

Association of serum lipids with level of blood pressure in type 2 diabetic patients

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ABSTRACT

Introduction: Dyslipidemia and high blood pressure in diabetic patients increase the risk of microvascular and macrovascular complications.

Objectives: This study was conducted to investigate the association between serum lipids and level of blood pressure in type 2 diabetic patients (T2D).

Patients and Methods: A prospective analytical study was carried out in 60 patients with T2D of both genders. None of the patients had a history of hypertension, and none was treated with antihypertensive drugs. Resting systolic blood pressures and fifth phase diastolic blood pressures were measured three times while the subjects were seated, and the results were averaged second and third measurements. Sixty patients with T2D were enrolled to the study. None of the patients who had a history of gout, was treated with allopurinol or treated with antihypertensive drugs previously.

Results: Of 60 participants, mean of serum creatinine was 0.98 ± 0.22 mg/dL. Mean of systolic and diastolic blood pressure was 133 ± 13 mmHg and 84 ± 7.4 mmHg respectively. In this study, a significant positive correlation of serum cholesterol with systolic ($r=0.598$, $p=0.001$) and diastolic blood pressure ($r=0.584$, $p=0.001$) was seen. Also the associations of serum LDL-C with systolic and diastolic blood pressure were as follow ($r = 0.335$, $p<0.001$) and (0.491 , $p<0.001$) respectively. Associations of HDL-C with systolic and diastolic blood pressure were not significance as follow -0.05 and 0.04 respectively.

Conclusion: The results of this study suggest that serum cholesterol has a strong association with levels of systolic and diastolic blood pressure in T2D patients. More attention to serum lipids and treatment of dyslipidemia could halt the progress of diabetic kidney disease.

Implication for health policy/practice/research/medical education:

A study was conducted, to investigate the association between serum lipids level and level of blood pressure in type 2 diabetes. Sixty patients with T2D was enrolled to the study. The results suggest that serum cholesterol and LDL-C have a significant association with levels of systolic and diastolic blood pressure in type 2 diabetes patients. More attention to the serum lipid levels and treatment of dyslipidemia could halt the progress of diabetic kidney disease.

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Introduction

Dyslipidemia and high blood pressure in diabetic patients increase the risk of microvascular and macrovascular complications (1). Also disturbances of lipid metabolism associated to insulin resistance may be the primary event in the development of type 2 diabetes (1,2). The prevalence of hypertension is higher in diabetic patients than in nondiabetic individuals (3). Hypertension considerably increases the risk of nephropathy (3,4). Hypertension and dyslipidemia are often

associated with insulin resistance and aggravation of diabetic kidney disease (3,4). Recently the close association of blood cholesterol and L-DL-C, with essential hypertension have shown (3,4), however limited studies have been conducted on the association of blood pressure with the dyslipidemia of type II diabetes patients.

Objectives

The aim of this prospective, observational study was to

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determine whether baseline serum lipid levels are associated with level of blood pressure in T2D.

Patients and Methods

Patients

A prospective analytical study was carried out in 60 patients with T2D of both genders. None of the patients had a history of hypertension and none was treated with antihypertensive drugs. Resting systolic blood pressures and fifth phase diastolic blood pressures were measured three times while the subjects were seated, and the results were averaged second and third measurements (5). Hypertension was defined as a blood pressure $\geq 140/90$ mmHg or participant receiving current antihypertensive treatment (3,5).

Laboratory methods

Venous blood samples were obtained in the fasting state for determinations of serum creatinine, uric acid and hemoglobin A_{1c} (HbA_{1c}) (reference range 4–6%). 24 hours urine proteinuria was measured too.

Ethical issues

(1) The research followed the tenets of the Declaration of Helsinki; (2) informed consent was obtained; (3) the research was approved by ethical committee of Shahrekord University of Medical Sciences.

Statistical analysis

Results were expressed as mean (SD) and were considered as statistically significant when $p < 0.05$. Independent-student's *t*-test was used for comparison of variables between male and

female subjects. Spearman's rho coefficient correlation for evaluating relations among variables. For association of serum lipids with levels of blood pressure the partial correlation test with adjustment for age, duration of diabetes and serum creatinine was used.

