	0.010	S***
E (50-60)Yrs	20	180.1000	42.97845	9.61027	2.325	0.025	S

Sign*: Significant
S*:** Significant at P< 0.05
N:** Non Significant

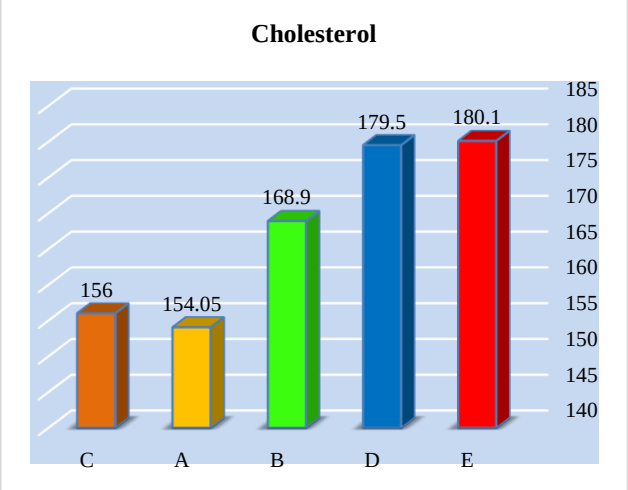

Fig. (2): Mean of serum cholesterol

Table (3): Statistical analysis of HDL serum level in study groups

High density lipoprotein HDL							
Groups	N	Mean	± SD	± SE	t- value	p-value	Sign
Control (18-60)Yrs	20	46.45	5.21612	1.166			
A (18-29)Yrs	20	49.30	7.18991	1.607	1.435	0.160	N**
B (30-39)Yrs	20	46.80	6.74030	1.507	0.184	0.855	N
D (40-49)Yrs	20	44.50	7.47276	1.670	0.957	0.345	N
E (50-60)Yrs	20	41.00	7.63648	1.707	2.636	0.012	S***

Sign*: Significant
S*:** Significant at P< 0.05
N:** Non Significant

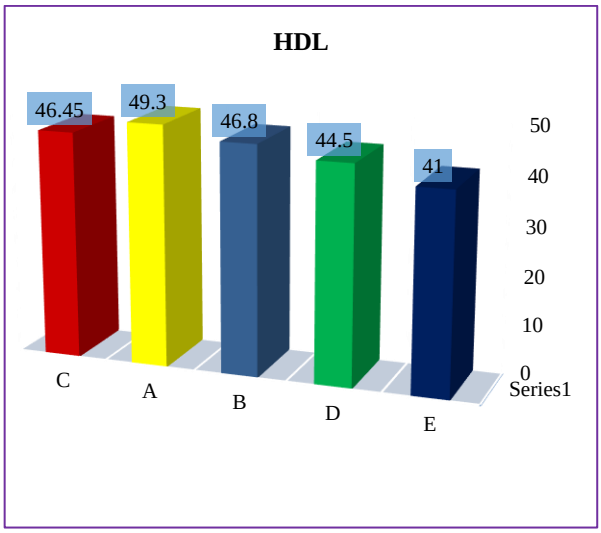

Fig. (3): Mean of serum HDL

Table (4): Statistical analysis of LDL serum level in study groups

Low density lipoproteins LDL							
Groups	N	Mean	± SD	± SE	t- value	p-value	Sign*
Control (18-60)Yrs	20	93.85	13.92	3.11471			
A (18-29)Yrs	20	85.40	30.43	6.80457	1.129	0.269	N**
B (30-39)Yrs	20	84.60	29.53571	6.60438	1.267	0.216	N
D (40-49)Yrs	20	103.45	29.50731	6.59804	1.316	0.199	N
E (50-60)Yrs	20	112.40	38.2751	8.55859	2.037	0.049	S***

