Changing the lipid profile by Tumeric, Garlic and Cinnamon in Diabetic patients Type-2

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Back ground: Diabetes mellitus (DM) is a chronic metabolic syndrome characterized by hyperglycemia with possible correlation to medical plants and their lipid lowering effect.
Aim: the aim of present study is to find new agents with fewer side effects in the therapy of DM type-2.
Material and methods: this study was performed in AL-Kadhmiya teaching hospital between April 2008- October 2009 was approved by ethic committee of college of medicine. Fifty diabetic patients (18 males and 32 females) were involved in the present study , their ages ranged (42-58) years and were randomly allocated to five groups each group was given glipizide ia addition to the one of the following agents (acarbose , turmeric, garlic and cinnamon). Blood sample were taken before treatment with these agents and after treatment for nine weeks to estimate the lipid profile, serum cholesterol, triglyceride, HDL, LDL, and VLDL levels.
Results: all the tested agents reduced both serum cholesterol and LDL levels significantly when used in combination with glipizide but the later has no significant effect when used alone. Combination of garlic or cinnamon with glipizide decreased significantly the triglyceride at the same time combination of acarbose or garlic raised significantly the HDL levels where as turmeric is the only agent that decreased VLDL levels significantly.

Conclusions: turmeric, garlic and cinnamon proved to have hypocholesterolemic effect and the possibility to be used clinically in management of heart diseases.

Key words: turmeric, garlic, cinnamon, hypocholesterolemia.

الخلاصة

تغيير صورة الدهون باستعمال الكركم ،الثوم والدارسين في النوع الثاني لمرضى داء السكر

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داء السكر متلازمة أيضية مزمنة تتميز (ارتفاع السكر بالدم يرافقها متغيرات أيضية على مستوى الكاربوهيدرات والدهون). أنجزت هذه الدراسة في مستشفى الكاظمية التعليمي بعد إستحصال موافقة لجنة الأخلاق الطبية حيث شارك فيها (٥٠) مريضاً مصاباً بداء السكر –النوع الثاني وزعوا على خمسة مجموعات أعطيت جميعها خافض السكر الفموي جليبزايد مع إضافة لكل منها إحدى المواد المراد فحصها (الأكاربوز ،الكركم، الثوم، الدارسين) أخذت عينات الدم قبل وبعد أستخدام المواد المراد فحصها والتي أستعملت لمدة (٩) أسابيع . تم قياس مستويات الكوليسترول الكليسريدات الثلاثية أضافة الىHDL,LDL,VLDLبالمصل وكذلك .

أظهرت النتائج للمواد المفحوصة مع الجليبزايد إنها كانت سببا في إنخفاض معنوي معتد لكل من الكوليسترول وال دي ال في حين لم يسبب الجليبزايد لوحده إنخفاضا لها في وقت سبب الثوم والدارسين المتحد بالجليبزايد انخفاضا معنويا معتدا للكيسريدات الثلاثية كما ان اتحاد الاكاربوز والثوم مع الجلبيزايد سببا زيادة معنوية معتدة ل(اج دي ال) ويبقى الكركم العامل الوحيد لذي قلل مستوى(في ال دي ال) بصورة معنوية.

الأستنتاج : إمكانية أستعمال النباتات المذكورة لمعالجة أمراض القلب والدوران وذلك لتأثيرها الخافض للكوليسترول ورخص ثمنها وعدم تسببها في أعراض جانبية تذكر .

الكلمة المفتاح : الكركم ،الثوم ، الدارسين، نقص الكوليسترول بالدم.

Introduction

Diabetes mellitus (DM) is a chronic metabolic syndrome in which type-2 is more complex condition than type-1 because there is a combination of resistance to the action of insulin in liver and muscle together with impaired pancreatic β-cell function leading to relative insulin deficiency [(1)].Type-2 DM is a heterogeneous group of disorders. Genetic factors appear to be the major determined for the development of this type, yet no association between type-2 and HLA phenotypes or islet cell cytoplasmic antibodies has been demonstrated [(2)]. Type-2 DM is associated with group of disorders obesity, hypertension, dyslipidemia and atherosclerosic heart diseases which are just as important as reducing hyperglycemia[(3)].The aim of the study was to investigate the lipid lowering effect of Curcuma Longa (turmeric) Allium Sativum (garlic) Cinnammune Verum (cinnamon) in diabetic patients type-2.

Materials and Methods

The present study was carried out in AL-Kadhmiya teaching hospital between April 2008-October 2009. Fifty diabetic patients (18 males and 32 females) were participated in the study, their ages ranged (42-58) years. They have no history of other chronic diseases or any surgical problem. Cigarette smoking and alcohol consumption were not allowed. The present study was approved by ethic committee of Al-Nahrin college of medicine. The patients had been informed about the procedure and purpose of the study. They were randomly allocated to five groups, each group contained 10 patients

Group-I was given glipizide 5 mg three times daily before meals.

Group-II was given glipizide 5 mg three times daily and acarbose 50 mg three
times daily before meals and used as control.

