The influence of body mass index on glycosylated hemoglobin and lipid profile in diabetic patients.

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الخلاصه:-

المقدمه:- السمنه هي ليست العامل الوحيد لداء السكري. ولكن الخطوره تكمن في درجة السمنه. **الهدف**:- هدف الدراسه هو تقدير مدى تاثير عامل حجم الكتله على مستويات الهيمو غلوبين الكلوكوزي ومستويات الدهون المصليه لدى مرضى السكري من النوعين المعتمد وغير المعتمد على الانسولين.

طريقة العمل:- شملت الدراسه ١٠٠ مريض بداء السكري. ٤٠ مريض منهم (٢٠ ذكر و ٢٠ انثى) كان من النوع المعتمد على الانسولين و ٢٠ ذكر و ٢٠ مريض (٢٠ ذكر و ٢٠ انثى) من النوع المعتمد على الانسولين. تم جمع المينات بصوره عشوائيه من مركز الحكيم للسكري في مستشفى الصدر في النجف الاشرف. وهذه العينات من المرضى تم مقارنتهم باشخاص اصحاء عددهم ٥٠ (٢٥ ذكر و ٢٠ انثى) كمجموعة سيطره.

جمعت لكل عينه من المرضى والاصحاء ٥ مللتر من الدم الوريدي، ١ مللتر وضعت في انبوبه تحتوي على ماده مانعه للتخثر EDTA لغرض اجراء فحص HbA1c (الهيمو غلوبين الكلوكوزي) بجهاز HPLC. اما بقية الدم فقد تم فصل المصل منه لتقدير مستوى الكوليستيرول والثلاثي الكليسيرايد والدهون المصليه الاخرى باستخدام الطريقه القياسيه.

النتائج: - لقد اشارت النتائج الى ان معدل حجم الكتله للذكور هو ٢٢± ٥٠, • كغم/ م ٢ وللاناث كان المعدل ٢٥ - • ، • كغم/ م ٢ وللاناث كان المعدل ٢٥ - • ، • كغم/ م ٢ حيث ان الاشخاص الذين يكون لهم معدل اعلى من ذلك يعتبر سمينا.

لقد وجد ان
 0 من الرجال كانوا مصابين بالسمنه بينما السمنه كانت عند الاناث بمعدل ٧٢% بالاضافه الى ان مستويات الكوليستيرول الكلي والثلاثي الكليسير ايد كانت عاليه عند النساء عنها في الرجال. وجد ان هناك علقه ان مستويات الكوليستيرول الكلي والثلاثي الكليسير ايد كانت عاليه عند النساء عنها في الرجال. وجد ان هناك علاقه ار تباطيه بين معدل حجم الكتله و الهيمو غلوبين الكلوكوزي (0 , p<-, p<) ، الكولسترول الكلي علاقه ار تباطيه بين معدل حجم الكتله و الهيمو غلوبين الكلوكوزي (0 , p<-, p<) ، الكولسترول الكلي علاقه ار تباطيه بين معدل حجم الكتله و الهيمو غلوبين الكلوكوزي (0 , p<-, p<) ، الكولسترول الكلي الكلي والمصابات بداء السكري من النوع الثاني . بينما عند النساء المصابات بداء السكري وجد ان هناك علاقه ويه بين معدل حجم الكتله و الهيمو غلوبين الكلوكوزي (0 , p<-, p<-, p) ، الكولسترول الكلي الكلي الكولي وي الكلي الكلي و التلي . بينما عند النساء المصابات بداء السكري وجد ان هناك الكوكوزي (0 , p<-, p) ، الكولسترول الكلي الكولي و الكلي الكوكوزي (0 , p<-, p) ، الكولسترول الكلي الكولي الكلي المصابات بداء السكري وجد ان هناك و الماد المصابات بداء السكري وجد ان هناك علاقه قويه بين معدل حجم الكتله والهيمو غلوبين الكلوكوزي (0 , p<-, p) و المحد النساء المصابات بداء السكري وجد ان هناك علاقه قويه بين معدل حجم الكتله والهيمو غلوبين الكلوكوزي (0 , p<-, p) و الكلي (0 , p<-, p) .

