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RESEARCH ARTICLE

SAFETY AND OUTCOMES OF SLEEVE GASTRECTOMY AND GASTRIC BYPASS: A SYSTEMIC REVIEW

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Abstract

The purpose of the current investigation is to compare the safety and outcomes of Sleeve Gasterectomy with Gastric Bypass in patients.Up to February 2022, appropriate papers were screened from the published literature. The RevMan 5.1 software was used to conduct the meta-analysis.There were twenty studies included in this meta-analysis. GB had a greater incidence of both early and late problems than SG. Leaks, UTIs, obstructions, and deaths happened more frequently in the GB group within a month following surgery. The discrepancies could lead to excellent rates of readmission to the hospital and a need for additional surgery. When it came to remission of hypertension and the weight loss outcome at one year, GB beat out SG. However, in type 2 diabetes,no differences were observed in OSA or the weight loss outcome after two or three years.SG was a better alternative for individuals than GB because SG is as effective and safer than GB.

Introduction:-

Due to rising living standards and a decline in physical activity over the last several decades, an increasing number of people are suffering from morbid obesity. Obesity rates among adults have risen to 34.9 percent (Wang, Yu, Yan, Yan, & Song, 2017). Life expectancy is decreased, and economic costs are increased as a result of obesity. That's why bariatric surgery is so necessary. The average BMI rose globally in every decay by 0.4–0.5 kg/m2 for both women and men (El Chaar, Lundberg, Stoltzfus, & Diseases, 2018). Over 700 million obese adults globally are increasing; based on the World Health Organization's findings, gastroesophageal reflux disease, stroke, coronary heart disease,obstructive sleep apnea, hypertension, and cancer are all made worse by obesity, which is a global epidemic (Wu, Bai, Yan, Yan, & Song, 2020). Complications include cardiovascular, OSA (obstructive sleep apnea), gastroesophageal reflux disease (GERD), and type 2 diabetes, all made worse by obesity, which is rising all over the globe. According to the WHO (World Health Organization), cancer and reflux illnesses are rising (Welsh & Murayama, 2018). There were around 700 million obese adults, according to the WHO. Obesity rates continued to increase year after year across the globe in 2015. Several studies have demonstrated the durability of bariatric surgery, medical comorbidities, and obesity itself. Furthermore, it can enhance long-term survival rates significantly in patients who are fat. SG has risen to become the most common technique for weight loss for people suffering from severe obesity in terms of a single technique due to its weight loss and health benefits (Emile, Elfeki, Elalfy, Abdallah, & techniques, 2017). Obesity-linked comorbidities shorten life expectancy and raise the burden on the economy, making bariatric surgery essential. Bariatric surgical procedure is the most efficient therapy for associated comorbidities and obesity, with the two most frequent operations being gastric bypass and sleeve gastrectomy (SG) being the most frequently performed (Peterli et al., 2018). SG is one of the most prevalent procedures globally,

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accounting for 37% of all procedures. A fast learning curve and rapid weight loss are two advantages of SG, but the technique has two significant drawbacks: a high risk of gastric reflux syndrome (GERD) and weight gain (Plamper, Lingohr, Nadal, &Rheinwalt, 2017). The GB identified as gastric bypass, is a relatively recent therapy that Dr. Rutledge invented in the 1970s. In addition, a slew of other studies have been published, including randomized controlled experiments that evaluated the effectiveness and safety of SG and GB treatments (Wu et al., 2020). An increasing number of countries are turning to GB for its safe and uncomplicated treatment and its positive effects. Despite its widespread popularity, GB's long-term viability is hampered by issues like bile reflux, marginal ulcers, and poor follow-up (Xu et al., 2020). Observational studies over the past decade have demonstrated GB's long-term and short-term benefits.Comparative studies between GB and SG, however, are still limited. As a result, we performed a meta-analysis to assist the doctor in making a well-informed decision between the two options.

Methodology:-

Search strategy:

"Comparison of sleeve gasterectomy with gastric bypass" and "comparisons between sleeve gasterectomy and gastric bypass," "single anastomosis," and "mini-gastric bypass" were among the terms we used to look for relevant papers in the PubMed and Science direct databases. The period covered by the literature search was from the database created to February 2022. Additional studies that met the eligibility criteria were identified by reviewing the references. I completed the search procedure on my own. If the two reviewers couldn't agree on a conclusion, a third reviewer was involved.