Group- III was given glipizide 5 mg three times daily before meals and curcuma longa 4 gm/day divided to three portions after meals

Group-IV was given glipizide 5 mg three times daily before meals and allium sativum caps 2.5 mg/day after meals

Group-V was given glipizide 5 mg three times daily before meals and cinnamonum verum caps 4gm/days divided to three portions after meals

Drugs used in the present study are Glipizide (Mini diab 5 mg tab upJohn S.P. A Italy) Acarbose (Glucabay -50 mg tab Bayer-Germany).

Plants Curcuma longa, Cinnamomum verum were taken from local market, crushed and grinded by electrical grinder. The powder put in capsules containing 500 mg. The plants were identified by Iraqi national centre of herbs before starting the study. Allium Sativum (Ranbaxy-India) contain 0.625 mg of garlic oil. Blood samples were taken three days after withdrawal of previous medication (washing out period) then every three weeks after onset of treatment which last for nine weeks about 10 ml of venus blood samples were taken from each patient and then centrifuged to collect the serum and stored at-4 C^0 for biochemical investigation. The lipid profile include (serum cholesterol, triglycerides, HDL,LDL and VLDL) were determined by biolabo Kit for cholesterol – France [4,5].The analysis of variance in data was conducted by using complete randomized design (CRD) and least significance difference (LSD) at 5% level. T-test was used to examine the significance of difference in each parameter.

Results

The obtained results of the tested agents revealed non significant effect of glipizide on serum lipids but combination of glipizide with either acarbose, turmeric, garlic and cinnamon produced significant reduction in serum of both cholesterol and LDL levels. The combination of glipizide with garlic was the best in lowering all the parameters of lipid profile significantly but combination of garlic or cinnamon with glipizide lowering triglyceride levels significantly at the same time combination of acarbose or garlic with glipizide raised the HDL levels significantly where as turmeric was the only agent that decreased VLDL levels significantly (as shown in table 1, 2, 3, 4, and 5).

Discussion

D.M is a chronic clinical syndrome that is characterized by abnormalities in carbohydrates , lipid and lipoprotein metabolism which is not only lead to hyperglycemia but also cause many complications such as hyperlipidemia ,hyperinsulinemia ,hypertension and atherosclerosis[6]. Clipizide is a sulfonylurea drug (group-I) that stimulates insulin release when given alone but with no significant reduction in lipid profile especially the serum cholesterol level after the nine weeks of treatment. Using acarbose which is alpha –glucosidase inhibitor (group-II) in combination with glipizide resulted a significant decrease in serum cholesterol levels. These results are compatible with results of others[7].All the results of the three plants turmeric, garlic and cinnamon that used in combination with glipizide showed significant reduction in serum cholesterol levels after nine weeks of treatment. These results in accordance with results of others as shown below.Tumeric (group-III) acts by increasing α-tocopherol level in the plasma of rats suggesting an interaction of curcumin with α-tocopherol that may increase the bioavailability of vitamin E and decrease cholesterol levels[8].

The action of garlic (group-IV) appears to be involve in the inhibition of HMG-CoA reductase (3-hydroxy-3-methyl glutaryl- coenzyme A) and remodeling the plasma lipoproteins and cell membranes [9].High concentration of garlic extract can inhibit the later stages of cholesterol biosynthesis due to the presence of allicin, ajoene, nicotinic acid and adenosine [10].While cinnamon (group V) produces a maximal phosphorylation of insulin receptors associated with increased insulin sensitivity with improved glucose and lipid levels [11]. Insulin has been found to be important for the action of lipoprotein lipase enzyme, diminished lipoprotein lipase activity may result in accumulation of triglycerides in the circulation [12]. Despite its ability to stimulate insulin secretion, glipizide produced non significant decrease in serum triglycerides level when used alone but the tested agents when used in combination with glipizide produced a reduction in serum triglyceride levels. This might be resulted from the effect of these agents in correction of hyperglycemia by different mechanisms, garlic (group IV) and cinnamon (group V) showed a significant reduction of serum triglyceride levels after combination with glipizide. This effect may be related to the action of increased insulin sensitivity and insulin secretion by garlic and cinnamon respectively. The combination of acarbose or turmeric with glipizide showed non significant decrease in serum triglyceride levels, this due either to the dosage of these agents or to the shorten of the treatment period. Regarding the serum HDL that showed a significant increase in serum levels of combination of glipizide with acarbose (group II) or garlic (group IV) while combination of turmeric or cinnamon showed non significant change in HDL serum levels. Garlic appears to be an important protective factor against heart diseases and stroke via its ability to impact the process of atherosclerosis at many steps, it can greatly improve the LDL to HDL ratio a significant goal in prevention of heart diseases in addition to allicin content of garlic extract, other beneficial effect in prevention stroke [10].