Sign*: Significant
S*:** Significant at P< 0.05
N:** Non Significant

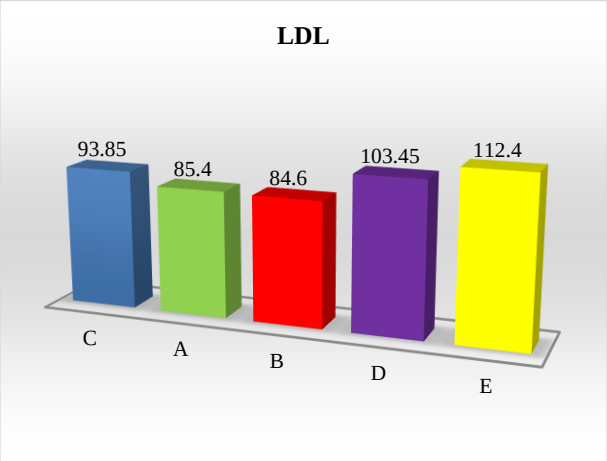

Fig. (4): Mean of serum LDL

Table (5): Statistical analysis of Triglyceride serum level in study groups

Triglyceride TG							
Groups	**N**	**Mean**	**± SD**	**± SE**	**t- value**	**p-value**	**Sign**
Control (18-60)Yrs	20	132.5	18.802	4.204			
A (18-29)Yrs	20	188.6	54.318	12.145	4.365	0.000	S*
B (30-39)Yrs	20	223.1	91.118	20.374	4.355	0.000	S
D (40-49)Yrs	20	175.45	57.028	12.751	3.199	0.004	S
E (50-60)Yrs	20	188.75	60.550	13.539	3.968	0.001	S

S*: is significant P< 0.05

Discussion

Over the years epidemiological and case control studies have indicated a clear association between long-term khat chewing and cardiovascular, respiratory, gastrointestinal, obstetric, metabolic, endocrine, and nervous system dysfunctions [17]. Besides, the habit of khat chewing reinforces the development of other habits like cigarette smoking, and alcohol intake, increases the risk factors of many physiological and metabolic disorders.

Imbalance of lipids (dyslipidemia) such as total cholesterol, low density lipoproteins LDL-C, triglycerides TG and high density lipoproteins HDL-C in our study results highlighted the chronic khat chewing and imbalance lipid profile of adult males with 5 to 29 years period being daily khat chewers. (Table 1).

Our study is consistent with other study by Al-Motarrib et al. (n=157) reported higher levels of TC by twice the time among khat chewers [18]. Also another study is in agreement with ours, results from six Arabic countries on acute coronary syndrome patients, estimated high level of TC in khat chewers than non-khat chewers 224.4 +_ 116.1mg/dl versus 1+_ 77.4mg /dl respectively p<0.001. [19]. Our study is also consistent with a recent study in university in Yemeni male students (n=380) noted increased serum levels of TC and LDL-C in khat chewers (n=283) than non khat chewers (n=77). [13]. While a study on rabbits fed with khat caused significance reduction in plasma cholesterol TC throughout 6 months. [20]. Our results revealed a decrease in HDL-C among chronic khat chewers is consistent with a study in 2009 [21], and in agreement with a recent study showed HDL-C was low in 83% of khat chewers versus 75.3% in non khat chewers [13]. In the contrary to our study, one study in Yemen demonstrated higher fasting plasma level of HDL-C by 15% in khat users [20]. Our study showed significant increase in serum TG-C level, which is consistent with one Yemeni study in 2003, showed increased level of fasting TG in khat chewers than non khat chewers 92.77+_49.26mmg/dl versus 85.15 +_36.73mg/dl (20) and inconsistent with another study showed significant decrease in TG levels by 30% and 36.7% after chewing 200gm and 400gm of khat leaves [22].

Chronic khat chewers males have high risk of cardiovascular diseases because of lipid imbalances which might be of several reasons; stressful conditions due to current civil war and political crises that has driven adult males to khat chewing sessions to escape life stresses, dietary habits and less sport activities besides the application of a variety of pesticides that heavily used in khat plant cultivation and its risk of liver damage, smoking cigarette. Serum HDL-C variations might be genetically related [23].

The advantages of this study is that it was carried out during war conflicts and gives an important health indicator and baseline data on lipid profile abnormalities among khat chewers in Al Shuiab district and health authorities in AL Dhalaa Governorate.

Conclusion

There are concerns about health hazards related to the consumption of Khat . This study demonstrates abnormal lipid profile of khat chewers in Yemen and in the region. Low HDL-C was the main lipid variable followed by hypertriglyceridemia among Yemeni male chewers. Genetic factors, war conditions, physical inactivity, and low-fat traditional Yemeni diets are considered the determinants of such findings. khat chewing is considered a significant economic and health problem in Yemen that needs specialized programmes to help people to stop and reduce the habit of khat chewing and cultivation of lands.