بينما كانت قيم الثلاثي الكليسير ايد (٥٠, ٥٧, p<...) ، الكولسترول الواطيء الكثافه (٥٠, ٥٠, p<...)) = = ، الكولستيرول الواطيء الكثافه جدا(٥٠, ٥<, p<...) عند مرضى السكر الذكور من النوع الغير معتمد على الانسولين . بينما في اناث مرضى السكري من النوع الثاني وجد ان الثلاثي الكليسير ايد (٥٠, ٥٠, p<...)) = ، الكولسترول الواطيء الكثافه (٥٠, ٥٠, p<...) ، الكولستيرول الواطيء الكثافه جدا(٥٠, ٠.) - ، r=...

وقد بينت الدراسه انـه لا توجد علاقـه بين معدل حجم الكتلـه والهيمو غلوبين الكلوكوزي ومستويات الدهون لدى مرضى السكري من النوع المعتمد على الانسولين ولكلا الجنسين.

الاستنتاج:- الارتباط القوي بين معامل حجم الكتله من جهه و الهيمو غلوبين الكلوكوزي ومستويات الدهون من جهه اخرى تثبت ان هنالك علاقه وثيقه بين داء السكري ومستوى تأيض الدهون.

Abstract:

Background:

Obesity is a powerfull independent contributer to the onset of diabetes mellitus and risk is related to the degree of obesity.

Objective:

The study was desingend to investigate the influence of the body mass index on the levels of glycosylated hemoglobin and the parameters of serum lipid profile in patients with IDDM and NIDDM.

Methods:

A total of 100 diabetic patients 40 IDDM patients (20 males and 20 females) and 60 NIDDM patients (30 males and 30 females) were randomly selected from AL-Hakeem diabetic center in AL-Sadder Hospital in Najaf in parallel with 50 healthy subjects as control group. 5 ml of venous blood were obtained from each healthy and diabetic subjects, 1 ml of blood put in EDTA tube for HbA1c determination using ion exchange HPLC instrument. Lipid profile parameters were evaluated using the Spainreact kits with standared methods.

Results:

The results revealed that the mean of body mass index was $27 \pm 0.5 \text{ kg/m}^2$ for males and 25 ± 0.5 for females 37.5% of the male patients were obese, while the obesity in females were found 72%. As well as the levels of serum total cholesterol, triglycerides are higher in females as compared with their males counterpart. Significant correlations were present between the body mass index and glycosylated hemoglobin (r=0.58, p< 0.05), serum total cholesterol (r= 0.5, p< 0.05) in diabetic male patients, however in diabetic female patients showed a highly significant correlation between the body mass index and glycosylated hemoglobin (r=0.51, p< 0.05), serum triglycerides (r=0.57, p< 0.05), LDL-cholesterol (r=0.51, p< 0.05), VLDL-triglycerides

(r=0.52, p< 0.05) in type 2 diabetic male patients. While in type 2 diabetic female patients was found serum triglycerides (r=0.56, p< 0.05), LDL-cholesterol (r=0.59, p< 0.05), VLDL-triglycerides (r=0.85, p< 0.005).

Conclusion:

the highly positive correlations between the BMI and HbA1c, TC, S.Tg, LDL-cholesterol, VLDL- triglycerides suggest that the relationship between diabetes and lipid metabolism.

