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STUDY OF APOLIPOPROTEIN B100 AND LIPID PROFILE AMONG OBESE AND NON-OBESE HYPERTENSIVE PATIENTS IN A TERTIARY CARE CENTRE SANT BABA GURU GHASIDAS JI MEMORIAL GOVERNMENT HOSPITAL RAIGARH, CHHATTISGARH: CASE CONTROL STUDY

Biochemistry

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ABSTRACT

Background: Obesity & hypertension are major non-communicable diseases associated with increased cardiovascular morbidity and mortality. Obesity is associated with dyslipidaemia & elevated Apolipoprotein B100, which increase the risk of atherosclerosis and cardiovascular disease. **Aim:** To analyse Apo-B100 and lipid profile in obese hypertensive patients and non-obese hypertensive patients. **Materials and Methods:** The present hospital-based observational comparative study was conducted in the Department of Biochemistry at Late Shri Lakhiram Agrawal Memorial Govt. Medical College & associated Hospital. A total of 100 hypertensive patients included, comprising 50 obese and 50 non-obese individuals. After ethical clearance and informed consent, fasting blood samples were collected for estimation of Apo-B100 and lipid profile. Apo-B100 was analysed by nephelometry, while lipid profile parameters were estimated using standard biochemical protocol with a semi-auto analyser. **Results:** Obese hypertensive patients were more common in 51–75 years age group (52%), while non-obese hypertensive patients were more common in 36–50 years age group (40%). BMI, systolic blood pressure and diastolic blood pressure were significantly higher in obese hypertensive patients compared to non-obese hypertensive patients (P<0.001). Apo-B100 & lipid profile were significantly elevated in obese hypertensive patients, whereas HDL levels were significantly lower (P<0.001). **Conclusion:** Obese hypertensive patients showed significant dyslipidaemia and elevated Apo-B100 levels compared to non-obese hypertensive patients, indicating increased atherogenic and cardiovascular risk. Estimation of Apo-B100 along with routine lipid profile may be useful for early identification and management of cardiovascular complications in obese hypertensive individuals.

KEYWORDS

Lipid Profile, Apo-b100, Obesity, Hypertension.

INTRODUCTION

Obesity and hypertension are important non-communicable diseases that contribute greatly to illness and death worldwide. The number of people affected by both conditions has increased rapidly in developed & developing countries, including India [1]. Hypertension is now considered a major risk factor for cardiovascular diseases in the Indian population, especially among urban people [2]. Obesity is defined as excessive accumulation of body fat that adversely affects health. It is closely associated with metabolic disorders such as insulin resistance, dyslipidaemia, type 2 diabetes mellitus, and cardiovascular diseases [3]. Increased body fat raise blood pressure through increased sympathetic nervous system activity, activation of the renin–angiotensin–aldosterone system, oxidative stress & endothelial dysfunction [4].