Ethical Consideration

Ethical approval of carrying out this study was obtained from the Ethical Scientific Research Committee University of Aden (Rec-57-2019). A consent approval by volunteers after they were given a full explanation about the purpose of the study,

References

[1] P. Kalix, & O. Braenden. Pharmacological aspects of the chewing of khat leaves. Pharmacological Reviews, 37:2, 149164.2004

[2] A. S. Elmi. The chewing of khat in Somalia. Journal of Ethnopharmacology, 8, 163-176. 2007.

[3] A. J. Giannini, & S. Castellani. A manic-like psychosis due to khat (Catha edulis Forsk). Journal of Clinical Toxicology, 19, 455-459. 2006

[4] M. H. Chapma, M. Kajihara, & G. Broges . "Servere , acute Liver injury and Khat leaves ," new England journal of medicine , vol.362,no.17,pp. 1642-1644.2010

[5] M. Rashwan, S. Farag, A. A. Gunaid, and A.A. Qirbi. Effect of khat on the metabolism of erythrocytes. Biochemical Pharmacology, Vol. 38(4) 563-56.1989

[6] M. A. Al-Shagga, M. A. Alshawsh, & A. Seyedan. Khat (Catha edulis) and obesity: a scoping review of animal and human studies. Annals of Nutrition & Metabolism. (3–4):200–211.2017.

[7] A. Al. Salahi; M. A. Abdulla; M. Al Mamary; MI. Noordin; SI. Abdulwahab and A. M. Al Absi. Toxicological features of Catha edulis on livers and kidneys on male and female Sprague Dauley Rats. Evid based complement Alternat Med 829-901.2012.

[8] M. Rashwan; M. Farag and M. El Khafif. Effect of khat on the level of some chemical neurotransmitters in brain homogenate of rabbits Egypt. J. of biochemistry, Vol. 10(1) 111-118.1992.

[9] A. Al–Akwa. Effect of khat on glucose metabolism in rats Az. J. Pharm. Sci, 26,16-21.2000.

[10] A. A. Al–Adhal. Sub acute toxicity studies of Catha edulis (khat). Y. M. J, 4 39-49. 2001

[11] MB. Ahmed, AB. El Qirbi . Biochemical effects of Catha edulis, cathine and cathinone on adrenocortical functions. J Ethnopharmacol, 39:213-216.1993.

[12] A. Al-Motarreb, M. Al-Kebsi, B. Al-Adhi and K.J. Broadley. Khat chewing and acute myocardial infarction. Heart 87:279-280.2002

[13] M.A. Al Duais and Y. S. Al Awthan. Association between khat chewing and dyslipidemia among young males. Journal of Taibah university Medical Sciences. Vol. 14, no.6, pp.538-546. 2019.

[14] BA. Al Sharafi and AA. Gunaid. Effect of habitual khat chewing on glycemic control, body mass index and age at diagnosis of diabetes in patients with type 2 DM in Yemen. Clin. Med. Insight endocranioldiabetes. 8; 47-53. 1÷2015.

[15] AT. Wendemagagn,MC. Cheme,KT. Kibret. Perceived psychological, economic and social impact of khat chewing among adolescence and adults in Nekamete Town east Weliga zone, West Ethiopia. Biomed Res Int;7427892. 2017.

[16] Third report of the national cholesterol education program (NCEP). Adult treatment Panel lll, final report. Circulation. 106:3143-3421.2002.

[17] R. Hoffman, M. Al Absi. Khat use and neurobehavioral functions: suggestion for future studies. Journal of ethenopharmacology, 132, 554-563, 2010.

[18] A. Al Motarreb, A. Al Qaisy, A. Al Faqeeh et al., Decreased antioxidant in the saliva of khat chewers, the Saudi Journal for Dental Research, vol. 7, no. 1, pp. 18-23.2016.

[19] W.M. Ali, Zubaid, Al Motarreb et al. Association of khat chewing with increased risk of strok and death in patients presenting with acute coronary syndrome. Mayo Clinic Proceeding. Vol.85, no.11, pp. 974-980,2010.

