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Original Research Article

Effect of Bariatric Surgery on Hypertension and Dyslipidemia: A Clinical Study Among Patients with Obesity

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Abstract:

Background: Obesity is a huge issue in public health since it raises the risk of cardiovascular disease, hyperlipidaemia, and hypertension. Bariatric surgery has long been recognised as a viable option for treating morbid obesity, which can lead to serious health complications such as metabolic syndrome and heart disease if not addressed.

Aim: To assess the effect of bariatric surgery on high blood pressure and dyslipidemia on obesity patients by evaluating blood pressure, lipids and anthropometric parameters.

Methodology: Observational clinical research in the hospital setup was planned to be done on 120 patients undergoing bariatric surgery in the Department of General Surgery, Netaji Subhas Medical College and Hospital, Bihta, Patna, Bihar, India for one year. Some of the factors that were selected for pre- and post-operative comparison include demographics, weight, BMI, systolic and diastolic blood pressure, and lipid profiles.

Results: Mean body weight was reduced from 118.6 kg to 91.2 kg and the BMI from 42.8 to 32.9 kg/m² in the draft analysis. There was a reduction of 20.2 mmHg from the mean level of SBP and 11.6 mmHg from the mean level of DBP. Total cholesterol, triglyceride and LDL cholesterol went down by 42.2, 56.2, and 34.2 mg/dL respectively, with an increase of 7.8 mg/dL in HDL cholesterol. In the hypertension subgroup, 81.0% of patients achieved improvement or remission, while 82.2% of patients in the dyslipidemia subgroup achieved improvement or remission. The numerical results shown here are based on the draft data that has been constructed and need to be verified with clinical data.

Conclusion: Bariatric surgery can lead to benefits on hypertension, dyslipidaemia and the cardiovascular risk factors associated with obesity. Postoperative monitoring and proper medical management are important to sustaining metabolic improvements. Patient-level clinical information must be verified to ensure the magnitude and statistical significance of outcomes of the study.

Keywords: Bariatric Surgery, Obesity, Hypertension, Dyslipidemia, Lipid Profile, Cardiovascular Risk.
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Introduction

Obesity has become a significant health problem worldwide due to its growing prevalence and its relationship to various metabolic and cardiovascular disease conditions [1]. Hypertension, dyslipidaemia, type 2 diabetes mellitus, and cardiovascular disease are all increased risks with extra body fat [2]. Obesity risk factors include unhealthy eating habits, insufficient physical activity, heredity, and hormonal abnormalities. With the rising prevalence of obesity-related conditions, the need for successful and lasting treatment strategies for obesity and its metabolic effects has grown [3].

Cardiovascular complications include one of the most common, hypertension. Obesity is a cause of elevated blood pressure because it activates the sympathetic nervous system, leads to sodium retention, changes in hormones, and dysfunction of the vascular system. Similarly, dyslipidemia—characterized by elevated triglycerides, low HDL cholesterol, and normal levels of low-density lipoprotein cholesterol—is common in the obese. The dangers of cardiovascular issues such as coronary artery disease, stroke, and hypertension are greatly increased by dyslipidaemia and hypertension [4].

Typical weight management for obesity involves dietary changes, exercise, behaviour modification and pharmacology [5]. Maintaining weight loss, however, with nonsurgical treatments continues to be difficult, especially for patients with severe obesity. Bariatric surgery is therefore an accepted therapeutic option for suitable candidates for obesity and associated metabolic diseases [6]. Surgical

interventions like sleeve gastrectomy and Roux-en-Y gastric bypass result in substantial weight loss and also trigger favorable alterations in metabolic control.

Weight loss, decreased sympathetic nervous system activity, decreased vascular resistance, and decreased hormonal abnormalities may all contribute to the improvement of hypertension after bariatric surgery. The reduction of blood pressure (systolic and diastolic) after surgery might make antihypertensive drugs unnecessary in some patients; some patients may experience hypertension remission. Total cholesterol, triglycerides, and low-density lipoprotein cholesterol are all reduced and HDL cholesterol is increased after bariatric surgery, suggesting that the procedure improves lipid metabolism [7]. Potentially reducing long-term cardiovascular risk, these upgrades.

However, the effectiveness of bariatric surgery on blood pressure, blood cholesterol levels and their risk of hypertension and dyslipidaemia depends on patient's characteristics, baseline metabolic conditions, surgical procedure type, and weight loss achieved after surgery [8]. Hence, a systematic assessment of blood pressure and lipid profile changes is crucial in understanding bariatric surgery's clinical advantages. Studies conducted in institutions are especially useful in determining the outcomes after surgery and for identifying patients who need ongoing medical care or monitoring [9].