Introduction:

Major alterations have been known occur in the lipid metabolism of diabetic patients espicially in relation to the atherosclerotic vascular disease. Hypertriglyceridemia, hypercholesterolemia, elevated fatty acid concentration and increased levels of low density lipoproteins have been reported in diabetic patients[1]. The most common form for hyperlipidemia is hypertriglyceridemia, in which a defective clearance of triglyceride is implicated [2]. Lipoprotein lipase and hepatic triglyceride lipase are concerend with the triglyceride clearance. It was showen that lipoprotein lipase was decreased in non insulin dependent diabetes [3,4]. Increased levels of hepatic triglyceride lipase were reported in diabetics [5]. Both serum triglyceride and cholesterol levels were elevated in diabetic population as compared with the normal population [6] and the levels shifted to higher values in patients with vascular complications [7]. A correlation between glycosylated hemoglobin and serum triglycerides, serum cholesterol levels was reported [8].

This investigation was undertaken to determine the levels of hemoglobin A1c and serum total cholesterol, triglycerides and serum lipoprotein levels in Iraqi diabetic patients and to examine their relationship with body mass index .

Patients and Methods:

40 IDDM patients (20 males and 20 females) and 60 NIDDM patients (30 males and 30 females) aged 30 to 80 years were selected randomly from AL- Hakeem diabetic center in AL- Sadder hospital in Najaf. 50 healthy subjects (25 males and 25 females) age and sex-matched were selected as control group, 5 ml of venous blood samples were obtained from each subject after a 12-14 hours overnight fast. Patients were excluded from the study if they were on lipid lowering drugs. 1 ml of blood put in EDTA tube for HbA1c determination with ion exchange HPLC instrument immediately after the collection of the blood sample, The remaining blood sample was allowed to clot and the serum separated for determination of seum cholesterol, serum triglycerides, HDL- cholesterol, LDL- cholesterol, and VLDL- triglycerides levels with respective diagnostic kits (Spinreact, Spain).Body mass index was calculated with the formula BMI= weight (kg)/hight (m²), Male patients with a body mass index 27 ± 0.5 or more and female patients with a body mass index 25 ± 0.5 or more were taken as obese. Mean \pm SD calculated. Regression analysis were performed.

Results:

The results revealed that the 37.5% of male patients and 72% of female patients are obese. The respective mean \pm SD values of glycosylated hemoglobin, serum total cholesterol, serum triglycerides and serum HDL- cholesterol, LDL- cholesterol, VLDL-triglycerides of IDDM, NIDDM diabetic patients were 9.9 \pm 3.7, 280 \pm 33.9, 255 \pm 45.3, 25.5 \pm 3.2, 210 \pm 29.5, 51 \pm 9.1, for IDDM patients, and 9.1 \pm 2.8, 290 \pm 57.5, 288 \pm 60.7, 21.9 \pm 4.12, 215 \pm 50.8, 50.8 \pm 12.1for NIDDM patients, respectively.

To investigate the influence of the body mass index on the levels of glycosylated hemoglobin and the parameters of serum lipid profile, the linear regression analysis was used for the analysis of the data; when (r<0.2) there is no significant correlations. Table (1) showed that the male type 1 diabetic patients has no significant correlation between BMI and other parameters; while type 2 male diabetic patients has highly positive correlation between BMI and HbA1c (r=0.58, P<0.05), serum triglycerides (r=0.57, P<0.05) and significant correlation with serum cholesterol (r=0.5, P<0.05), LDL-cholesterol (r=0.51, p<0.05) and VLDL-triglycerides (r=0.52, P<0.05) fig 1,2.

Table (2) showed the study of regression correlation of female type 1 diabetic patients nearly to results of male counterpart.while female type 2 diabetic patients apeared highly positive correlation between BMI and VLDL-triglycerides (r=0.85, P<0.05), HbA1c (r=0.7, P<0.05), serum cholesterol (r=0.6, P<0.05), LDL-cholesterol (r=0.59, p<0.05) and, serum triglycerides (r=0.56, P<0.05) fig 3, 4.