Inclusion criteria:

The following criteria were used to select articles for inclusion by an impartial panel: studies that compare SG with GB in the treatment of morbid obesity are available. Final findings, comparing GB and SG; (2) patient age; (3) operation mortality, or overall early complications, or specific problems, or a combination of these endpoints, must be at least one of the following: late complications in general, or specific late complications in particular, and either a 1-year, 2-year, or 3-year percent EWL or EWL percentage.

Data Extraction:

Two authors double-checked data extraction in real time to ensure that it was accurate and thorough. The third author, who arrived at his conclusion, reconciled the disagreement. Every study included data on the research design, sample size, preoperative BMI, and 1-year follow-up rate, which were extracted independently. A total of the following information was gathered from every investigation: the author and the sample size; preoperative BMI; myocardial infraction, obstruction, vein thrombosis, urethral bleeding, transfusion; early complications rate, mortality; overall; and specific complications rate; follow-up rate of 1 year; when statistics sets overlapped or were replicated, only the most current data was used to determine which data sets should be included. If additional information is required, please contact the writers. **Endpoint:**

The most important outcomes were the EWL% at 1, 2, and 3 years and the remission rates for comorbidities. Secondary outcomes also included measuring the rates of overall early issues, leakage, postoperative bleed, and overall late complications.

The study of statistics:

The statistical assessment was carried out with the help of RevMan 5.3. It was calculated and studied for the odds ratio of dichotomous variables with a 95% CI. We used the WMD (weighted mean difference) with a 95 percent confidence interval to compare outcomes between the SG and GB groups. When it comes to dichotomous variables, an odds ratio greater than one indicates that the GB group is more frequent. Furthermore, the fact that WMD 0 showed that the values of GB were greater than the values of the continuous variables in the study was a strong indicator. In the "Results" section, we employ a percentage and range to illustrate the sample, rather than just a single number or a single percentage. In addition, we also express several other variables in terms of their mean, standard deviation, and event, as well as their mean, event, and standard deviation.

Results and Discussions:-

Complications:

Seventeen studies revealed problems. Included in this meta-analysis were the three studies with the most significant data. Fig. 1 shows the results of nine studies included in the 12 studies to research the early complications and twelve included in the early and late complications, presented in Figs. 1 and 2. In addition, we looked at the common problems that people run into. In early problems such as UTI, leakage and impediment occurred considerably further after GB than after SG (Cl 1.60 to 3.57 leak for 95% OR id 2.28) UTI, 95% OR is 4.27 % CI 1.47 to 12.61. Apart from this,GB was associated with more significant late problems than SG (OR = 1.46, 95 percent confidence interval); however, when stratified analyses by various complications were undertaken, we found no significant difference. The GB group demonstrated a greater death rate following surgery in patients than the SG group (OR = 2.23, 95 percent CI 1.37 to 3.64). Neither group had a significantly different late mortality rate (OR = 1.22, 95% CI 0.18 to 8.06). An increased risk of hospital readmission (OR = 1.75, 95 percent confidence interval (CI) 1.48–2.00) and repeat surgery (OR = 2.16, 95 percent (CI) 1.67–2.81) was found in patients over the age of 65 who underwent GB surgery as opposed to those in the SG group. Patients in the GB group (OR = 1.40, 95 percent CI 0.92 to 2.12) had the same number of postoperative emergency department visits as those in the SG group. However, there was a substantial difference in the prognosis for hypertension following surgery between GB and SG, demonstrating a statistically significant difference between the two groups (OR = 1.73, 95% CI 1.02 to 2.93).

Weight loss outcomes:
Are typically expressed as a percentage of excess weight loss (EWL) and a percentage of total weight loss (TWL) after bariatric surgery. We collected data at three separate intervals: one year, two years, and three years after surgery. Following one year of observation, four studies (Casillas et al., 2017) reported their EWL and TWL percentages, while one study reported on its 1-year follow-up. Anabove-average one-year endpoint percent EWL was seen in the GB cluster compared to the SG group (Cl 14.72 to 23.34, MD 19.55) (Kaplan et al., 2018). 2-year follow-ups were reported in trials (Moon et al., 2016). Endpoint percentage EWL is 16.6 to 55.84 percent (0.06 to 34.07 for and percentage TWL is 6.62% MD, CI 1.34 to 12.95, p = 0.10) were not significantly different between GB and SG. Percent TWL and percent EWL results were reported in three trials (Casillas et al., 2017) with a 3-year follow-up (Prasad et al., 2019). SG and GB had no significant difference in the percentage TWL at the end of the study (MD = 4.97, 95 percent CI 2.34 to 12.27).

