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RESEARCH ARTICLE
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COMPARATIVE ANALYSIS OF LIPID PROFILE AND SERUM ELECTROLYTES IN PATIENTS WITH ESSENTIAL HYPERTENSION.

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Introduction:
Hypertension is not viewed as a specific disease but rather as a quantitative trait that deviates from normal values. Blood pressure refers to the force exerted by circulating blood on the walls of blood vessels, essential for delivering oxygen and nutrients to tissues and organs and removing metabolic waste. Blood pressure is considered optimal when the systolic blood pressure (SBP) is below 120 mmHg and the diastolic blood pressure (DBP) is below 80 mmHg. Hypertension is diagnosed when SBP exceeds 140 mmHg and/or DBP exceeds 90 mmHg.[1] According to the Global Burden of Disease 2019 (GBD 2019) estimates, the leading metabolic risk factor globally is elevated blood pressure, to which 19% of global deaths are attributed.[2]
Hypertension is a major public health problem due to its high prevalence worldwide as per World Health Organization (WHO), The number of adults with hypertension increased from 594 million in 1975 to 1.13 billion in 2015, with the increase seen mainly in lowand middle-income countries.[3]
The only way to detect hypertension is to have a health professional measure blood pressure. Having blood pressure measured is quick and painless. Although individuals can measure their blood pressure using automated devices, an evaluation by a health professional is important for assessing risk and associated conditions.[4]

Complications of hypertension:[5]
Excessive pressure on the artery walls caused by high blood pressure can damage blood vessels, as well as organs. High blood pressure and the longer we can be controlled, the more it is harmful.[3]
Uncontrolled high blood pressure can lead.
• Stock
• Aneurysm
• Vascular disease, heart disease and heart failure
• Metabolic diseases
• Nephropathy
• High blood pressure

• Retinopathy

Material and Methods: Study was conducted in the of department of Biochemistry and department of General Medicine during a period from Aril 2024-March 2025 at Government Medical College & Super specialty Hospital Chakrapanpur Azamgarh.

Result:

Table 1: Gender distribution of the patients with percentage.

Gender	Case Group (n=65)	Control Group (n=65)	percentage	p value
Male	38	36	74 (57%)	0.712
Female	27	29	56 (43%)	

The gender distribution between the case and control groups showed no statistically significant difference (p = 0.712). Males constituted 57% of the total study population (38 in the case group and 36 in the control group), while females made up 43% (27 in the case group and 29 in the control group). This indicates that gender was evenly distributed across both groups, and thus unlikely to have influenced the outcome of the study

Table:2 Camparison of Systolic and diastolic blood pressor between case controls.

Study Variables	Case n=65	Control n=65	P value
Systolic BP (mmHg)	135.6 ± 15.2	128.4 ± 12.8	0.013
Diastolic BP (mmHg)	85.3 ± 9.6	79.7 ± 8.4	0.007

Systolic and diastolic blood pressure were significantly higher in the hypertensive group compared to controls (p = 0.013 and 0.007, respectively), confirming elevated BP levels in the case group.

Table 3: Age Distribution Among Case and Control Groups (n = 130)

Age Group (years)	Case (n=65)	Control (n=65)	Total (n=130)	Total Percentage (%)	p-value
18–30	8	11	19	15	0.72
31–45	22	25	47	36	
46–60	24	21	45	35	
>60	11	8	19	15	
Total	65	65	130	100%	

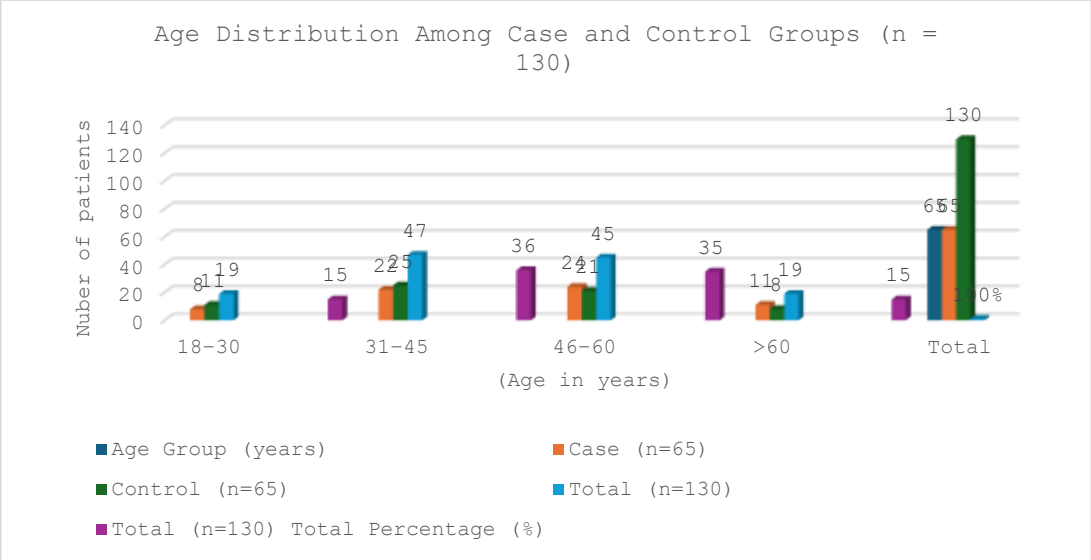

Figure 1: grammatical represents Age Distribution Among Case and Control Groups (n = 130)

Table 4: Comparison of Mean Scores Between Study and Control Groups Across Different Age Groups.

