Medical check-up of Biochemical Parameters for Polycythemic Patients Aimed to Improving Smoking Cessation

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الخلاصة:

التدخين يعتبر الخطوة الاولى لتشخيص نوع الـ Polysythemia المصاب بها المريض وبذلك يمكن معرفة العلاج اللازم، وكذلك حث المريض على التوقف عن التدخين.

أجريت الدراسة على 42 مريض مصابين بـ Polysythemia من النوع الثاني واستمرت الدراسة على 30 مريض فقط لتمكنه من تقليص استهلاكهم للسكائر. أجريت التحاليل اللازمة للمرضى قبل تقليل عدد السكائر وبعد تقليل عدد السكائر المستهلكة بشكل يومي وكانت كما يلي: الهيماتوكرت، عدد الليوكوسايت ومستويات الكولسترول الكلي، الهيموغلوبين والترايكليسيرايد كانت اعلى في حالة التدخين المكثف مما اصبحت عليه بعد تقليل التدخين، بينما كان مستوى الكولسترول ليبوبروتين ذو الكثافة العالية على العكس حيث أن مستواه كان اقل في حالة التدخين المكثف مما اصبح عليه بعد تقليل عدد السكائر المستهلكة في اليوم الواحد. اما بالنسبة لوزن المرضى ومستوى ضغط الدم لديهم لم يحصل اي تغيير يذكر قبل تقليل عدد السكائر المستهلكة بشكل يومي وبعد تقليلهم لها.

من هذه القياسات المستحصل عليها من خلال هذه الدراسة تمكن الاطباء من متابعة مرضى الـ Polysythemia من النوع الثاني والسيطرة على حالتهم الصحية وتحسينها.

Abstract:

Smoking should be considered at an early stage in the differential diagnosis of unexplained polycythemia and to avoid inappropriate treatment and also to motivate the patient to stop.

Fourty two patients with secondary polycythemia seen in the outpatient clinic of Baghdad teaching hospital, Medical City over the period from Jan. 2008 to Jan. 2010. Total number of patients was 42 patients; follow up was done only to 30 patients with secondary polycythemia who managed to reduce their cigarette consumption. Many results were significantly different between heavy smokers and reduced smokers. The hematocrit, leukocyte count and levels of total cholesterol, hemoglobin and triglyceride were significantly higher in heavy smokers, than light smokers, while the level of high-density lipoprotein cholestrol was significantly lower. The weight of the patients and their blood pressure were not changed befor and after reduce smoking. Secondary

polycythemia and all related measurments are smoking-related abnormal finding; physicians should know the effects of smoking on medical check-up to improve their disease, prevention and health promotion activities.

Key words: secondary polycythemia, hematocrit, triglyceride

Introduction:

Polycythemia is a condition that results in an increased level of circulating red blood cells in the blood stream, which is measured as a hematocrit level[1]. Causes of polycythemia are primary, (acquired or genetic mutation)[2], or secondary (diseases, conditions, high altitude, tumors, cancer and congenital defects). In primary polycythemia (polycythemia vera, intrinsic factors in red blood cell production cause an increase in red cell count[3]. In secondary polycythemia, external factors effect, hypoxia from long standing (chronic) lung disease and smoking or common cause of polycythemia. Therefore, smoking can be significant risk factor for polycythemia[4,5].

Other causes of secondary polycythemia includes heart or lung diseases that result in hypoxia, and endocrine abnormalities, people when testosterone levels are high because of the use of anabolic steroids, including athletes who abuse steroids[6]. In secondary polycythemia there may be 6 to 8 million and occasionally 9 million erythrocytes per cubic millimeter (micro liter) of blood. Secondary polycythemia resolves when the underlying cause is treated, can be induced directly by phlebotomy to withdraw some blood, concentrate the erythrocytes and return them to the body [7,8].

Materials and Methods:

Patients:

Patients with secondary polycythemia seen in the Outpatient Clinic of Baghdad Teaching Hospital, Medical City over the period from January 2008 to January 2010. Total number of patients was 42 males with secondary polycythemia and 10 normal subject, follow up was done only to 30 patients with secondary polycythemia, and the other 12 patients were excluded because they couldn't managed to reduce their smoking. The patients aged (44.0±10.7) years.

Diagnosis of secondary polycythemia was made by a specialist physician through measurement of specific parameters. Before the examination the patients filled out questionnaires about medical history and lifestyle including smoking habit, and the average number of cigarettes smoked a day (≥ 40). Most of the patients had been previously treated by phlebotomy and asprin 100mg/day and other with asprin 100mg/day without phlebotomy table-1, and all were encouraged to stop smoking. All of the patients underwent a physical examination including height, weight, blood pressure and blood tests table-2.

The blood test included:

Serum total cholestrol (TC) triglyceride (TG), HDL-C, hemoglobin, hematocrit, leukocyte count.

All 30 patients we put them under investigation before and after reducing cigarette consumption, and measured all the blood tests before reducing cigarette consumption ($\geq$40/day)and after reducing cigarette consumption ($\leq$8/day) and compared with control, table-2.