Discussion:-

Currently, GB and SG are the most frequently performed bariatric operations. Many studies have compared gastric bypass surgery (GB) with sleeve gastroplasty (SG) in the treatment of senior obesity, but no clear winner has emerged. The current meta-analysis comprises 20 studies that used both GB and SG (Sharples &Mahawar, 2020). Based on past research, we thoroughly and comprehensively examine the differences between these two surgical procedures in elderly patients regarding safety and draw some conclusions. When it came to senior patients, we discussed the risks of two treatments in terms of complications, mortality, and the use of postoperative medical resources. Compared to SG, this study found that GB was more likely to cause problems (Rogers & Diseases, 2019). The staple-line leak, UTI, and blockage were more common in GB than in SG in the first month following the surgery. SG was found to have a similar safety profile in studies of younger patients (Hu et al., 2020). Safety in the clinical setting may result from the SG procedure's ease of use (Vinan-Vega, Diaz Vico, & Elli, 2019). Despite the higher likelihood of complications, in patients ages 65 and older, there were no increased 30-day death or readmission rates. Although mortality, readmission, and reoperation rates were more significant in the elderly compared to younger patients, this suggests that in the elderly, surgical problems may have more severe consequences (Gray et al., 2018). In other words, complications in the general population should be given more attention before bariatric surgery, and additional research is needed to fully understand this phenomenon (Arnold et al., 2019). Although the study did not find statistical significance, elderly patients who underwent GB surgery had a higher likelihood of visiting the emergency room post-surgery. It's possible that the lack of a significant month-over-month mortality rate difference was due to a lower number of individuals in the GB cluster compared to the SG cluster when compared to mortality following surgery within a month. The month-over-month mortality rate was obfuscated by additional confounding factors that can't be controlled directly in retrospective research (Kaplan et al., 2018). In terms of morbidity, mortality, and postoperative healthcare resource utilization, SG is safer than GB for obese patients. Patients and bariatric surgeons both rely on their decisions on how well their procedures function in practice. The rate of comorbidity resolution is critical in determining the effectiveness of bariatric surgery (Marczuk et al., 2019). Previous meta-analyses found no significant difference in the rate of SA(sleep apnea) reduction among both techniques, following our beliefs findings in senior people (Wang et al., 2017). There was insufficient information to conduct subgroup analysis based on our study's follow-up period vs. theirs. This study looked at freshly published research and showed that both treatments had the same effect on older patients, a first for studies including the elderly (Xu et al., 2020). Hu et al. reported in the journal Pediatrics that GB achieved a higher short-term remission rate than SG, but there was no discernible change in the long run. Although all of the studies included in this present meta-analysis were at least 12 months in duration, they were found to be superior to standard of care (SG) in controlling hypertension in elderly obese adults. To fully understand this phenomenon, additional research is required. Another objective for elderly patients is to reduce their weight (Wu et al., 2020). At the three-year mark, we chose percent TWL as a weight-loss metric due to the abundance of data that could be gathered. In our meta-analysis, we found that both procedures resulted in significant weight reduction in older individuals, with GB leading to a higher EWL percentage than SG (MD = 18.9, 95 percent CI 14.55–24.36) after one year. 2 and 3 years later, there was no statistical significance. As a result, this study contradicts previous studies, which found statistically equivalent results for the two treatments after two years, but the mid-term and long-term findings of the two surgeries differed. Bariatric surgery might be less beneficial for people because they are less active and have a slower metabolism than other people, according to several studies (Marczuk et al., 2019). However, how these variances in effect affect the contradictory outcomes is still unknown. We have identified some flaws in our meta-analysis. For starters, the retrospective design of 17 of the included studies raises the specter of selection bias. To begin with, there aren't enough studies that included performing any race or BMI stratification on the way aid in individual choice. In the case of several comorbidities, the data offered is based on sample size. It is important to note that the information is solely derived from two research projects. To be sure, more excellent investigation is required to ensure the validity of these findings. Including equally open surgeries and laparoscopic evaluations could create discrepancies (Smith et al., 2019).