Results

Of 60 participants, 56.7% were female. Mean of age was 57 (± 8.3) years. Mean of diabetes duration was 9.2 (± 4.9) years. Mean of serum creatinine was 0.98 (± 0.22) mg/dL. Mean of systolic and diastolic blood pressure was 133 (± 13) mmHg and 84 (± 7.4) mmHg respectively. Table 1 shows the important data of the patients. In this study, there was no significant difference of serum HbA_{1c} and creatinine, between males and females ($p > 0.05$). Similarly, there was no significant difference of proteinuria and levels of systolic or diastolic pressure between males and females ($p > 0.05$). In this study, a significant positive correlation of serum cholesterol with systolic ($r = 0.598$, $p = 0.001$) and diastolic blood pressure ($r = 0.584$, $p = 0.001$) was seen. Also the association of serum LDL-C with systolic and diastolic blood pressure was ($r = 0.335$, $p < 0.001$) and (0.491 , $p < 0.001$) respectively. Associations of HDL-C with systolic and diastolic blood pressure were not significant (-0.05 and 0.04 respectively), however, there were negative. Statistical analysis regarding the associations of serum cholesterol and LDL-C with systolic and diastolic blood pressure per sex are shown in Table 2 and Figure 1.

Discussion

In the present study, we found significant positive correlation of serum cholesterol and LDL-C with levels of systolic and

Table 1. Mean (SD) of systolic (BPSYS), diastolic (BPDIAS) blood pressure, serum cholesterol, LDL-C, HDL-C and TG in male and female subjects

Variable	Male	Female	P Value
BPSYS	133.26 (13.7)	133.23 (13.2)	0.99
BPDIAS	84.61 (7.8)	83.67 (7.2)	0.632
CHOLESTROL	196.9 (70)	191.6 (58)	0.747
LDL-C	122.9 (94)	99 (30)	0.179
HDL-C	41.7 (7)	42.5 (8)	0.711
TG	279 (124)	220 (88)	0.032*

*P Value < 0.05 was significance

Table 2. Correlation and partial correlation between systolic blood pressure (BPSYS), diastolic blood pressure (BPDIAS) and serum cholesterol, LDL-C, HDL-C and TG in male and females and comparison them

Variable	Cholesterol	LDL-C	HDL-C	TG-C	Partial correlation	
Male	BPSYS	0.594*	0.472*	0.149	0.249	0.502*
	BPDIAS	0.579*	0.67*	0.2	0.37	0.272
Female	BPSYS	0.6*	0.16	-0.19	0.15	0.61*
	BPDIAS	0.58*	0.22	-0.06	0.02	0.6*
total	BPSYS	0.598*	0.335*	-0.05	0.05	0.565*
	BPDIAS	0.584*	0.491*	0.04	0.197	0.473*