Triglycerides level was measured by a commercial kit:

Triglycerides liquicolor ^{mono}: GPD-PAP method enzymatic colorimetric test for triglycerides with lipid clearing factor (LCF)[9]:

Method: The triglycerides are determined after enzymatic hydrolysis with lipases. Indicator is quinoneimine formed from hydrogen peroxide, 4-aminoantipyrine and 4-chlorophenol under the catalytic influence of peroxidase .

Cholesterol level was measured by a commercial kit:

Cholesterol liquicolor: Enzymatic colorimetric test, for cholesterol with lipid clearing factor (LCF)[10].

Method: The cholesterol is determined after enzymatic hydrolysis and oxidation. The indicator is quinoneimine is formed from hydrogen peroxide and 4-aminophenazone in the presence of phenol and peroxidase.

Hemoglobin level was measured by a commercial kit:

Total Hemoglobin (T Hb)

Quantitative determination of total hemoglobin in whole blood .

Colorimetric method

Assay principle [11]:

In the presence of alkaline potassium ferricyanide hemoglobin is oxidised to methaemoglobin. This then reacts with potassium cyanide to form cyanmethaemoglobin which absorbs at 540nm. The intensity of this absorbance is directly related to total hemoglobin concentration.

HDL-cholestrol level was measured by HDL kit PAP 150 (Bio Merieux, France), using the enzymatic method [12].

Assay principle:

The chylomicron and lipoproteins of VLDL and LDL contained in the sample are precipitated by the addition of phosphotungestic acid in the presence of magnesium ions. The supernatant obtained after centrifugation contains HDL from which the cholesterol and phospholipids can be determined using the cholesterol enzyme reagent. The absorbance was read at 500 nm after 5 minute at 37^{0}C.

Leukocyte count measured by chamber method [13].

Data were expressed as mean $\pm$ standard deviation and differences between means were analyzed by student's t-test value less than 0.05 were considered significantly different.

Results:

Table-1, shows the data for patients on their arrival were their mean of age (44±10.7), mean of weight (66.4±10.1), and this table also show the number of patients without previous phlebotomy (18 patients) and the number of patients with 3 months since last phlebotomy (12 patients).

Table-2, shows patients who reduced consumption of cigarettes have mean ± value of Hb, Hct, TC and leukocyte count were decreased significantly after reduce consumption of cigarettes, ($p<0.05$). The mean ± value of HDL-cholestrol increased significantly after reduced consumption of cigarettes, ($p<0.05$).

There were no significant differences in body weight and blood pressure between before and after reduced smoking.

Thirty of the 42 patients managed to reduce their cigarette consumption (to less than half of the initial value), mean of the heavy smoking (44/day) and mean after reduced smoking (6/day).

Discussion and conclusion:

The present study demonstrated that many results of medical checkup appeared to be different between heavy smokers and after reduced smoking in comparison to control healthy subjects. In this study level of hematocrit, hemoglobin, leukocyte count, total cholesterol. Were significantly higher, while the levels of HDL-C were significantly lower, in the group of heavy smokers than in the same group after reducing smoking table-2.

For the elevated WBC count, there are several possible mechanisms of smoking-induced leukocytosis, such as smoking-induced chronic inflammation[14,15], and catecholamine release[16]. In addition, a recent study has demonstrated that exposure to second hand smoke may be associated with elevation of WBC count[17,18], therefore the smoking induced increase in WBC count may more emphasized by comparison with (the control) without passive smoking.

This study showed that serum TG level (135±99) was significantly higher in smokers than in non smokers control group (108±98).

Leukocytosis and polycythemia in addition to low HDL-C and high TG levels may play roles in the development of atherosclerosis in smokers [19, 20].

There were no significant differences in body weight and blood pressure between before and after reducing smoking.

By using these finding, medical professionals can effectively persuade smokers to quit smoking when they inform smokers of medical check-up results. Physician should know the above effects of smoking on medical check-up results to improve their disease prevention and health promotion activities.

Mean of Age	44±10.7
Mean of weight	66.4±10.1
No. of patients without previous phlebotomy	18
No. of patients with previous phlebotomy	12 (3 months since last phlebotomy)

Table-1: Data for patients on their arrival

Parameter	Control n=10	Heavy smoking (≥40/day) n=30	Reduced smoking (≤8/day) n=30
Hb mg/dl	15.15 ± 0.64^a	19.89 ± 0.58^b	$16.59\pm1.14^{*c}$
HCT%	46.45 ± 1.93^a	60.67 ± 1.74^b	$50.7\pm3.5^{*c}$
Systolic blood pressure (mmHg)	119±15	118±15	116±15
Diastolic blood pressure(mmHg)	77±15	75±11	74±11
Body weight (kg)	68.3±8.8	66.4±10.1	66.4±10.1
Total cholesterol (mg/dl)	203 ± 34^a	220 ± 34^b	$210\pm33^{*c}$
Triglyceride (mg/dl)	108 ± 68^a	135 ± 99^b	$120\pm62^{*c}$
Leukocyte count(/µl)	6000 ± 1400^a	7500 ± 2000^b	$6100\pm1400^{*c}$

Table-2: Comparisons among control, heavy smoking and reduced smoking.
Data are expressed as mean ± SD
n=number of subjects
non-identical superscripts (a, b, c)represent significant difference, $p<0.05$.

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