	IDDM patients		NIDDM patients	
	r	Pvalue	r	P value
HbA1c	0.2	NS	0.58	0.05
Cholesterol	0.2	NS	0.5	0.05
Triglycerides	0.18	NS	0.57	0.05
HDLCholesterol	-0.12	NS	-0.32	0.05
LDL-Cholesterol	0.17	NS	0.51	0.05
Triglycerides	0.18	NS	0.52	0.05

 Table 1- Results of univariate analysis of body mass index of diabetic male patient and glycosylated hemoglobin(%), serum lipid profile (mg/dl).

r=correlation coefficient, p=probability.

Table 2- Results of univariate analysis of body mass index of diabetic female patient and glycosylated hemoglobin(%), serum lipid profile (mg/dl).

	IDDM patients		NIDDM patients	
	r	Pvalue	r	P value
HbA1c	0.19	NS	0.7	0.05
Cholesterol	0.21	NS	0.6	0.05
Triglycerides	0.2	NS	0.56	0.05
HDLCholesterol	-0.16	NS	-0.57	0.05
LDL-Cholesterol	0.18	NS	0.59	0.05
VLDL- Triglycerides	0.19	NS	0.85	0.05

r=correlation coefficient. , p=probability.



Fig.1 : Correlation of the BMI (kg/m2) & A) HbA1c B) Total cholesterol C) TriglyceridesD) HDL-cholesterol E) LDL-cholesterol F) VLDL-triglycerides. In type2 diabetic male patients.



Fig.2 : Correlation of the BMI (kg/m2) & A) HbA1c B) Total cholesterol C) TriglyceridesD) HDL-cholesterol E) LDL-cholesterol F) VLDL-triglycerides. In type2 diabetic female patients.

Discussion:

Obesity is a powerfull independent contributer to the onset of diabetes mellitus and the risk is related to the degree of adiposity [9]. All types of obesity are associated with an increase of blood glucose levels and with deterioration in glucose tolerance [10]. Obesity aggravates all the atherogenic trails and these factors are no less dangerous in diabetic patients. It was shown that 48% of the male and 68% of the female Iraqi diabetic patients are obese as compared with 17.8 % of males and 45.5% of females in normal Iraqi population [11]. In the present study 37.5% of male and 72% of female non insulin dependent diabetic patients are obese. Obesity is more prevalent in the female patients as compared with their male counterpart [12]. In the obese non insulin dependent diabetic patients weight loss results in an improved glucose homeostasis with redused basal hepatic glucose outputs improved post prandial glucose excursion and unchanged absolute insulin levels in the face of markely reduced glycemia indicative of enhanced β- cell sensitivity to insulinogenic stimuli [13]. Serum concentrations of both triglyceride and cholesterol were reported to be elevated in diabetic population as compared to normal population [14]. In non insulin dependent non ketogenesis prone diabetic patients, hypertriglyceridemia and hyper-cholesterolemia are frequent and persist desite therapy. In Iraqi non insulin dependent diabetic patients 28% have higher than 190 mg/dl serum triglycerides and 68% have cholesterol levels higher than 200 mg/dl.

In a recent survay in U.S.A, it was found that the serum cholesterol levels are higher in 27% of the adults of all ages (20 to 74 years) and the values are higher in males (45%) than in females (36 %) and the male sex is regarded as independent risk factor for coronary heart disease [15,16]. It was reported that there was no correlation between lipids and glycosylated hemoglobin in insulin dependent diabetic patients, glucose but not hemoglobin A1c correlated with total triglycerides [17]. In the Iraqi diabetic patients both body mass index and hemoglobin A1c levels correlated with total lipids, triglycerides and cholesterol. In altered LDL metabolism, hypertrigly-ceridemia rather than diabetes is important. It was reported that in another Arab population of Syrian people (normal and obese) the levels of serum total lipids, triglycerides and cholesterol are higher in males than in females [18]. In the Iraqi diabetic patients as well as normal population, women has higher levels of all these lipids associated with high prevalence of obesity as compared with their male counterparts. Thus, the positive correlations of HbA1c levels and body mass index with serum total lipids, triglycerides and cholesterol levels indicate the association between diabetes and obesity with lipid metabolism in these Iraqi diabetic patients.

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