Dyslipidemia in hypertension

This research is presented to Diyala medical college council as part of graduation requirements for 6th year medical students

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بسم الله الرحمن الرحيم

(وَقُلْ رَبِّ زِدْنِي عِلْماً)

صدق الله العلي العظيم

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Dedication

I would thank God for His grace

who made every difficult thing easier and eased every matter

Thank to my supervisor and professor, **Dr. Ali Muosa**

I would thank **Maryam** for her kindness and support

I would especially thank my best friend **Hisham**

Thank to **Aisha** for helping and support

I thank them all for their support and patience throughout the research period

And to **Dr. Zaid**, who helped me with the statistics and the results of this research

To my group mates also

Finally, I would like to thank all those who helped me in this research and sincerely

I thank all the patients who participated in this study

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Abstract

Background: The prevalence of hypertension in dyslipidemic patients was investigated in a prospective population-based study. Dyslipidemic hypertension was defined in terms of Total Cholesterol (TC) ,Triglycerides (TG) , High-density lipoprotein cholesterol (HDL-C) and Low-density lipoprotein cholesterol (LDL-C)

Objective: - to study the role of dyslipidemia in hypertension

To find out the prevalence of Dyslipidemia along with its associated risk factors Among Hypertension patients in Diyala province Patients, Materials and Methods :-*Study Design , Area and Period* This study has been done in Diyala province which is located in eastern of Iraq , 60 km from the capital city Baghdad The study was conducted during more than one month from the first of March until the 10th of April of 2022 The data was collecting from inpatients in Baquaba teaching hospital, outpatients from clinics , collage and the nearby place , data on socio-demographic characteristics and clinical factors were collected using a structured questionnaire through face to face interview , A questionnaire was prepared to achieve accurate and exact consequence of our study and that questionnaire has been printed so some of the participants whose involved in this study have the opportunity to collect all the data what this study needed , It included at first the full title and main goal of the study , also brief introduction about the whole survey. Furthermore, it covered all the necessary questions started by full name of the individual , then the age , gender , residency , family history , level of education and about the disease that association or lead Hypertension in order to avoid it's effect as a risk factor for many complications , This cross-sectional questionnaire was applied to 100 cases , 50 with hypertension and the other without , gathering data during the period between the 1st of March 2022 and the 10th of April 2022 , data on HBA1c , Random Blood Glucose (RBG) , Total Cholesterol (TC) , Triglycerides (TG) , High-density lipoprotein cholesterol (HDL-C) and Low-density lipoprotein cholesterol (LDL-C) level were collected

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from participants along with Renal Function Test (RFT) Urea & Creatinine and measurement of Blood Pressure , this results used to evaluate the associated risk factors for Dyslipidemia

Results: - Fifty hypertensive subjects were studied and compared to fifty-five non-hypertensive subjects (control). The duration of hypertension was 7.6 ± 7.3 years (1-30 years).

Conclusion: - This is a type from comprehensive evidence-based mapping of literature on different phases of management of hypertension and dyslipidemia in Diyala population. Although we performed a comprehensive review to gather locally relevant data, the number of studies discussing patient-centric outcomes for the management of hypertension and dyslipidemia is limited. Addressing data gaps at different stages of patient management would need a multi-disciplinary effort at the national, healthcare, and population levels to reduce the burden of hypertension and dyslipidemia. Finally, this study may provide a basis for research priority settings and guidance to practice and amend health policies and addition to educating people in order to monitor their health status and lifestyle