Curcuma is a potent antioxidant agent that had very important action for wellbeing [13]. The obvious increase in the oxidized LDL level is considered a risk factor contributing for cardiovascular diseases but the high efficacy of antioxidant activity of curcuma prevent the risk of stroke [14]. The results of the present study revealed that was a slight increase in serum levels of LDL before treatment with tested agents [15]. Combination of glipizide with either of acarbose or turmeric, garlic, cinnamon produced significant decrease in serum LDL levels after nine weeks of treatment. This may result from their effect in decreasing serum cholesterol, triglyceride and HDL levels. These results are in agreement with the results of others and their working on curcuma [14]. No important adverse effects were seen in the patients except paresthesia in the lower limb of one patients and also some gastrointestinal upset and flatulence associated with acarbose. In conclusion; curcuma longa, allium sativum and cinnamomum verum can safely be used to diabetic patients for their hypoglycemia and hypolipidemic effect with no hepatic and nephrotic toxicity as we proved in our study.

Table-1: The means of serum cholesterol levels (mmoL/L) throughout the nine weeks of the present study.

	Combination	Before treatment	After 3 weeks of treatment	After 6 weeks of treatment	After 9 weeks of treatment
1	Glipizide	5.97	6.1 ± 0.66	5.79 ± 0.72	5.71 ± 0.68
2	Glipizide + acarbose	5.78	5.01 ± 0.71 *	4.76 ± 0.8 *	4.78 ± 0.81*
3	Glipizide + turmeric	5.6	5.01 ± 0.95 *	4.52 ± 0.99 *	4.23 ± 1.04*
4	Glipizide + garlic	5.74	5.25 ± 1.02 *	4.65 ± 1.01 *	4.36 ± 1.05 *
5	Glipizide +cinnamon	5.39	5.17 ± 0.55 *	4.76 ± 0.65 *	4.18 ± 0.74 *

*Significant P<0.05

Table-2: The means of serum triglyceride levels (mmoL/L) throughout the nine weeks of the present study.

	Combination	Before treatment	After 3 weeks of treatment	After 6 weeks of treatment	After 9 weeks of treatment
1	Glipizide	2.9	2.75 ± 0.47	2.65 ± 0.46	2.85 ± 0.48
2	Glipizide + acarbose	2.97	2.91 ± 0.79	2.78 ± 0.65	2.69 ± 0.64
3	Glipizide + turmeric	3.21	3.19 ± 0.47	3.18 ± 0.45	3.16 ± 0.44
4	Glipizide + garlic	4.63	3.06 ± 0.37*	2.48 ± 0.62*	1.6 ± 1.08*
5	Glipizide +cinnamon	4.51	3.25 ± 0.42*	2.28 ± 0.76*	1.45 ± 1.125*

*Significant P<0.05

Table-3: The means of serum HDL levels (mmoL/L) throughout the nine weeks of the present study.

	Combination	Before treatment	After 3 weeks of treatment	After 6 weeks of treatment	After 9 weeks of treatment
1	Glipizide	1.13	1.19 ± 0.163	1.25 ± 0.165	1.29 ± 0.19
2	Glipizide + acarbose	0.78	1.24 ± 0.38*	1.39 ± 0.32*	1.49 ± 0.34*
3	Glipizide + turmeric	0.91	1.05 ± 0.24	1.07 ± 0.25	1.08 ± 0.27
4	Glipizide + garlic	0.98	1.25 ± 0.19*	1.47 ± 0.25*	1.61 ± 0.3*
5	Glipizide +cinnamon	0.88	0.92 ± 0.26	0.93 ± 0.29	1.01 ± 0.31

*Significant P<0.05

Table-4: The means of serum LDL levels (mmoL/L) throughout the nine weeks of the present study.

	Combination	Before treatment	After 3 weeks of treatment	After 6 weeks of treatment	After 9 weeks of treatment
1	Glipizide	3.14	3.1 ± 0.34	2.6 ± 0.43	2.82 ± 0.44
2	Glipizide + acarbose	3.22	3.02 ± 0.67*	2.5 ± 0.75*	2.19 ± 0.77*
3	Glipizide + turmeric	3.9	3.24 ± 0.66*	2.9 ± 0.75*	2.16 ± 1.02*
4	Glipizide + garlic	3.78	3.2 ± 0.46*	2.69 ± 0.68*	2.3 ± 0.85*
5	Glipizide +cinnamon	3.95	2.95 ± 0.58*	2.53 ± 0.72*	2.16 ± 0.82*

*Significant P<0.05

Table-5: The means of serum VLDL levels (mmoL/L) throughout the nine weeks of the present study.

	Combination	Before treatment	After 3 weeks of treatment	After 6 weeks of treatment	After 9 weeks of treatment
1	Glipizide	1.29	1.25 ± 0.21	1.24 ± 0.22	1.22 ± 0.22
2	Glipizide + acarbose	1.28	1.36 ± 0.42	1.34 ± 0.42	1.32 ± 0.44
3	Glipizide + turmeric	1.99	1.61 ± 0.43*	1.34 ± 0.48*	1.23 ± 0.53*
4	Glipizide + garlic	1.64	1.61 ± 0.27	1.59 ± 0.34	1.58 ± 0.36
5	Glipizide +cinnamon	1.36	1.35 ± 0.13	1.31 ± 0.14	1.29 ± 0.15

*Significant $P<0.05$

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