Conclusion:-

SG may be a better option for people than GB because it has not been proven to be less successful than GB while being safer in terms of health. There are fewer early and late problems with the SG approach and a lower readmission rate, a lower mortality rate, and a lower risk of reoperation than with the GB method. A year of treatment with GB showed that obese patients lost more weight and had lower blood pressure than those who did not. However, the research severely restricted the statistical power, despite these shortcomings. Consequently, clinical studies with a large enough sample size are required to discover which procedures provide the best results for patients.

List of Tables and Figures

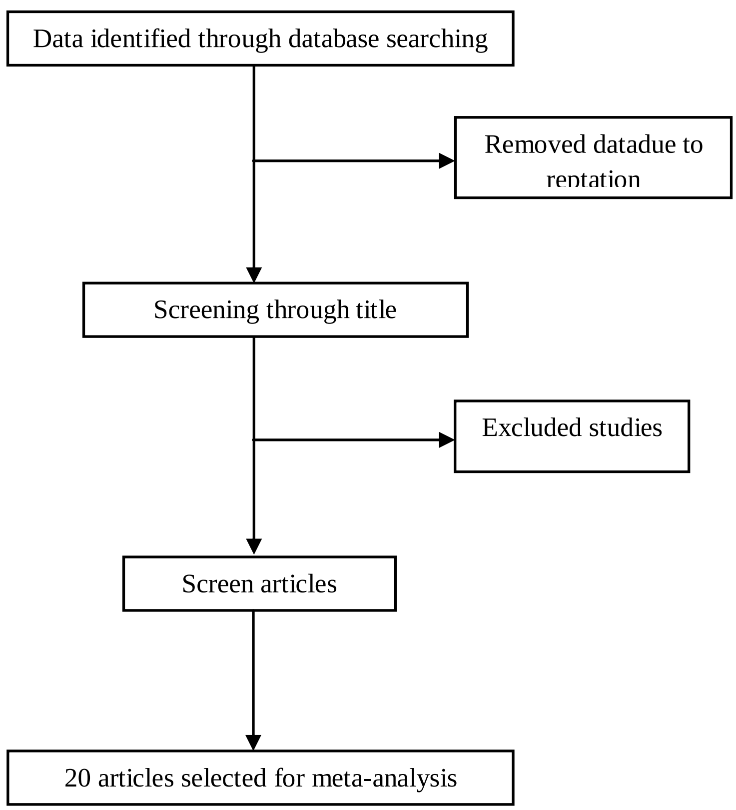


Fig 1:- Flow diagram of screening articles on SG & GB.

Table 1:- Basic characteristics of GB& SG studies.

Basic characteristics		**GB**		**SG**	
		Mean	**SD**	**Mean**	**SD**
Age	Year	43.6	11.1	45.1	10.7
Weight	Kg	132.2	26.8	140.6	28.8
BMI	Kg/m^2	46.8	7.6	49.7	8.6
Comorbidities		**% age**			
Coronary heart disease		32	17.8	19	15.8
Type 2 diabetes		71	42.1	46	38
Sleep apnea		104	63.2	62	51.6
Hypertension		122	72.4	93	81.1
Dyslipidemia		124	73.4	78	66.1

Table 2:- Outcome of complication analyses after postoperatively.

Complication	**Studies no**	**No of patient**					
		GB		**SG**			
		Event	**Total**	**Event**	**Total**	**95%Cl2**	**OR**
Myocardial infraction	2	2	924	1	1003	0.95-32.48	5.55
Obstruction	2	5	379	1	691	1.16-42.8	7.03
Vein Thrombosis	3	7	1126	4	1442	0.72-8.74	2.52
UTI	3	15	942	4	1088	1.46-12.51	4.27
Bleeding Transfusion	4	32	1144	29	1527	0.88-3.48	1.46
Staple line leak	4	67	5791	31	6172	1.5-3.48	2.28

