ORIGINAL ARTICLE

Evaluation of Lipid Profiles and Hematological Parameters in Hypertensive Patients

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ABSTRACT

Aim: To evaluate the lipid profiles and hematological parameters in hypertensive patients.

Study design: Cross sectional analytical study

Place and duration of study: Department of Hematology, Shaikh Zayed Hospital, Lahore from 1st July 2021 to 31st December 2021.

Methodology: Eighty hypertensive patients within the age group of 25-65 years were enrolled. A 5-cc blood was withdrawn from each study patient for analysis of their complete lipid profile including triglycerides, cholesterol, low density lipoproteins, high density lipoproteins as well as for hematological parameters analysis which included red blood cells, white blood cells hematocrits, hemoglobin, red blood cell indices and platelets.

Result: The mean age of the patients was 51.89±12.47 years. There were 45 males and 35 females in this study. Obesity was more common in hypertensive women than men. Lipid profile except high density lipoproteins was significantly higher in patients with uncontrolled blood pressure levels. High red blood cells were observed in both males and females with uncontrolled blood pressure while the platelets level decreased in uncontrolled BP males and increased in uncontrolled BP females in comparison to controlled males and females respectively. An increased level of hemoglobin and hematocrit in patients from both genders with uncontrolled blood pressure was observed.

Conclusion: Disturbed lipid profile and hematological parameters imbalances are related with the hypertension

Key words: Lipid profile, Hematological parameters, Hypertension

INTRODUCTION

Hypertension has been commonly related with cardiovascular diseases. The prevalence of hypertension has been reported as 26.4% globally in year 2000 while this prevalence is expected to raise up to 1.5 billion by year 2025. The attributing justification is a high number of older populations worldwide with an overall excessive population in the developing countries.[1,2] The progression of hypertension is related with various modifiable as well as non-modifiable factors including age, gender, body mass index, high sodium usage, comorbidities, alcohol consumption, depression, hyperlipidemia and genetic factors.[3]

Excessive cholesterol intake in addition to saturated fatty acids causes lipid imbalances inside the body. This results in hyperlipidemia, hypertriglyceridemia or hypercholesterolemia. All these conditions are related with obesity and hypertension[4]. Hypertension in addition to dyslipidemia has been identified as major risk factors with cardiovascular disease up to a percentage risk of 15-31%. This further accounts for a high number of disabilities and morbidities in underdeveloped and developing countries[5,6]. Alteration in lipid levels inside the serum have been targeted as the main cause of cardiovascular disease and is also related with hypertension therefore establishing the term as dyslipidemia hypertension[7,8].

Hypertension merely is not associated with cardiovascular disease and is involved in other major organ related damages including renal and nervous system issues. Uncontrolled blood pressure can result into stroke formation[8]. There has been a major debate on the hematological parameters involvement in hypertension. Various haematological parameters are responsible for blood flow and transport of essential minerals and vitamins, co enzymes and co factors inside the targeted tissues and cells. In hypertensive condition a significant alteration in its parameters can be resulted. The present study was designed to analyze the association of lipid profile and hematological parameters with hypertension[9-11].

The results of this study will assist in understanding their health-related impact and strategies for their maintenance and bring health related betterments.

MATERIALS AND METHODS

This cross sectional analytical study was conducted at Department of Hematology, Shaikh Zayed Hospital Lahore from 1st July 2021 to 31st December 2021 after getting permission from Ethical Review Board. A total of 80 hypertensive patients which were within the age group of 25-65 years were enrolled. Those patients who were having preeclampsia history, obesity, hematological imbalances, diabetes mellites and on lip management medications were excluded from the study. Informed consent was obtained from all study patients. The sample size was calculated by using WHO sample size calculator considering hypertensive prevalence as 19-25% using 80% power of test, 95% CI and 5% margin of error. A 5-cc blood was withdrawn from each study patient for analysis of their complete lipid profile including triglycerides, cholesterol, low density lipoproteins, high density lipoproteins as well as for hematological parameters analysis which included red blood cells, white blood cells hematocrits, hemoglobin, red blood cell indices and platelets. For the purpose if blood analysis the 5cc blood was divided into 2 tubes each with 2.5 cc. One tube contained anti-coagulant while other was used to generate blood serum. The proper storage of samples was performed until analysis. Auto analyzer using coulter method in case of hematological parameters (Abbott company) was used for analyzing the biochemical and hematological analytes. Waist circumference was also measured by standardized protocol. Demographic details of each patients and their gender, clinical histories, BMI, blood pressure and symptoms were documented on a well-structured questionnaire. Data was analyzed by SPSS version 26 using Chi square test where p value <0.05 was considered as significant.

RESULTS

The mean age of the patients was 51.89 ±12.47 years. There were 45 males and 35 females in this study with most of them married. As 84.4% of males were married and 60% of females were also married. Majority of the patients visiting the clinical setting were residents of an urban area (72.5%). The educational level also represented majority of them to have at least college level education (Table 1).

