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Early Serum Lipid Profile Changes after Laparoscopic Sleeve Gastrectomy at a Tertiary Care Hospital

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ABSTRACT

Objective: This research aims to ascertain how frequently dyslipidemia resolves in patients having laparoscopic sleeve gastrectomy in tertiary care hospitals. **Study Design:** Quasi-experimental study. **Settings:** Department of Surgery, Allied Hospital, Faisalabad Pakistan. **Duration:** September 2021 to March 2022. **Methods:** 95 patients, aged between 20 and 50 years, who had dyslipidemia and a BMI of more than 30 kg/m2 were selected for the study. Following informed consent, patients were recruited for the study using non-probability consecutive sampling, preoperative venous blood samples taken while fasting for lipid levels and they subsequently had sleeve gastrectomy. The fasting lipid profile test was conducted after three months of surgery. The frequency at which dyslipidemia resolved was recorded. SPSS 22 was used for data entry and analysis. Using stratification, effect modifiers such as age, gender, diabetes, and BMI were managed. The post-stratification chi-square test was used to determine their impact on the result. The significance level is chosen where the P-value is equal to or less than 0.05. **Results:** A total of 95 patients with a mean age of 33.87± 8.6 years were registered in this research. 53.7% of the participants were women and 46.3% of men. BMI averaged 38.5±2.9 kg/m2. 83.2% of the patients had diabetes. Eighty-two percent of the patients had hypertension. 37.9% of the patients were smokers. A decrease in dyslipidemia was observed in 57.9% of the individuals. **Conclusion:** Most patients experience reduced hyperlipidemia load following a laparoscopic sleeve gastrectomy.

Keywords: *Cholesterol, Sleeve gastrectomy, Dyslipidemia.*

INTRODUCTION

Severe obesity is a major health concern in Western countries.[1] Increasingly, bariatric surgery is being used to treat this clinical condition in addition to nutritional and pharmaceutical approaches. Numerous studies have documented the effectiveness of various bariatric surgery techniques in lowering body weight and controlling blood sugar levels.[2] On the other hand, little is understood about how bariatric surgery affects lipid profiles.[3]

Before the introduction of biliopancreatic diversion with duodenal switch (BPDDS), laparoscopic sleeve gastrectomy (LSG) was the intended surgical procedure for patients who were considered high-risk candidates for surgery and were extremely obese. LSG is generally recognized as the effective treatment for patients who are morbidly obese because of its increased efficacy, economy, and lower rate of complications. The stomach is split vertically in laparoscopic sleeve gastrectomy (LSG), leaving the digestive tract intact and most of the stomach's fundus intact. Long-term weight loss and the amelioration or resolution of the comorbidities are linked with LSG.[4]

Sarkhosh *et al*. conducted a systematic review to examine the impact of LSG on co-morbidities. Previous research found that after having LSG, 58% of patients observed a resolution of their hypertension, while 75% observed improvement in their hypertension.[5]

A different systematic review found that 66.2% of patients experienced a resolution and 26.9% of patients had improvement in type 2 diabetes mellitus (T2DM) following LSG.[6] Lipid abnormalities are present in the majority of obese patients; however, only 20% of obese patients do not exhibit the typical metabolic lipid changes that most obese patients do. It is commonly acknowledged that one of the primary co-morbidities of severe obesity is hyperlipidemia. Therefore, it should come as no surprise that lipid profiles are receiving more

attention in research and treatment to possibly lower the incidence of diseases linked to the cardiovascular system.[7] A study by Lira *et al*. found that after three months of SG, hypercholesterolemia significantly decreased from 34.4% preoperative to 10.3%, LDL cholesterol decreased from 34.2 % to 11.3 %, and HDL improved from 44% to 70.2%.[8] There was no discernible change in serum triglyceride levels (P=0.097).[8]

Due to the lack of local data and previous research on the subject in Pakistan, this study was designed and proposed to record the prevalence of dyslipidemia in our local population among patients undergoing laparoscopic sleeve gastrectomy and determine the current scope of the issue.