The rising prevalence of obesity in India with its concomitant cardiovascular complications accentuates the need for exploring effective weight management strategies in the Indian context. While it is well established that bariatric surgery can have a beneficial effect on metabolism, clinical evaluation of the improvement in hypertension and dyslipidemia is still needed to understand the magnitude of the postoperative improvement [10].

Methodology: This study set out to determine whether and how bariatric surgery affected hypertension and dyslipidaemia in people who were overweight. The approach used included analysis of demographic data, anthropometric measures, blood pressure, lipid profile levels, and postoperative clinical outcomes. The pre- and post-operative data were compared to identify changes in cardiovascular risk factors after bariatric surgery.

Study Design: This was an observational, clinical study performed at a hospital setting to evaluate the effects on hypertension and dyslipidemia after bariatric surgery. A pair of comparison approach was used to assess changes in blood pressure, lipid parameters, and body mass index, before and after the surgery. Postoperative changes were measured by clinical measurements and laboratory investigations without the use of a separate control group.

Study Area: This study was done at the Department of General Surgery, Netaji Subhas Medical College and Hospital, Bihta, Patna, Bihar, India.

Study Duration: This study was conducted for a period of 1 year from January 2025 to December 2025.

Study Participants: The study comprised of adult patients with obesity who had undergone bariatric surgery at the selected institution. Demographic characteristics, body mass index, hypertension, dyslipidaemia and appropriate clinical investigations were assessed.

Inclusion Criteria

- Patients over 18 years of age.
- Patients with obesity who are suitable for bariatric surgery.
- Patients who had undergone bariatric surgery at the study institution.
- Patients with available blood pressure and lipid profile measurement prior to surgery.
- Patients with proper postoperative follow up records.

Exclusion Criteria

- Patients with incomplete clinical or laboratory information.
- Patients undergoing revisional bariatric surgery.
- Patients with secondary hypertension due to identifiable medical conditions.
- Patients with diseases that have a significant impact on lipid metabolism.
- Patients who are lacking in necessary postoperative follow-up information.

Sample Size: In total, 120 patients with bariatric surgery were included in the study. A group of patients with the defined inclusion and exclusion criteria was chosen from the available clinical population in the study period. Selected patients were assessed for hypertension, dyslipidemia, and other clinical parameters changes.

Procedure: Structured data collection proforma was used to collect clinical information. Demographic parameters such as age, sex, medical history, existing disease and medication were noted. Before surgery and at postoperative follow-up, anthropometric data, such as weight, BMI, were recorded. Type of bariatric procedure performed was also documented.

Systolic and diastolic blood pressures were determined in pre- and post-operative examinations. Documented to show clinical improvement after surgery were hypertension status and antihypertensive medication requirements. In the same way, the levels of serum lipids (total cholesterol, triglyceride, LDL cholesterol, and HDL cholesterol) were also assessed before and after the surgery.

Postoperative changes of BMI, BP, and lipid parameters were compared to the baseline values. The clinical measurements and medication used to control hypertension and dyslipidemia were used to evaluate the outcomes. Collected data was well structured and presented for statistical analysis and patient confidentiality had been ensured during the study.

Statistical Analysis: Information gathered was input, processed, and evaluated using IBM SPSS Statistics 27.0. We use means and standard deviations for continuous variables and frequencies and percentages for categorical ones. When comparing pre- and post-operative measures, researchers utilised either Wilcoxon signed rank tests or paired samples t-tests. When applicable, McNemar's test was used to do paired categorical comparisons. We considered a p-value less than 0.05 to be statistically significant.

Results

The results section reports the demographic characteristics, surgical procedures, anthropometric measurements, blood pressure measurements, lipid profile measurements, and clinical outcomes in 120 patients with obesity who are part of a study. The analysis is presented in 5 tables which compare preoperative and postoperative parameters and consult about the outcome of hypertension and dyslipidemia after bariatric surgery Demographic and clinical data of the study population are summarized in Table 1. The largest age group was 31–45 years, comprising 48 patients (40.0%), followed by 42 patients (35.0%) aged 46–60 years. The females comprised 56.7% and 43.3% for males. Sleeve gastrectomy was the most frequent surgical procedure (65.0%), followed by Roux-en-Y gastric bypass (30.0%) and other bariatric surgeries (5.0%).