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Introduction

Hypertension is one of the most significant risk factors for cardiovascular (CV) morbidity and mortality that is characterized by a systolic blood pressure ≥ 140 mmHg and diastolic blood pressure ≥ 90 mmHg, So risk factors of hypertension in deferent age groups include excessive salt intake, alcohol and decrease the physical activity, also the obesity is a danger risk of hypertension (1) Evidence suspected that hypertension as asymptomatic and need long period to diagnosed also associated with deference types and stages like essential, secondary, white coat, hypertensive crisis and gestational HTN (2) , In some cases people comes early with elevated blood pressure and providing optimal medical care , in this cases of early diagnosis of hypertension, lifestyle should change and pharmacological interventions are essential for controlling the disease. However, poor adherence to non- pharmacological and pharmacological management of hypertension represents a serious challenge for public health in many countries (3) The diseases attributed to hypertension include, renal failure, IHD, stroke, renal failure and heart failure. is also associated with DM, endocrine, nephrological diseases and osteoporosis (4) The American -HEART- Association/American College of Cardiology (AHA/ACC) guidelines treat the all-elevating blood pressure (BP) values above 130/80 mmHg as HTN. Two stages of hypertension have been defined: stage 1 of hypertension in the range of 130–139/80–89 mmHg, and stage 2 for any pressure equal or above 140/90 mmHg. According to the guidelines of the European Society of Cardiology (ESC) and the European Society of Hypertension (ESH) from 2018 and the Polish Society of Hypertension (PTNT) from 2015, normal BP values in an adult were defined as less than 140/90 mmHg (5) It is recommended to divide BP into optimal (below 120/80 mmHg), normal (120–129/80–84 mmHg), high normal (130– 139/85–89 mmHg) and grades of hypertension 1–3. Values in the 140–159/90–99 mmHg ranges are defined as first stage hypertension, in the 160-179/100-109 mmHg ranges as second stage hypertension, and above 180/110 mmHg, third stage an important factor, about one

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third of deaths caused by all cardiovascular diseases, is increased blood cholesterol. Cholesterol may lead to pathological conditions resulting from both accumulation of its particles in the body as well as disorders in their metabolism (3) The basic tests recommended in the diagnosis of lipid disorders include: total cholesterol (TC), triglycerides (TG), HDL cholesterol (HDL-C), LDL cholesterol (LDL- C), and non- HDL cholesterol (non-HDL-C). LDL-C is the main lipid parameter used in the diagnosis of lipid disorders, risk assessment and treatment [7]. The recommended level of TC in the blood is below 200 mg/dL (5.2 mmol/L). Elevated cholesterol is defined as 200–250 mg/dL (5.1–6.5 mmol/L). We talk about a significantly elevated level when its value exceeds 250 mg/dL (> 6.5 mmol/L). The ESH/ ESC guidelines state that cholesterol intake should be reduced to <300 mg/day, especially in people with high plasma levels. The Polish Diabetes Association also reports that, in patients with elevated LDL cholesterol (≥ 100 mg/dl), dietary cholesterol should be reduced to <200 mg/ day (6) Due to ageing that we checked of the population, a non-healthy lifestyle and the increase in average body weight may lead to elevated the percentages diagnosis of hypertensive. Forecasts indicate that by the next 5-10 years the number of people with hypertension will have increased by 15%, reaching about more than billion people. A lifestyle modification is the most effective method for preventing. So, in the early diagnosis of the disease screening of blood pressure measurements performed at least once a year is of key importance (8) the BP measurements outpatient clinic or at a physician's office it's the GOLD standard for diagnosing HTN (7). Cholesterol is an important substance in intermediary metabolism. Endocrine condition associated with dyslipidemia include diabetes mellitus (Type ll especially) and hypothyroidism. Genetic predisposition, cigarette smoking, obesity, poor diet, and lifestyle can all lead to dyslipidemia. Dyslipidemia can be (acquired or familial) Familial Hypercholesterolemia (FH) is a common cause of premature cardiovascular disease. The principal metabolic causes of atherosclerosis include hyperlipidemia, hypertension, obesity, insulin resistance and diabetes mellitus (9) The treating of hypertension will only reduce chronic

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heart disease risk proximally 25% and treating dyslipidemia in hypertensive patients will reduce CHD proximally 35%, while if treating both of dyslipidemia and hypertension will reduce the chronic heart disease up to 50% and it's a very good prognosis (10)

Aim to study the correlation between dyslipidemia and hypertension

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Patients, Materials and Methods