Obesity was more common in hypertensive women than men with women to be the only gender having a BMI greater than 30 value. The waist circumference (WC) of the patients also showed that majority of the women was having high WC value

than normal. Family history was also more common in females in addition to uncontrolled blood pressure (Fig. 1).

The results of this study showed that the lipid profile except high density lipoproteins (HDL) was significantly higher in patients with uncontrolled blood pressure levels. Total cholesterol (TC) and low-density lipoproteins (LDL)in uncontrolled men was higher than uncontrolled women however the value of triglycerides (TG) was much higher in females than males (Table 2).

High red blood cells were observed in both males and females with uncontrolled blood pressure while the platelets level decreased in uncontrolled BP males and increased in uncontrolled BP females in comparison to controlled males and females respectively. An increased level of hemoglobin and hematocrit in patients from both genders with uncontrolled blood pressure was observed (Table 3).

Table 1: Gender wise demographic distribution of the patients

Variables	Males (n = 45)	Females (n = 35)	Total (n = 80)
Age in years	53.85±11.3	49.93±13.65	51.89±12.47
Marital status			
Single	3(6.66%)	5 (14.28%)	8 (10%)
Married	38 (84.4%)	21 (60%)	59 (73.7%)
Divorced	3 (6.66%)	5 (14.28%)	8 (10%)
Widowed	1 (2.22%)	4 (12.5%)	5 (6.25%)
Residence			
Rural	12 (26.66%)	10 (28.57%)	22 (27.5%)
Urban	33 (73.33%)	25 (71.42%)	58 (72.5%)
Educational status			
Illiterate	13 (28.8%)	7 (20%)	20 (25%)
Up to grade 12	7(15.5%)	21 (60%)	28 (35%)
College & above	25 (55.5%)	7 (20%)	32 (40%)

Table 2: Comparison of lipid profile between males and females

Variables	Males (n = 45)			Females (n = 35)		
	BP controlled	BP uncontrolled	P	BP controlled	BP uncontrolled	p
TC	194.42±55.91	227.02±34.27	0.015	184.86±55.56	216.67±62.29	0.097
TG	183.1 ±70.31	202.95±165.12	0.61	148.89±45.56	262.61±181.53)	0.019
LDL-C	106.86±38.42	128.00±36.11	0.044	92.12±33.43	127.73±57.57	0.027
HDL-C	65.34±17.93	61.37±21.89	0.47	72.01±19.91	59.81±19.50	0.054

Table 3: Comparison of hematological parameters of males and females with controlled and uncontrolled blood pressure value

| Variables	Males (n = 45)			Females (n = 35)		
	BP controlled	BP uncontrolled	P	BP-controlled	BP uncontrolled	p
RBC (10^6cells/µL)	4.66±0.58	4.91±0.45	0.049	4.52±0.47	4.65±0.44	0.28
WBC (10^3 cells/µL)	6.25±1.55	7.72±2.51	0.008	8.27±3.51	8.02±2.05	0.96
Platelets (10^3 ×cells /µL)	234.72±77.2	212.16±76.54	0.287	224.28 ±59.28	278.95±70.77	0.013
MCV (fL)	90.01±4.61	88.71±2.69	0.185	88.32±4.74	88.95±3.11	0.58
MCH (pg)	31.65±2.09	31.10±1.07	0.212	30.66±2.37	31.61±1.81	0.12
MCHC (%)	34.47±1.78	35.12±0.94	0.085	34.73 ±1.15	35.14±13.08	0.15
Haemoglobin (g/dL)	14.78±1.46	15.44±1.27)	0.077	13.77 ±2.06	14.69 ±1.78	0.12
Haematocrit (%)	42.49±4.1	44.14 ±4.22	0.12	39.61±5.55	41.06±4.26	0.31
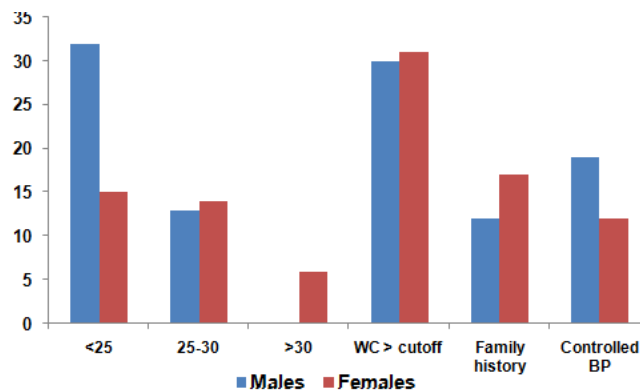
Fig. 1: Gender wise distribution of BMI, Waist circumference and blood pressure

DISCUSSION

The current research reported high levels of cholesterol, triglycerides and low-density lipids in cases of uncontrolled hypertension when compared with findings of controlled hypertensive cases. Lipid abnormalities were significantly related with the status of hypertension and showed a direct relation with hypertension and an increasing trend towards cardiovascular disease. Similar results have been reported from other researcher which elaborates that increasing trend of triglycerides, total cholesterol and low-density lipid is found with increasing levels of blood pressure while a decreasing trend is seen with high density lipoproteins with increasing blood pressure level[12-16]. Abnormally raised levels of triglycerides were related with high incidence of cardiovascular disease as well as strokes[17].