Obesity and hypertension commonly occur together and increase the risk of atherosclerosis and cardiovascular diseases. Obese individuals have abnormal lipid metabolism, including increased triglycerides, elevated low-density lipoprotein cholesterol (LDL-C), decreased high-density lipoprotein cholesterol (HDL-C), and increased atherogenic lipoproteins [5]. A strong relationship between obesity and dyslipidaemia, especially higher triglyceride and LDL cholesterol levels, along with increased prevalence of hypertension [6]. Dyslipidaemia plays an important role in the development of cardiovascular disease. Lipid profile parameters such as total cholesterol, triglycerides, LDL-C, and HDL-C are commonly used to evaluate cardiovascular risk. Recent studies suggest that apolipoprotein B100 (Apo B100) may be a better marker of atherogenic risk because each atherogenic lipoprotein particle contains one Apo B molecule [7]. Apo B100 is the main structural protein of very low-density lipoprotein (VLDL), intermediate-density lipoprotein (IDL) & LDL particles produced in the liver. Increased Apo B100 levels indicate an atherogenic lipoproteins and endothelial damage, plaque formation, and progression of cardiovascular disease [8]. Recent studies highlighted the role of Apo B in cardiometabolic disorders and hypertension. Increased Apo B levels are associated with obesity, insulin resistance, metabolic syndrome, and cardiovascular abnormalities [9]. Obese hypertensive patients generally show more severe lipid abnormalities and higher Apo B100 levels compared to non-obese hypertensive patients, thereby increasing their cardiovascular risk [10]. In India, the coexistence of obesity, hypertension, and dyslipidaemia is increasing because of urbanization, physical inactivity and sedentary lifestyle [11]. Indian studies have shown that many hypertensive patients are overweight or obese and dyslipidaemia, indicating a growing burden of cardiometabolic diseases in the country [12].Therefore, this study aims to evaluate lipid profile and Apo B100 levels in obese and non-obese hypertensive patients at Late Shri Lakhiram Agrawal Memorial Govt. Medical College & associated Sant Baba Guru Ghasidas Ji Memorial Government Hospital Raigarh (C.G.) to assess cardiovascular risk.

Aim: - Analysis of Apo-B100 & Lipid Profile in Obese Hypertensive Patients and Non-obese Hypertensive Patients.

Objectives: - 1. To estimation of Apo-B100 & lipid profile in Obese hypertensive patients.
2. To estimation of Apo-B100 & lipid profile in Non-obese hypertensive patients.
3. Comparison of Apo-B100 & lipid profile in Obese and Non-obese hypertensive patients.

MATERIALS AND METHODS: - The present study was conducted in the Department of Biochemistry, Late Shri Lakhiram Agrawal Memorial Govt. Medical College & associated Sant Baba Guru Ghasidas Ji Memorial Government Hospital, Raigarh, Chhattisgarh. A total of 100 subjects were included in the study, comprising 50 cases and 50 controls. After obtaining institutional ethical clearance and written informed consent from all participants, 5 mL fasting blood samples were collected under aseptic precautions. ApoB100 was estimated by nephelometry, serum cholesterol by the CHOD-PAP method, triglycerides by the GPO-POD method, and HDL-cholesterol by the selective inhibition method using a semi-auto analyser.

Inclusion criteria: -
1. Age Group: Male and female patients aged between 18 and 75 years.
2. Confirmation of Hypertension: Patients previously diagnosed with hypertension or those with a current blood pressure reading of SBP ≥ 140& DBP ≥ 90 mmHg.
3. Group Categorization (Based on BMI as per WHO guideline):

- Group A Case (Obese): BMI 30 kg/m2 (or 25 kg/m2 as per Asian standards).
- Group B Control (Non-Obese): BMI within the normal range (18.5 - 24.9 kg/m2).

Exclusion criteria: -
1. Diabetes Mellitus
2. Cardiovascular Diseases

3. Chronic Kidney Disease (CKD)
4. Chronic Liver Diseases
5. Pregnant Women
6. Severe Infection (Sepsis)

Statistical analysis: - Statistical analysis was performed by using MS Excel and SPSS software. Continuous variables were expressed as Mean ± Standard Deviation (SD). Comparison between obese and non-obese groups was done using the unpaired Student's t-test. A p-value <0.05 was considered statistically significant.

Observation & Results: - The present study was to assess the levels of Apo-B100 and lipid profile between Obese hypertensive patients and Non-obese hypertensive patients at the Tertiary Care Centre, Late Shri Lakhiram Agrawal Memorial Govt. Medical College & associated Sant Baba Guru Ghasidas Ji Memorial Government Hospital, Raigarh, Chhattisgarh.

Table No. 01
Age Group between Obese & Non-obese Hypertensive Group.