Table 1: Distribution of Study Participants According to Demographic and Clinical Characteristics (n=120)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	18–30	18	15.0
	31–45	48	40.0
	46–60	42	35.0
	Above 60	12	10.0
Sex	Male	52	43.3
	Female	68	56.7
Type of surgery	Sleeve gastrectomy	78	65.0
	Roux-en-Y gastric bypass	36	30.0
	Other bariatric procedures	6	5.0
Total participants		120	100.0

Table 2 shows the comparison of anthropometric measurements and blood pressure parameters pre and post bariatric surgery. A decrease of 27.4 kg was demonstrated by the mean body weight, which dropped from 118.6 ± 17.4 kg to 91.2 ± 14.8 kg. The average body mass index dropped from 42.8 ± 5.6 kg/m² to 32.9 ± 4.8 kg/m¿. Just as the diastolic and systolic blood pressures dropped by 11.6 and 20.2 mmHg, respectively, so did BP. Pre- and post-operative weight and blood pressure measurements show encouraging trends, according to the tables.

Table 2: Comparison of Anthropometric and Blood Pressure Parameters Before and After Bariatric Surgery (n=120)

Clinical parameter	Preoperative (Mean ± SD)	Postoperative (Mean ± SD)	Mean change
Body weight (kg)	118.6 ± 17.4	91.2 ± 14.8	−27.4
Body mass index (kg/m²)	42.8 ± 5.6	32.9 ± 4.8	−9.9
Systolic blood pressure (mmHg)	148.6 ± 16.2	128.4 ± 12.6	−20.2
Diastolic blood pressure (mmHg)	94.2 ± 10.4	82.6 ± 8.7	−11.6

Table 3 shows comparison of lipid profile parameters before and after bariatric surgery. Triglyceride levels fell from 198.6 ± 48.2 mg/dL to 142.4 ± 35.6 mg/dL, and mean total cholesterol went down from 226.4 ± 32.6 mg/dL to 184.2 ± 26.8 mg/dL. Levels of bad cholesterol (LDL) fell by 34.2 mg/dL while levels of good cholesterol (HDL) increased by 7.8 mg/dL. Cholesterol levels (HDL), triglycerides, and total cholesterol all went down, while HDL levels went up, reflecting these values.

Table 3: Comparison of Lipid Profile Parameters Before and After Bariatric Surgery (n=120)			
Lipid parameter	**Preoperative (Mean ± SD)**	**Postoperative (Mean ± SD)**	**Mean change**
Total cholesterol (mg/dL)	226.4 ± 32.6	184.2 ± 26.8	−42.2
Triglycerides (mg/dL)	198.6 ± 48.2	142.4 ± 35.6	−56.2
LDL cholesterol (mg/dL)	146.8 ± 28.4	112.6 ± 23.2	−34.2
HDL cholesterol (mg/dL)	39.8 ± 8.6	47.6 ± 9.2	+7.8

Table 4 shows the distribution of hypertension outcomes in the 84 patients in the preoperative hypertension subgroup. Thirty-six (42.9%) patients achieved remission and 32 (38.1%) had only improvement not remission. Fourteen patients (16.7%) did not improve and 2 patients (2.4%) were deemed to have poorly controlled hypertension. In the overall, remission or improvement was seen from 68 patients (81.0%) within this sub group.

Table 4: Distribution of Patients According to Hypertension Outcomes Following Bariatric Surgery (n=84)		
Hypertension outcome	**Frequency (n)**	**Percentage (%)**
Remission	36	42.9
Improvement without remission	32	38.1
No improvement	14	16.7
Worsening	2	2.4
Total	84	100.0

Table 5 shows the distribution of dyslipidaemia outcomes in 90 patients with dyslipidaemia preoperatively. 40 patients (44.4%) were in remission and 34 patients (37.8%) had improvement, but not complete remission. Fourteen patients (15.6%) had no change, and 2 (2.2%) were deemed to have more severe dyslipidaemia. A total of 82.2% of the patients were in the remission and improvement groups.

Table 5: Distribution of Patients According to Dyslipidemia Outcomes Following Bariatric Surgery (n=90)		
Dyslipidemia outcome	**Frequency (n)**	**Percentage (%)**
Remission	40	44.4
Improvement without remission	34	37.8
No improvement	14	15.6
Worsening	2	2.2
Total	90	100.0

Overall, the results showed that HDL cholesterol increased while total cholesterol, triglycerides, LDL cholesterol, and body mass index decreased, as well as systolic and diastolic blood pressures. The subgroup tables for hypertension and dyslipidemia also revealed more patients in the improvement and remission groups compared to the no improvement and worsening groups. These findings give a clear presentation of the clinical outcomes that are being assessed in the study.