Study Design , Area and Period This study has been done in Diyala province which is located in eastern of Iraq , 60 km from the capital city Baghdad The study was conducted during more than one month from the first of March until the 10th of April of 2022 The data was collecting from inpatients in Baquaba teaching hospital, outpatients from clinics , collage and the nearby place , data on socio-demographic characteristics and clinical factors were collected using a structured questionnaire through face to face interview , A questionnaire was prepared to achieve accurate and exact consequence of our study and that questionnaire has been printed so some of the participants whose involved in this study have the opportunity to collect all the data what this study needed , It included at first the full title and main goal of the study , also brief introduction about the whole survey. Furthermore, it covered all the necessary questions started by full name of the individual , then the age , gender , residency , family history , level of education and about the disease that association or lead Hypertension in order to avoid it's effect as a risk factor for many complications , This cross-sectional questionnaire was applied to 100 cases , 50 with hypertension and the other without , gathering data during the period between the 1st of March 2022 and the 10th of April 2022 , data on HBA1c , Random Blood Glucose (RBG) , Total Cholesterol (TC) , Triglycerides (TG) , High-density lipoprotein cholesterol (HDL-C) and Low-density lipoprotein cholesterol (LDL-C) level were collected from participants along with Renal Function Test (RFT) Urea & Creatinine and measurement of Blood Pressure , this results used to evaluate the associated risk factors for Dyslipidemia

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Statistics

Statistical analyses were performed using SPSS statistical package for
Social Sciences (version 20.0 for windows, SPSS, Chicago, IL, USA).
Quantitative data are represented as mean, SD, minimum and maximum.
Qualitative data are expressed as number and percentage. Student's t-test was
used to study the difference between diabetics and control groups
Chi-square test was used to test the relation between the presence or absence of
infection with other factors.
P value of <0.05 was considered statistically significant.

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Results

Fifty hypertensive subjects were studied and compared to fifty five non-hypertensive subjects (control). The duration of hypertension was 7.6±7.3 years (1-30 years).

Demographic characteristics are presented in the following tables.

Table 1: Demographic characteristics of the studied groups

		Group			
		Hypertension		Control	
		Count	%	Count	%
Age group	20-39	11	22.4%	28	50.9%
	40-59	24	49.0%	20	36.4%
	60+	14	28.6%	7	12.7%
Gender	Male	36	72.0%	28	50.9%
	Female	14	28.5%	27	49.1%
Residence	Urban	28	56.0%	37	67.3%
	Rural	22	44.0%	18	32.7%
Education	High	23	46.0%	21	38.9%
	Low	27	54.0%	33	61.1%

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Table 2: Presence of hypertensive risk factors and other chronic diseases in the studied groups

		Group			
		Hypertension		Control	
		Count	%	Count	%
Stress	Yes	48	96.0%	0	0.0%
	No	2	4.0%	0	0.0%
Family history	Yes	44	88.0%	23	41.8%
	No	6	12.0%	32	58.2%
Anti HBP Rx	Yes	43	86.0%	0	0.0%
	No	7	14.0%	0	0.0%
IHD	Yes	18	36.7%	4	8.0%
	No	31	63.3%	46	92.0%
Renal	Yes	14	28.0%	6	10.9%
	No	36	72.0%	49	89.1%
Neurological	Yes	20	40.0%	3	5.5%
	No	30	60.0%	52	94.5%
Lipid	Yes	27	54.0%	10	18.9%
	No	23	46.0%	43	81.1%
Anti lipid Rx	Yes	22	81.5%	6	66.7%
	No	5	18.5%	3	33.3%
DM	Yes	20	40.0%	8	14.5%
	No	30	60.0%	47	85.5%

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Table 3: Blood pressure in the studied groups

| | Group | | | | | | | |
| | Hypertension | | | | Control | | | |
	Mean	SD	Min	Max	Mean	SD	Min	Max
SBP P=0.005	152.00	18.32	110.00	220.00	114.82	4.08	110.00	120.00
DBP P=0.005	95	14	55	140	75	4	70	80