* $P < 0.05$ and significance

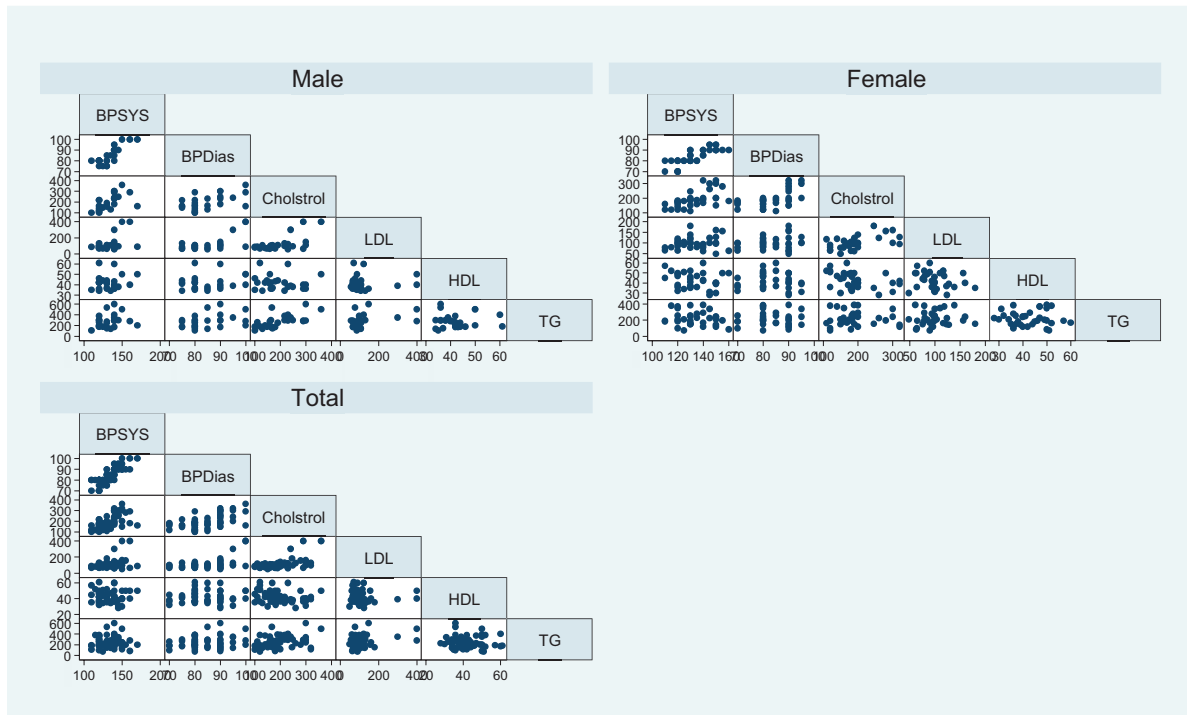


Figure 1. Correlation between systolic blood pressure (BPSYS), diastolic blood pressure (BPDias) and cholesterol, LDL-C, HDL-C and TG in male and female patients.

diastolic blood pressure. In fact in addition to being associated of hypertension with increasing the risk of cardiovascular disease, dyslipidemia is also associated with an increased risk of kidney damage in patients with type 2 diabetes (7). Chronic kidney disease can increase the risk of cardiovascular disease too (4-6,8). Indeed, few attempts have been paid to analyze the relation between levels of blood pressure and dyslipidemia in individuals with T2DM. A relevant understanding of the interrelation between level of blood pressure and serum lipid levels may be through the understanding of how hypertension is related to the development of diabetic kidney disease and, thereby, aggravates by dyslipidemia (8,9). In a study on 1859 patients were diagnosed as hypertension, Qiao *et al.* found blood cholesterol and L-DL-C are associated closely with level of blood pressure (10). A recent cross-sectional survey on 32004 patients showed that co-existence of high blood pressure and abnormal glucose metabolism is common in Chinese population (11).

Conclusion

Hypertension and dyslipidemia both are aggravating factors of diabetic nephropathy, thus more attention to dyslipidemia and appropriate treatment of hypertension could attenuate progression of diabetic kidney disease.

Authors' contributions

All authors contributed in design of the research. AH analyzed the data. HN, SB, AB, PH, and AH wrote the manuscript. MRK edited the paper. All authors read and approved the paper.

Conflict of interests

The authors declared no competing interests.

Ethical considerations

Ethical issues (including plagiarism, data fabrication, and

duplicate publication) have been completely observed by the authors.

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References

1. Baradaran A. Lipoprotein (a), type 2 diabetes and nephropathy; the mystery continues. *J Nephropathol* 2012; 1:126-9.
2. Tolouian R, Hernandez GT. Prediction of Diabetic Nephropathy: The need for a sweet biomarker. *J Nephropathol* 2013;2:4-5.
3. Nasri H, Yazdani M. The relationship between serum LDL-cholesterol, HDL-cholesterol and systolic blood pressure in patients with type 2 diabetes. *Kardiol Pol* 2006; 64:1364-8.
4. Danquah I, Bedu-Addo G, Terpe KJ, Micah F, Amoako YA, Awuku YA, *et al.* Diabetes mellitus type 2 in urban Ghana: characteristics and associated factors. *BMC Public Health* 2012; 12: 210.
5. Nasri H. Hypertension and renal failure with right arm pulse weakness in a 65 years old man. *J Nephropathol* 2012; 1:130-3.
6. Elnasri HA, Ahmed AM. Patterns of lipid changes among type 2 diabetes patients in Sudan. *East Mediterr Health J* 2008;14:314-24.
7. Vijayaraghavan K. Treatment of dyslipidemia in patients with type 2 diabetes. *Lipids Health Dis* 2010 20;9:144.
8. Petitti DB, Imperatore G, Palla SL, Daniels SR, Dolan LM, Kershner AK, *et al.* Serum lipids and glucose control: the

- SEARCH for Diabetes in Youth study. *Arch Pediatr Adolesc Med* 2007;161:159-65.
9. Kamara NT, Asiimwe S. Dyslipidaemia and hypertension among adults with diabetes in rural Uganda. *Trop Doct* 2010;40:41-2.
10. Qiao S, Ye Q, Dou Y, Li M, Kou Y, Qian D, *et al*. Analysis for hypertension and related risk factors of physical examination population. *Int J Clin Exp Med* 2013; 6:785-93.
11. Sun NL, Wang HY, Huo Y. Blood pressure control and glucose metabolism status in hypertension specialty clinics in China. *Zhonghua Nei Ke Za Zhi* 2013; 52:654-8.

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