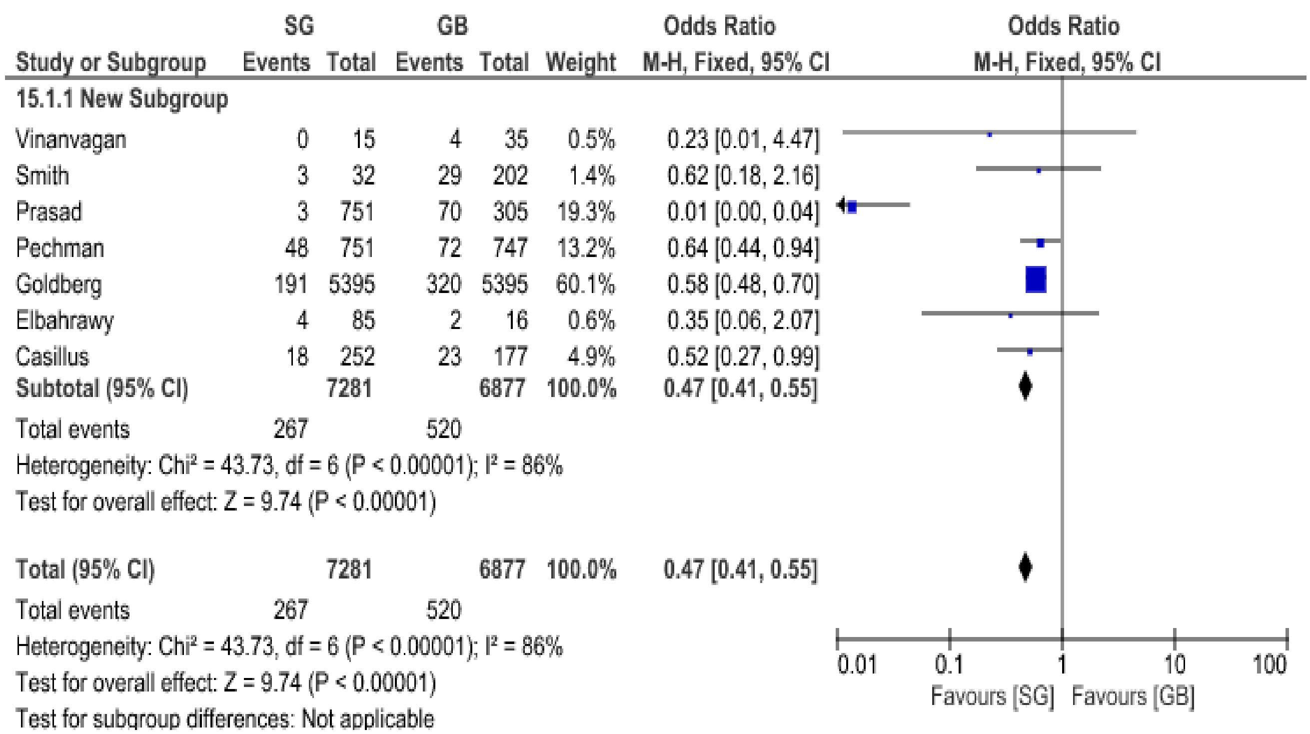


Fig. 02:- Early complication.

Study or Subgroup	GB Events	GB Total	SG Events	SG Total	Weight	Odds Ratio M-H, Fixed, 95% CI
Arnold	527	5593	328	3929	93.3%	1.14 [0.99, 1.32]
Casillus	31	177	21	252	3.8%	2.34 [1.29, 4.22]
Elbahrawy	2	18	7	85	0.6%	1.39 [0.26, 7.33]
Gray	11	69	9	65	2.1%	1.18 [0.45, 3.06]
Yoon	3	16	1	24	0.2%	5.31 [0.50, 56.39]
Total (95% CI)		**5873**		**4355**	**100.0%**	**1.20 [1.04, 1.37]**
Total events	574		366			

Heterogeneity: Chi² = 6.87, df = 4 (P = 0.14); I² = 42%
Test for overall effect: Z = 2.56 (P = 0.01)

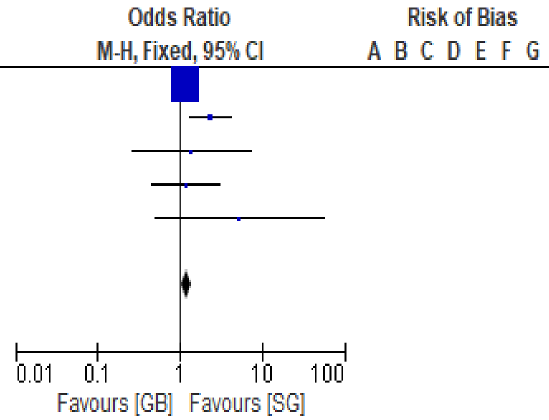


Fig. 03:- Late complication.