There was a significant difference in blood pressure measurements in the studied groups (P<0.05)
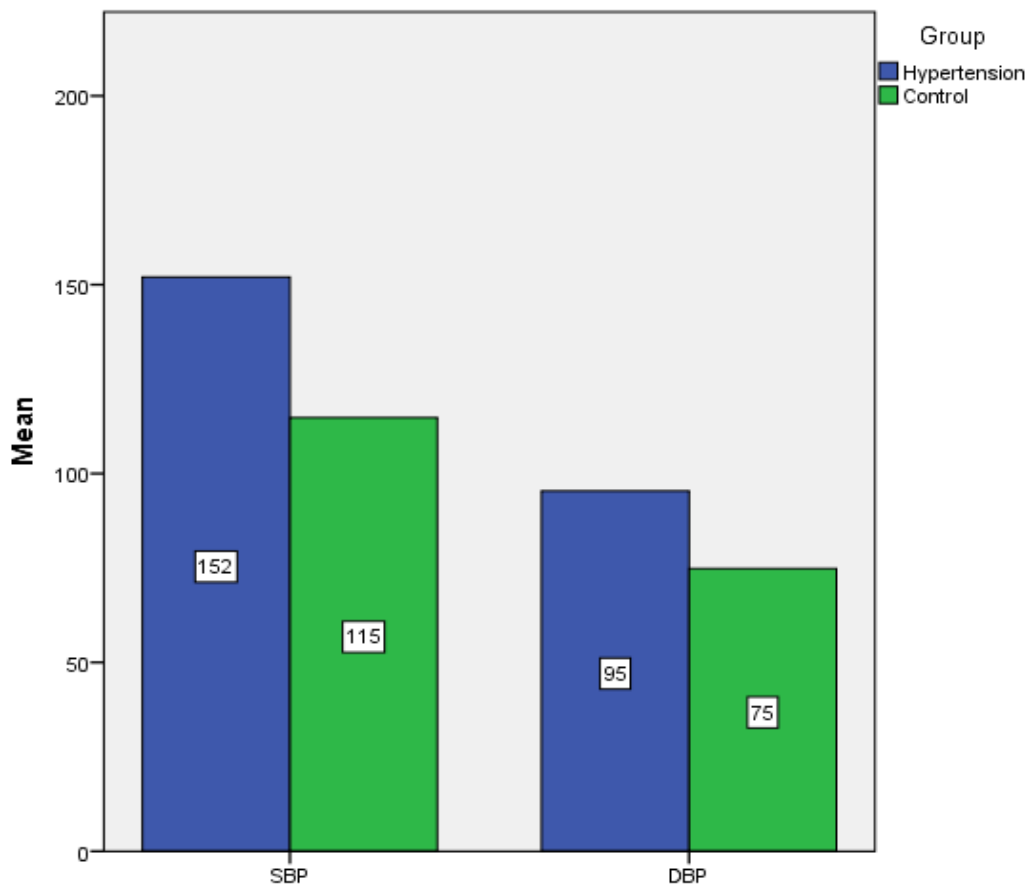

Figure 1: Systolic and diastolic pressure readings in the studied groups

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Table 4: Comparing glucose, HBA1c, urea and creatinine between hypertensive subjects and control

	Group							
	Hypertension				Control			
	Mean	SD	Min	Max	Mean	SD	Min	Max
RBS mg/dl P=0.005	179.62	90.71	75.00	410.00	118.84	61.56	71.00	374.00
Urea mg/dl P=0.316	27.42	15.44	16.10	110.00	25.07	7.47	11.00	41.00
Creatinine mg/dl P=0.037	0.99	1.01	0.23	7.60	0.69	0.23	0.39	1.30
HBA1c% P=0.108	9.63	16.47	4.20	123.00	6.01	1.55	3.99	11.62

There was a significant difference between hypertensive and control groups in RBS and creatinine ($P<0.05$). Student's t-test; while urea and HBA1c% were not different ($P>0.05$)

RBS and creatinine were higher in the hypertensive group.