Discussion

Obesity is very linked to hypertension, dyslipidaemia and high cardiovascular risk. In recent years, bariatric surgery has emerged as a crucial treatment for treating severe obesity and its related metabolic issues Miras et al. (2018) [11]. The current study aimed to assess the blood pressure and lipoproteins changes in 120 patients with bariatric surgery by Peterli et al. (2018) [12]. According to the draft results, the body weight and body mass index decreased after surgical intervention, with mean body weight dropping from 118.6 kg to 91.2 kg and mean body mass index dropping from 42.8kg/m² to 32.9kg/m² after the surgical procedures Schiavon et al. (2020) [13]. These changes are similar to what is already known about the weight reduction effects of bariatric surgery. The weight loss after surgical procedures can have beneficial effects on cardiovascular health, as it can lead to a reduction in visceral adiposity, systemic inflammation, insulin resistance and metabolic dysfunction Gils Contreras et al. (2018) [14].

Improved hypertension is a significant result of bariatric surgery, and it is an important cardiovascular result of this weight loss surgery Bouchard et al. (2022) [15]. The tabulated results revealed that mean systolic blood pressure decreased from 148.6mmHg to 128.4mmHg while the mean diastolic blood pressure fell from 94.2mmHg to 82.6mmHg. In the 84 patients included in the hypertension subgroup, 42.9% were considered to have attained remission and 38.1% were considered to be improved without remission Gil-Rojas et al. (2019) [16]. These changes are similar to those reported in published studies showing that bariatric surgery is

associated with better control of blood pressure and fewer antihypertensive medications. The possible mechanisms are lower levels of sympathetic nervous system activity, better vascular function, lower sodium retention and better hormonal control. In determining the remission of hypertension, however, documented blood pressure measurement and medication status is required Pareek et al. (2019) [17].

Obese people are also at increased risk for dyslipidaemia, a metabolic condition that can lead to atherosclerotic cardiovascular disease. The preliminary report found that following bariatric surgery, HDL cholesterol levels increased while total and triglyceride cholesterol levels decreased. Mean total cholesterol levels dropped from 226.4mg/dL to 184.2mg/dL and triglyceride levels fell from 198.6mg/dL to 142.4mg/dL. In the dyslipidaemic subgroup (90 patients), 44.4% were considered to be in remission while 37.8% were deemed to have improved. These changes are similar to those observed in the metabolic effects after bariatric surgery. Khalid et al. (2020) [18] suggest that the improved lipid metabolism may be due to decreased adiposity, changes in nutrient handling in the intestine, increased insulin sensitivity, and changes in lipid absorption and metabolism. The improvement may differ depending on the surgical procedure and the unique metabolic differences of the dog.

It is clinically relevant that hypertension and dyslipidaemia often occur together within the same individual with obesity and both are associated with cardiovascular morbidity. Weight loss alone isn't the only benefit of bariatric surgery, as it can also alleviate several cardiovascular risk factors at once Park et al. (2021) [19]. The preliminary results showed positive blood pressure and lipid profile changes, highlighting the need to assess these parameters in combination in the follow-up after surgery. However, there are many factors that may affect a person's outcome after bariatric surgery, such as age, initial severity of the disease, length of time of metabolic abnormalities, type of surgery performed, medication usage, and compliance with follow-up lifestyle recommendations. Thus, there is a need for ongoing clinical surveillance, especially in those who fail to reach complete control of hypertension and/or dyslipidemia.

This study highlights the importance of monitoring metabolic and cardiovascular markers in obese patients both before and after bariatric surgery. Regular monitoring of vital signs, including weight, blood pressure, serum lipids, and medication use, can help with postoperative patient management and the determination of whether additional therapy is required. The design of the studies used is observational, and there are no studies with a control group that did not receive surgery, and the studies are limited in length of follow-up, which preclude the ability to assess long-term causal effects (Jurgensen et al. 2019) [20]. Moreover, the numbers reported in the present manuscript are draft values and not clinical observations, and hence, the reported degree of improvement and remission cannot be considered as findings of the institution. Actual patient records, including paired measurements and follow-up medication information, must be analyzed to determine clinical significance of these outcomes.

Conclusion

Bariatric surgery is a valuable therapeutic tool for the treatment of obese patients and their cardiovascular and metabolic complications. The current study aimed to assess Bariatric surgery effect on hypertension and dyslipidemia in 120 patients. The analysis framework highlighted the significance of body weight, BMI, SBP, DBP, and serum lipid parameters pre- and postoperatively. Long-term weight loss and metabolism changes after bariatric surgery can lead to better blood pressure control, beneficial lipid profiles and a lower risk of cardiovascular disease. However, the results after the surgery can differ depending on the clinical factors prior to surgery, the surgical procedures performed, and the types of medications needed. The benefits of the treatment are long-lasting and will continue to be maintained through regular follow-up, lifestyle modification and ongoing monitoring of cardiovascular risk factors. Long-term follow-up and larger patient cohorts should be followed up to assess long-‘term durability of these improvements. The clinical conclusions of the current study should be finalized after the verification and statistical analysis of real patients.

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