METHODS

Following ethical review committee approval, this quasi-experimental study was conducted at the Allied Hospital Faisalabad's Surgery Department from September 2021 to March 2022.

A sample size of ninety-five was determined by taking 10% absolute precision, 60% previously reported frequency, and a 95% confidence interval. Ninety-five patients, aged between 20 and 50 years, of either gender or dyslipidemia with a BMI of more than 30 kg/m2. were incorporated into the research.

The study excluded patients with a history of abdominal surgery, gouty arthritis, HIV, or those on lipid-lowering medication. After giving informed consent, patients were added to the study using non-probability consecutive sampling. Every patient had a laparoscopic sleeve gastrectomy. A specific proforma was created to document the results of this investigation. Every pertinent baseline study was completed. A three-milliliter venous blood sample was obtained (while fasting) and sent to the hospital laboratory for serum lipid levels to diagnose dyslipidemia before and after surgery. The researcher recorded all pertinent data in the study proforma. The computer program SPSS-22 was used to enter and analyze the data. For the age and BMI of the patients, descriptive statistics were computed, including mean and standard deviation; for categorical variables such as gender, age groups, diabetes, hypertension, smoking, and dyslipidemia reduction, frequencies and percentages were computed. Using stratification, effect modifiers such as age, gender, diabetes, and BMI were managed. The post-stratification chi-square test was used to determine their impact on the result. A P-value of 0.05 or less was regarded as significant.

RESULTS

A total of 95 patients with a mean age of 33.87±8.6 years were enrolled in our study. 50.5% of the patients belonged to the 20–35 age group, and 49.5% to the 36–50 age group. 53.7% of the participants were women and 46.3% of men. BMI averaged 38.5±2.9 kg/m2. 83.2% of the patients had diabetes. Eighty-two percent of the patients had hypertension. 37.9% of the patients were smokers. A decrease in dyslipidemia was observed in 57.9% of the individuals. Age, gender, BMI, smoking, diabetes, and hypertension were all stratified in the data.

Table 1: Age distribution of the sampled population

		Frequency	Percent
Age groups	**20-35 years**	48	50.5
	36-50 years	47	49.5
	Total	95	100.0

Table 2: Dyslipidemia resolution and age groups

			Dyslipidemia reduction		Total
			Yes	No	
Age groups	**20-35 years**	Count	27	21	48
		% within Age groups	56.2%	43.8%	100.0%
	36-50 years	Count	28	19	47
		% within Age groups	59.6%	40.4%	100.0%
p-value 0.743					

Table 3: Dyslipidemia resolution and gender

			Dyslipidemia reduction		Total
			Yes	No	
Gender	**Male**	Count	30	14	44
		% within Gender	68.2%	31.8%	100.0%
	Female	Count	25	26	51
		% within Gender	49.0%	51.0%	100.0%
p-value 0.059					

Table 4: Dyslipidemia resolution and diabetes

			Dyslipidemia reduction		Total
			Yes	No	
Diabetes	**Yes**	Count	48	31	79
		% within Diabetes	60.8%	39.2%	100.0%
	No	Count	7	9	16
		% within Diabetes	43.8%	56.2%	100.0%
p-value 0.209					

Table 5: Dyslipidemia resolution and Body mass index

			Dyslipidemia reduction		Total
			Yes	No	
BMI	Equal to or less than 40kg/m2	Count	37	25	62
		% within BMI	59.7%	40.3%	100.0%
	More than 40Kg/m2	Count	18	15	33
		% within BMI	54.5%	45.5%	100.0%
p-value) .630					

Post Stratification Chi-Square test was applied. A p-value of less than o.o5 was considered significant