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Table 5: Comparing lipid profile in the studied groups

| | Group | | | | | | | |
| | Hypertension | | | | Control | | | |
Mean	Mean	SD	Min	Max	Mean	SD	Min	Max
Total cholesterol mg/dl P=0.506	195.94	31.20	131.00	276.00	189.05	66.66	105.00	475.00
Triglyceride mg/dl P=0.210	179.52	59.43	56.00	338.00	157.16	111.71	43.00	525.00
HDL mg/dl P=0.898	105.02	34.57	28.80	190.00	103.84	56.45	29.00	329.00
LDL mg/dl P=0.001	69.98	23.97	32.00	130.00	52.94	26.71	13.50	190.00

There was no significant difference in hypertensive than control groups for total cholesterol, TG and HDL (P>0.05); while LDL were significanlty higher (P<0.05). Student's t-test
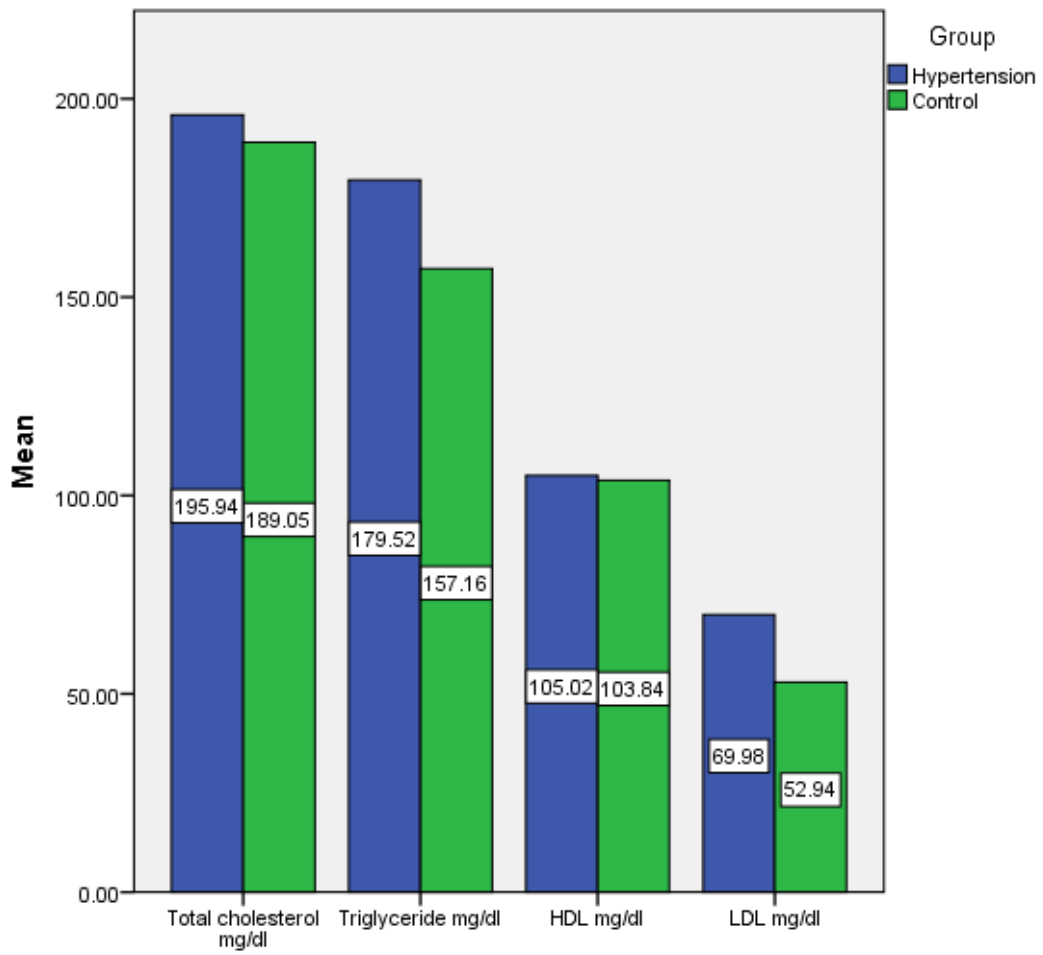
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Figure 2: Lipid profile in the studied groups

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Discussion

The relationship between hypertension and dyslipidemia has been discussed many times in many countries (22,23)

The hypertensive and serum lipid showed to be important predictors for metabolic disturbance including dyslipidemia, diabetes mellitus, cardiovascular diseases etc.