Age Group	Non-obese Group (n =50)	Obese Group (n =50)	Total %
20 - 35 Year's	16 (32%)	07 (14%)	23%
36 - 50 Year's	20 (40%)	17 (34%)	37%
51 - 75 Year's	14 (28%)	26 (52%)	40%
Grand Total	50 (100%)	50 (100%)	100%

Table No. 02
SBP, DBP, BMI, Apo-B100 & lipid profile between Obese & Non-obese Hypertensive Group

Parameter	Non-Obese (n = 50)	Obese (n = 50)	Unpaired t test	df	P-Value
SBP (mmHg)	148.5±8.66	162.3±22.71	4.01	98	P<0.001
DBP (mmHg)	71.68±5.04	101.3±12.47	15.6	98	P<0.001
BMI	23.90±3.77	37.81±6.50	13.10	98	P<0.001
Apo-B100	74.66 ±12.25	118.94 ± 9.49	20.25	98	P<0.001
Cholesterol	161.52±12.21	215.88 ± 18.72	17.20	98	P<0.001
Triglycerides	91.70 ± 12.81	162.28 ± 21.15	20.17	98	P<0.001
HDL	58.76 ± 5.32	42.36 ± 3.79	17.17	98	P<0.001
LDL	84.42 ± 5.34	141.06 ± 18.20	21.12	98	P<0.001
VLDL	18.34 ± 2.56	32.45 ± 4.23	20.14	98	P<0.001

DISCUSSION: -

In the present study, obese hypertensive patients were more common in the 51–75 years age group (52%), while non-obese hypertensive patients were more common in the 36–50 years age group (40%). Similar findings were reported by Dalal et al. (2024), Basu et al. (2024), and Kahali (2024), who observed increased obesity, hypertension, and dyslipidaemia with advancing age [13–14]. In this study, males and females were equally distributed in both obese and non-obese hypertensive groups. Similar findings were reported by Mohammad and Bansod (2024) and Mohanty et al. (2022), who observed that obesity and hypertension are prevalent among both genders in India [15,16]. BMI, systolic & diastolic blood pressure were significantly higher in obese hypertensive patients compared to non-obese hypertensive patients (P<0.001). Similar findings were reported by Parvanova and Reseghetti (2024), Basu et al. (2024), and Gupta et al. (2024), who observed a strong association between obesity, elevated blood pressure, and increased cardiovascular risk [17–19]. In the present study, Apo-B100, total cholesterol, triglycerides, LDL, and VLDL levels were significantly higher in obese hypertensive patients compared to non-obese hypertensive patients, while HDL levels were significantly lower (P<0.001). Similar findings were reported by Kounatidis et al. (2024), Suokhrie et al. (2023), and Mishra et al. (2023), who observed increased dyslipidaemia and elevated Apo-B100 levels among obese hypertensive individuals, indicating higher cardiovascular risk [20–22].

CONCLUSION: -

The present study obese hypertensive patients have significantly higher BMI, systolic & diastolic blood pressure, Apo-B100, total cholesterol, triglycerides, LDL, and VLDL levels, along with significantly lower HDL levels compared to non-obese hypertensive patients. These findings indicate that obesity is strongly associated with dyslipidaemia and increased atherogenic risk among hypertensive individuals. Elevated Apo-B100 levels observed in obese hypertensive patients suggest increased cardiovascular risk and progression of atherosclerosis. Therefore, estimation of Apo-B100 along with routine lipid profile may be helpful for early identification of cardiovascular risk and better management of obese hypertensive patients.

SUMMARY: - The study demonstrated significantly increased levels of Apo-B100, total cholesterol, triglycerides, LDL, and VLDL among obese hypertensive patients, while HDL levels were significantly reduced. These findings indicate that obesity is strongly associated with dyslipidaemia, elevated Apo-B100 levels, and increased cardiovascular risk in hypertensive patients. Therefore, assessment of Apo-B100 along with lipid profile may be useful for early detection of atherogenic risk and prevention of cardiovascular complications in obese hypertensive individuals.

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Conflict of Interest: - Nil

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