Age Group (years)	Study Group (Mean ± SD)	Control Group (Mean ± SD)	P-value	t-value
<30	104.00 ± 26.69	82.80 ± 18.81	>0.05	1.45
31–40	114.63 ± 33.67	111.10 ± 24.23	>0.05	0.53
41–50	112.84 ± 39.09	110.38 ± 25.15	>0.05	0.37
51–60	116.22 ± 36.61	114.62 ± 26.48	>0.05	0.27
>60	110.49 ± 37.49	109.60 ± 24.70	>0.05	0.132

Table represents in all age groups, the Study Group showed slightly higher mean values compared to the Control Group. However, the differences were not statistically significant ($p > 0.05$), with low t-values across the board. The largest difference was seen in the <30 age group, but even this did not reach significance. Overall, the data suggests no significant impact of the intervention across age groups.

Table 5: Comparison of Lipid Profile and Serum Electrolytes Between Case and Control Groups

Parameter	Case Group (n=65) Mean ±SD	Control Group (n=65) Mean ±SD	P-value
Total Cholesterol (mg/dL)	208.4 ± 38.5	182.6 ± 30.2	0.001**
Triglycerides (mg/dL)	172.3 ± 45.1	142.7 ± 35.6	0.003*
HDL-Cholesterol (mg/dL)	38.7 ± 6.8	47.2 ± 7.5	0.000
LDL-Cholesterol (mg/dL)	128.6 ± 32.4	110.5 ± 28.7	0.004*
VLDL-Cholesterol (mg/dL)	34.6 ± 9.1	28.5 ± 7.3	0.005*
Sodium (Na^+, mEq/L)	138.2 ± 4.5	140.6 ± 3.8	0.012*
Potassium (K^+, mEq/L)	4.2 ± 0.5	4.4 ± 0.4	0.085
Chloride (Cl^-, mEq/L)	101.6 ± 3.9	103.3 ± 4.2	0.036*
Calcium (Ca^{2+}, mg/dL)	8.6 ± 0.6	9.1 ± 0.5	0.001**

Total cholesterol and triglycerides were significantly higher in the hypertensive group compared to controls ($p = 0.001$ and 0.003, respectively), indicating a higher risk of atherosclerosis and cardiovascular disease. HDL-cholesterol, the "good cholesterol," was significantly lower ($p = 0.001$), reflecting reduced cardiovascular protection. Similarly, LDL and VLDL levels were significantly elevated in the case group ($p = 0.004$ and 0.005), supporting the presence of dyslipidemia in hypertension. Among electrolytes, sodium levels were slightly but significantly lower in hypertensive patients ($p = 0.012$), possibly due to altered sodium handling or the use of diuretics. Chloride and calcium levels were also significantly reduced ($p = 0.036$ and 0.001), which may relate to renal effects or increased vascular resistance. Potassium levels showed a marginal decrease in the case group, but this difference was not statistically significant ($p = 0.085$), indicating no strong association in this sample.

Discussion: The study shows that essential hypertension is associated with significant changes in lipid profile and serum electrolytes. Hypertensive patients had higher total cholesterol, triglycerides, LDL, and VLDL, and lower HDL levels, indicating dyslipidemia.[6] Electrolytes like sodium, chloride, and calcium were significantly lower, while potassium showed a non-significant decrease. Age and gender were evenly distributed, and higher blood pressure readings confirmed the diagnosis in the case group.[7]

Conclusion: This study concludes that essential hypertension is strongly associated with dyslipidemia and certain serum electrolyte imbalances, particularly reduced sodium, chloride, and calcium levels. Monitoring these parameters in hypertensive patients may help in early detection of complications and in guiding more comprehensive treatment strategies to reduce cardiovascular risk.

Conflict of Interest: The authors declare no conflict of interest related to this study.

Reference:

1. Md. Balal et al. Study of Lipid Profile, Serum Magnesium and Blood Glucose in Hypertension International Journal of Pharmaceutical and Clinical Research 2023; 15 (12); 836-840
2. Abebe SM, Berhane Y, Worku A, Getachew A. Prevalence and Associated factors of hypertension: a Cross-sectional Community based study in Northwest Ethiopia. PLoS ONE. 2015;10(4): e0125210.
3. WHO. Hypertension [Internet]. 2021 [cited 2023 Jan 5]. https://www.who.int/ news-room/fact-sheets/detail/hypertension.
4. Al-Makki A, DiPrete D, Whelton PK, Murad MH, Mustafa RA, Acharya S, et al. Hypertension pharmacological treatment in adults: a World Health Organization Guideline Executive Summary. Hypertension. 2022;79(1):293–301.
5. Whelton PK, Carey RM, Aronow WS, Casey DE Jr, Collins KJ, Dennison Himmelfarb C, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA guideline for the prevention, detection, evaluation, and management of high blood pressure in adults. J Am Coll Cardiol. 2018;71(19): e127–e248.
6. Sharma R, Singh S, Kumar V. A study of lipid profile and correlation of serum uric acid levels in patients with hypertension. J Clin Diagn Res. 2024;18(4):123-128.
7. Das S, Roy S, Dutta P. Serum electrolyte and blood lipid profile in stroke patients: a cross-sectional study. Int J Glob Health Res. 2025;7(1):45-52