This study demonstrates that the higher levels of plasma TC, HDL-C(P>0.05) , and the TC, LDL-C (P<0.05)ratio are associated with hypertension and that higher levels of HDL-C are associated with a decreased risk of incident hypertension , this result seen in 50 cases of non-hypertensive , while in other 50 hypertensive cases seen low HDL-C , Elevated lipid levels appear to predate the onset of hypertension by years this result showed that the higher incidence of hypertension occurred in average of (40-59 years) 49 % age group , average of (20-39 years) is 22.4 % and > 60 years 28.6 % , From 1988 to 1994, the prevalence of hypertension in the United States between the ages of 20 and 74 years was &23%, and, in men over the age of 64 years, that proportion increased to 64% (21) , The patient who had low education are more risky Lipids and blood pressure have been associated in several cross-sectional studies (17) Castelli and Anderson **(18)** found that BP and serum cholesterol were strongly correlated among hypertensive patients, which led to early recommendations to treat elevated cholesterol in patients with hypertension.(19) Gaziano et al **(20)** also noted a potential interaction between elevated cholesterol and hypertension in the development of MI that suggested a direct relationship rather than the effect of 2 independent predictors. Also stress playing a real role of increase blood pressure that's our result shown 96% of 50 cases associated with affect while only 4% of them with no stress affected , Also a family history of hypertensive associated with 88% of our patients Other complications associated like renal diseases 28% less than neurological diseases 40% , Also Random Blood Glucose has been done for 50 cases of hypertensive and we found that 40% have diabetes mellitus , Anderson (18) Approximately found same result

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Perspectives

we found in our study association between baseline lipids and the subsequent development of hypertension. in this study a relationship between risk factor for atherosclerosis, hypertension and dyslipidemia suggests that hypertension may be a cause of atherosclerosis, my opinion that we need to educate people and inform that they should follow up and screening serum lipid profile to for identifying potential risk factors amenable we may eventually be able to reduce the burden of hypertension and subsequent cardiovascular disease.

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Conclusion

This is a type from comprehensive evidence-based mapping of literature on different phases of management of hypertension and dyslipidemia in Diyala population. Although we performed a comprehensive review to gather locally relevant data, the number of studies discussing patient-centric outcomes for the management of hypertension and dyslipidemia is limited. Addressing data gaps at different stages of patient management would need a multi-disciplinary effort at the national, healthcare, and population levels to reduce the burden of hypertension and dyslipidemia. Finally, this study may provide a basis for research priority settings and guidance to practice and amend health policies and addition to educating people in order to monitor their health status and lifestyle

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Recommendations

Hyperlipidemia is a risk factor for atherosclerosis and lead to many diseases and the education is very important thing for all of as in our socity so the recommendation is starting with screening or assessment of serum lipid profile routinely and changing of lifestyle and maintain a good diet to be in perfect body weight for avoiding many disease like hypertension and other cardiovascular diseases (CVD) , reducing saturated fat intake to 7 percent of total calories and limiting cholesterol to 200 mg per day reduce LDL cholesterol levels by 9 to 12 percent (16) ,so the diet is the basis of treatment of hyperlipidemia, also the physical exercise one of the good options which we have , The effects of exercise on serum lipid levels have been studied extensively. demonstrating that one positive effect of regular aerobic exercise is to raise HDL cholesterol levels (14), Other effects include decreases in total cholesterol, LDL cholesterol, and triglyceride levels (14) , The minimal amount of exercise needed to increase HDL cholesterol levels is 900 kcal of energy expenditure per week, or about 120 minutes of typical aerobic exercise (15) . Also as we know the stress is one of the main causes of hypertension so we should control ourself, Also we have medical therapy for hyperlipidemia treatment recommended for patients who have elevation of serum lipid, statins remain the 1st line drug treatment To decrease the elevation of serum lipid, Although of it side effects.

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