DISCUSSION

The primary cause of obesity is typically an imbalance where calorie intake exceeds the calories burned through physical activity. As BMI rises, growth hormone levels fall, impacting lipid metabolism and ultimately causing cardiovascular disease.[9] The National Cholesterol Education Program (NCEP) advises that " *Individuals who are healthy and at no risk for coronary artery disease maintain serum LDL cholesterol levels below 130 mg/dl, total cholesterol (TC) levels below 200 mg/dl, and triglyceride (TG) levels below 150 mg/dl*" .According to a prior study, blood levels of TC, HDL, and LDL cholesterol decreased by 0.02 mmol/L, 0.05 mmol/L, and 0.009 mmol/L, respectively, with every kilogram of body weight lost.[10] Consistent with this, further research has demonstrated a direct correlation between increased levels of obesity severity, mortality, morbidity, and risk factors for hypertension, type 2 diabetes mellitus (DM), (HTN), cardiovascular disease, and dyslipidemia.[11,12,13,14,15] When combined with other medical conditions, bariatric surgery is a highly successful treatment for morbid obesity.[16,17]Because it raises low HDL cholesterol and improves various cardiovascular risk factors, including hypertension, DM, and hypertriglyceridemia. After bariatric surgery, some researchers reported improvements in all lipid profile measures; however, other investigations found that the reduction in lipid levels was limited to serum TG, with insignificant changes identified in TC or LDL cholesterol levels.[10] In one study patients had a mean age of 36.75 ± 10.75 years, with 69.9% being female and 10.4% having comorbid conditions Pre-operative mean BMI was 45.66 ±8.46, and average pre-operative total cholesterol, low-density lipoprotein, high-density lipoprotein, and triglyceride were 4.67 ± 1.02, 2.55 ± 1.1, 1.14 ± 0.32, and 1.5 ± 1.11, respectively. The mean level of TG was substantially higher before surgery than after surgery, indicating a significant shift in the mean level.[10]

A total of 95 individuals with a mean age of 33.87± 8.6 years were selected for our research. 53.7% of the participants were women and 46.3% of men. BMI averaged 38.5±2.9 kg/m2. 83.2% of the patients had diabetes. 82% of the patients had hypertension. 37.9% of the patients were smokers. A decrease in dyslipidemia was observed in 57.9% of the individuals.

Our results align with those of Lira *et al*. (2008), who demonstrated a decrease in dyslipidemia following SG.[8] A 40% decrease was noted at the 24-month follow-up following surgery. Hussein also discovered that dyslipidemia was dramatically reduced with SG, regardless of the recruited patients' age or gender.[18]This is in line with the study's conclusions, which showed no discernible relationship between the patient's age and gender. According to Strain *et al*. cohort research, TG decreased one year following SG, from a pre-operative mean of 128.7 ± 66.7 mg/dl to 97.1 ± 43.5 mg/dl.[19]In India, a retrospective study was conducted with a similar conclusion [20]

The decrease in harmful lipids post bariatric surgery directly reduces the cardiovascular significant event risk as supported by many studies. Lewis *et al* found the mean cardiovascular risk before surgery was 4.87 ± 1.37, while the mean cardiovascular risk after surgery was 4.21 ± 2.34. The preoperative mean exceeded this cut-off, whereas the postoperative mean fell below it; a ratio of 4.44 is considered the average risk. Neither preoperative nor postoperative factors reached statistical significance when logistic regression was conducted to estimate factors related to a reduction in cardiovascular risk below the average risk cut-off of 4.44. [21]

CONCLUSION

After a sleeve gastrectomy, blood lipid profile markers decrease. The body mass index (BMI) is inversely correlated with this lipid reduction.

LIMITATIONS

The main limitation is the study design-observational study.

SUGGESTIONS / RECOMMENDATIONS

Comparative randomized clinical trials should be done to compare the effect of laparoscopic Sleeve gastrectomy surgery on the lipid profile with medical therapy or other bariatric surgery procedures

CONFLICT OF INTEREST / DISCLOSURE

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