[20] A. Al Zubairi, M. Al Habori and A. Al Geiry, Effect of Catha edulis khat chewing on plasma lipid peroxidation. Journal ethenopharmacology, vol.87, no.1, pp.3-9,2003.

[21] A. Al Akwaa, The effect on the level of cortisol and lipid profile in healthy khat chewers. Bulletin of Egyptian society for physiological sciences, vol.29, no.1, pp.89-98, 2009.

[22] Valente et al. Khat and synthetic cathinones; A review. Archives of Toxicology, vol. 88, pp. 15–45. 2014.

[23] G. Asiki, GA. Morphy, k. Baisly, RN. Nsubuga, A. Karabaride, R. Newton, et al. Prevalence dyslipidemia and associated risk factors in a rural population in South Western Ugenda: a community, based survey. PLoS One;10(5): e0126166,2015.

مقالة بحثية

علاقة مضغ القات المزمن باضطراب مستويات الدهون في الدم لدى الذكور البالغين في مركز الشعيب محافظة الضالع اليمن

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المُلخّص

هدفت هذه الدراسة التحقق علاقة مضغ القات المزمن باضطراب مستويات الدهون في الدم لدى مئة من الذكور الاصحاء البالغين ممن يمضغون القات في مركز الشعيب محافظة الضالع اليمن، والذين وافقوا على تكملة البحث معنا. اعتمدت الدراسة على المسح المقطعي في اختيار عينة البحث من منطقة الدراسة، حيث تم اختيار مئة من الذكور من بين 230 مشاركا ذكرا إذ تم اخضاعهم لمعايير الاستمرار في الدراسة أصحاء ولا يعانون من اي امراض كالسكري والضغط والقلب او يستخدمون علاجات تؤثر على مستوى الدهون في الدم، تم تقسيم المشاركين الى اربع مجموعات A، B، D و E كل مجموعه مكونه من عشرين مشاركا تم توزيعهم على المجموعات بحسب العمر والمدة الزمنية لمضغ القات التي تتراوح بين 5 الى 30 عاما. كما تم تحديد مجموعه ضابطه C من عشرين مشاركا ممن لم يمضغون القات اطلاقا. اعتمد الباحث في جمع البيانات على الاستبانه وعلى عينات الدم عقب صيام عن الطعام من 10 الى 12 ساعه ليلا. وفي الصباح الباكر جمعت العينات من المشاركين ووضعت عليها بيانات كل مجموعه ونقلت الى المختبر لإجراء الفحوصات على ملف الدهون ويشمل الكوليسترول الكلي TC، الدهون البروتينية عالية الكثافة HDL-C ومنخفضة الكثافة LDL-C وكذلك الدهون الثلاثية. أدخلت كافة البيانات لنظام SPSS الاحصائي. اظهرت النتائج ارتفاعا واضحا ذو دلاله احصائية $P<0.05$ في مستوى الكولسترول الكلي TC لدى المجموعات D، E مقارنة بالمجموعة الضابطة. كما ان مستويات HDL-C اظهرت انخفاضا ملحوظا على المجموعات D و E مقارنة بالمجموعه الضابطة. ومن جهة اخرى اظهرت نتائج قراءات مستويات LDL-C للمجموعات D، E ارتفاعا ذو دلالة احصائية $P<0.05$ وفيما يخص الدهون الثلاثية TG هناك ارتفاعا في المعدلات لدى جميع افراد المجموعات وكانت فروقات ذات دلاله معنوية مقارنة بالمجموعة الضابطة. تبين لنا من خلال مناقشة نتائج الدراسة بأن هناك اضطرابا كبيرا في مستوى الدهون لدى عينة الدراسة كما ان انخفاض مستويات HDL-C وارتفاع مستويات الدهون الثلاثية يعد من عوامل الخطورة للاصابة بامراض الجهاز الدوري كالضغط والقلب وتصلب الشرايين بالاضافة الى السكتات القلبية والدماغية. قد يعود هذا الخلل في الدهون الى العامل الوراثي، عادات التغذية وقلة الحركة وضغوطات الحياة اليومية الى جانب خطورة المبيدات التي تستخدم عشوائيا اثناء زراعة القات وخطرها على صحة الانسان.

الكلمات المفتاحية: مزمن، ملف الدهون، اضطراب الدهون، مضغ القات.

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