Study or Subgroup	SG Mean	SG SD	SG Total	GB Mean	GB SD	GB Total	Weight	Mean Difference IV, Random, 95% CI
Phillip J	41.3	11.1	140	45.1	10.9	74	8.2%	-3.80 [-6.89, -0.71]
Chenxin Xu	42.6	12	154	43.5	11.2	345	10.3%	-0.90 [-3.13, 1.33]
Maher El Chaar	44.5	12	9829	45.4	12	4354	14.3%	-0.90 [-1.33, -0.47]
John Melissas	42.5	11.6	101	43	10.6	134	8.6%	-0.50 [-3.39, 2.39]
Andreas Plamper	43.4	11.2	118	43.2	11.1	118	8.7%	0.20 [-2.65, 3.05]
Ralph Peterli	43	11.1	107	42.1	11.2	110	8.4%	0.90 [-2.07, 3.87]
Corey J	45.1	10.7	336	43.7	11.2	383	12.0%	1.40 [-0.20, 3.00]
Fu-Gang	43.5	11.2	144	42.1	11.6	289	10.2%	1.40 [-0.87, 3.67]
Alistair J	45.1	10.7	169	43.6	11.1	118	9.4%	1.50 [-1.07, 4.07]
Chang Wu	46.5	12.1	136	41	11.5	280	9.8%	5.50 [3.06, 7.94]
Total (95% CI)			**11234**			**6205**	**100.0%**	**0.51 [-0.83, 1.84]**

Heterogeneity: Tau² = 3.20; Chi² = 42.61, df = 9 (P < 0.00001); I² = 79%
Test for overall effect: Z = 0.75 (P = 0.46)

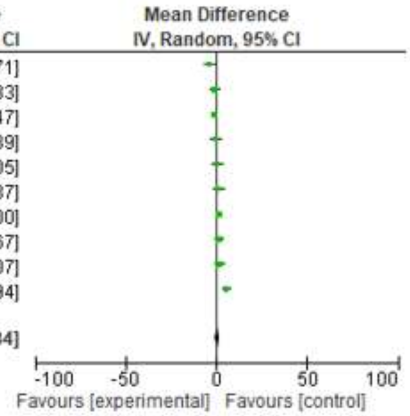
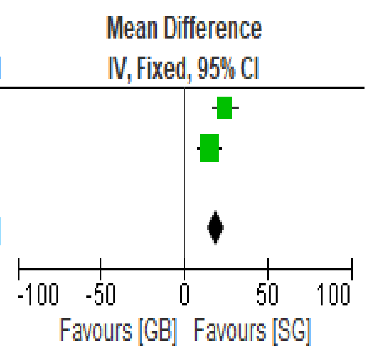


Fig. 04:- Weight difference.

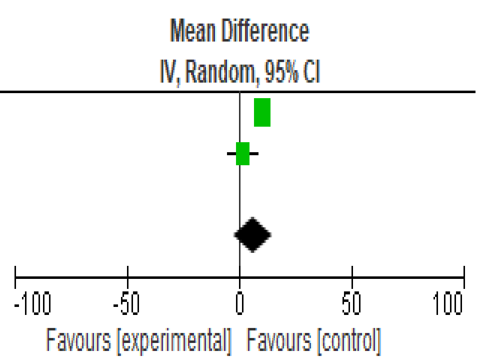
Study or Subgroup	GB Mean	GB SD	GB Total	SG Mean	SG SD	SG Total	Weight	Mean Difference IV, Fixed, 95% CI
Cassilus	75.2	41.6	176	50.5	40.4	251	41.6%	24.70 [16.78, 32.62]
Kaplan	56.6	15.3	177	41.5	42.1	172	58.4%	15.10 [8.42, 21.78]
Total (95% CI)			**353**			**423**	**100.0%**	**19.09 [13.98, 24.20]**