The present study results also showed elevated white blood cells and red blood cells values in male cases of controlled and uncontrolled blood pressure respectively. A statistically significant variance within platelet levels of controlled and uncontrolled blood

pressure of female cases was also interpreted in the current study. White blood cell count has been reported in various literatures to be associated with hypertension[18]. Raised microvascular capillary resistance is formed with inflammation. Increase levels of catecholamine are also observed in raised inflammation. There has been a significant relation within hypertension and inflammation[19].

Hemoglobin being the major significant whole blood viscosity determinant[20]. The increase in concentration of hemoglobin is related with hypertension as also presented in the present study results where uncontrolled blood pressure patients had higher levels of hemoglobin than controlled hypertensives[20,21].

CONCLUSION

Lipid profile and hematological parameters imbalances are related with the hypertension and are significantly disturbed in conditions of uncontrolled hypertension leading to a higher risk of cardiovascular disease and stroke.

Conflict of interest: Nil

REFERENCES

1. Cornier MA, Dabelea D, Hernandez TL, et al. The metabolic syndrome. Endocr Rev 2008;29: 777-822.
2. World Health Organization (WHO). Noncommunicable diseases country profile. Geneva: World Health Organization, 2011.
3. Leone A. Modifying cardiovascular risk factors: epidemiology and characteristics of hypertension-related disorders. Curr Pharm Des 2011; 17: 2948-54.
4. Kotsis V, Stabouli S, Papakatsika S, et al. Mechanisms of obesity-induced hypertension. Hypertens Res 2010; 33: 386-93.
5. Reddy KS. Cardiovascular disease in non-Western countries. N Engl J Med 2004; 350: 2438-40.
6. Dalal JJ, Padmanabhan T, Jain P, et al. Lipitension: interplay between dyslipidemia and hypertension. Indian J Endocrinol Metab 2012; 16: 240-45.
7. Halperin RO, Sesso HD, Ma J, et al. Dyslipidemia and the risk of incident hypertension in men. Hypertension 2006; 47: 45-50.

8. Srinivaspai K, Bhagoji SB, Biswas A. A study on the lipid profile of hypertensive patients in Mangalore? Int J Pharmaceut Sci Bus Manag 2014; 2: 1-10.

9. Al-Muhana F, Larbi E, Al-Ali A, et al. Haematological, lipid profile and other biochemical parameters in normal and hypertensive subjects among the population of the eastern province of Saudi Arabia. East Afr Med J 2006; 83: 44-8.

10. Osuji CU, Omejua EG. Prevalence and characteristics of the metabolic syndrome among newly diagnosed hypertensive patients. Indian J Endocrinol Metab 2012;16: S104-9.

11. Tachebele B, Abebe M, Addis Z, et al. Metabolic syndrome among hypertensive patients at University of Gondar Hospital, North West Ethiopia: a cross sectional study. BMC Cardiovasc Disord 2014; 14: 177.

12. Reza CM, Kabir ASMA, Biswas T, et al. Status of lipid profile among the hypertensive patients in Bangladesh. Univ Heart J 2014; 9: 13-7.

13. Ghooshchi G, Masoomian M, Yazdi MS, et al. Evaluation of the lipid profile of hypertensive patients compared to non-hypertensive individuals. Patient Safe Qual Improv J 2014; 2: 120-23.

14. Prabhanjan K, Moges B, Yohannes A, et al. A study of lipid profiles in hypertensive patients visiting Dilla University Referral Hospital. Int J Sci Res 2014; 3: 2336–8.

15. Srivastava A, Binawara B. Comparative study on lipid profile of hypertensive patients and non-hypertensive individuals in Bikaner, Rajasthan, India. J Pharmaceut Biosci 2016; 4: 62-6.

16. Nayak P, Panda S, Mohapatra S, et al. Evaluation of lipid profile and apolipoproteins in essential hypertensive patients. J Clin Diagn Res 2016; 10: BC01-4.

17. Albuche J, Ferrieres J, Ruidavets J, et al. Serum lipids in young patients with ischaemic stroke: a case-control study. J Neurol Neurosurg Psychiatry 2000; 69: 29-33.

18. Karthikeyan V, Lip G. White blood cell count and hypertension. J Hum Hypertens 2006; 20: 310-12.

19. Bautista LE, Lopez-Jaramillo P, Vera LM, et al. Is C-reactive protein an independent risk factor for essential hypertension? J Hypertens 2001; 19: 857-61.

20. Simone G, Devereux RB, Chien S, et al. Relation of blood viscosity to demographic and physiologic variables and to cardiovascular risk factors in apparently normal adults. Circulation 1990; 81: 107-17.

21. Kawamoto R, Tabara Y, Kohara K. A slightly low hemoglobin levels is beneficially associated with arterial stiffness in Japanese community-dwelling women. Clin Exp Hypertens 2012; 34: 92-8.