Heterogeneity: Chi² = 3.30, df = 1 (P = 0.07); I² = 70%
Test for overall effect: Z = 7.33 (P < 0.00001)



Study or Subgroup	GB Mean	GB SD	GB Total	SG Mean	SG SD	SG Total	Weight	Mean Difference IV, Random, 95% CI
Cassilus	29	16.8	176	18.7	16.2	251	55.6%	10.30 [7.11, 13.49]
Elbahwray	30.2	12	18	28.6	15.5	78	44.4%	1.60 [-4.92, 8.12]
Total (95% CI)			**194**			**329**	**100.0%**	**6.43 [-2.04, 14.91]**

Heterogeneity: Tau² = 30.98; Chi² = 5.51, df = 1 (P = 0.02); I² = 82%
Test for overall effect: Z = 1.49 (P = 0.14)



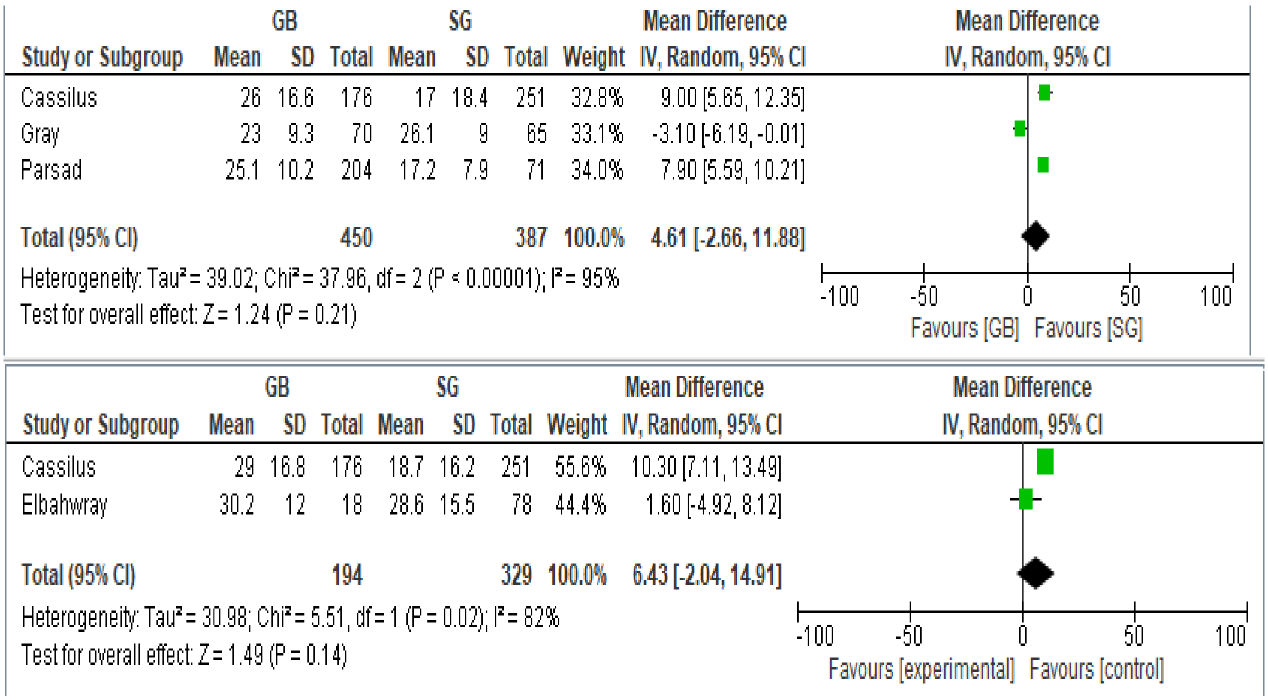


Fig. 05:- A Forest plot was created for Comparing the % of weight loss (percent EWL) and % of total weight loss (percent TWL) at the 1 and 2-year postoperative intervals.

Data Availability:
The article review data used to support the findings of this study is included within the article.

Conflicts of Interest:
The author declare that there are no conflicts of interest.

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