

Effect of Hybrid Nursing Instruction on Patients' Outcomes Post Gastric Sleeve surgery

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Abstract

Background: After gastric sleeve surgery, the altered gastrointestinal anatomy can lead to significant changes in how nutrients are absorbed, potentially causing deficiencies and unpleasant symptoms. therefore, the patients require specialized nursing instruction to prevent complications. **This study aimed to** evaluate the effect of hybrid nursing instruction on patients' outcomes post gastric sleeve surgery. **Design:** quasi experimental (per-posttest) research design. **Sample:** A purposive sample of 60 patients, equally divided into two groups study and control group. **Setting:** Surgery department, of gastrointestinal center at Mansoura university hospital. **Tools:** Two tools were used: Tool (1) structured interview questionnaire sheet. Tool (2) Post-gastric sleeve patients' outcomes. The study concluded that implementation of hybrid nursing instruction positively affect on post-gastric sleeve patients' outcomes regarding knowledge, eating pattern, complications, and perception comparing to pre intervention. **Results:** There was a statistically significant difference in knowledge scores between study and control groups, as well as patients' eating practice pattern and perception were improved post application of the hybrid nursing instruction. comparing to pre values with ($p = 0.001$). Finally, patients' complications post gastric sleeve surgery were improved. **Conclusion:** The study concluded that implementation of hybrid nursing instruction positively affect on post-gastric sleeve patients' outcomes regarding knowledge, eating pattern, complications, and perception comparing to pre intervention. **Recommendation:** The study recommended availability of written printed guidance regarding post-gastric sleeve nursing instruction to improve patient's outcomes.

Keywords: Gastric Sleeve, Hybrid Nursing Instruction, Patients' Outcomes.

Introduction

Obesity continues to represent a major global health challenge, and sleeve gastrectomy (gastric sleeve) has consistently been recognized as a highly effective intervention for sustained weight loss and comorbidity resolution **Anonymous, (2022)**. Success of this procedure heavily depends on post-operative adherence to dietary guidelines, behavioral changes, and nutritional supplementation. Despite surgical success, suboptimal long-term outcomes are often attributed to poor knowledge and nonadherence

to postoperative lifestyle modifications **Köhler et al., (2020)**. As such, enhancing patient understanding and engagement in their own care is

critical to maintain the benefits of bariatric surgery. Hybrid nursing instruction is a structured combination of face-to-face teaching and digital or remote education platforms has gained traction in healthcare as a versatile educational strategy. It can leverage visual aids, personalized instruction, and flexible reinforcement tools to improve patient

outcomes **Lee et al., (2021)**. In the context of post-bariatric care, structured hybrid programs can offer personalized, accessible, and continuous support, which is crucial during the transition phase after surgery **Zhao et al., (2021)**.

Virtual nutrition education for bariatric patient prior to surgery leads to significantly higher nutrition knowledge than routine care. It boosts patient preparation and retention of critical information **Anonymous, (2020)**.

Patient perception and understanding of the procedure's lifelong implications and play a critical role in recovery and outcome. when patients clearly understand their role in post-operative success, they are more likely to comply with dietary, psychological, and physical activity recommendations **Jalil et al., (2022)**. Hybrid instruction models can incorporate multimedia content, interactive sessions, and self-paced modules, all of which enhance patients' perception and engagement.

Eating behaviors such as uncontrolled eating, emotional eating, and hunger sensitivity are commonly disrupted in the post-bariatric population and are key determinants of weight regain **Masood, et al., (2019)**. A pilot intervention delivered psychoeducational support and structured follow-up, which yielded significant improvements in eating self-regulation and self-esteem among patients **(Altaheri et al., 2021)**. These results underscore the value of integrating targeted education into the postoperative period to shape healthier habits and perceptions.

In addition to eating patterns, patients' perceptions of dietary restrictions, body image, and their self-confidence in managing postoperative regimens play a central role in long-term adherence. Structured teaching programs addressing both physiological and psychological post-surgery challenges have been shown to significantly improve knowledge, self-esteem, and body-image acceptance **El-Attar, (2022)**. These interventions also reduced physiologic complications and increased dietary restraint behavior six months post-operatively, demonstrating sustained influence on patient attitudes and behaviors.

Nevertheless, research directly examining hybrid nursing instruction combining digital/remote learning with in-person sessions to influence knowledge, perception, and eating behavior specifically in post-gastric sleeve patients remains limited. Current evidence on hybrid models in other patient populations (e.g., peritoneal dialysis, chronic disease) indicates improved knowledge and self-reported outcomes **Lee et al., (2021)**. Therefore, applying such models in gastric sleeve care may fill a critical gap and potentiate sustained lifestyle changes.

Despite its potential, limited research has explored the impact of hybrid nursing instruction specifically on the behavioral and perceptual outcomes of patients' post-gastric sleeve surgery. This study aims to assess the effect of hybrid nursing instruction on eating patterns, knowledge, and perception among patients who have undergone gastric sleeve surgery. The findings are expected to contribute to the development of evidence-based educational strategies that promote long-term health and dietary compliance in this population.

Significance of the study

Gastric sleeve surgery is currently one of the most widely performed bariatric procedures worldwide, accounting for over 59% of all bariatric surgeries globally **(Angrisani et al., 2020)**. Despite its effectiveness in achieving significant weight loss and improving obesity-related comorbidities, long-term success is highly dependent on patient adherence to lifestyle changes, particularly nutritional behaviors. Studies have shown that 20–30% of patients regain weight within 2–5 years after surgery, largely due to inadequate dietary knowledge and poor post-operative compliance **Alhalel et al., (2021)**.

According to a study by **Lee et al. (2021)**, more than 40% of patients' post-gastric sleeve surgery failed to adhere to recommended eating patterns within the first six months. This noncompliance underscores the urgent need for effective educational interventions that are both comprehensive and sustainable.

Moreover, the economic burden of post-surgical complications due to poor compliance is substantial. In the U.S., the average cost of managing nutritional deficiencies and post-

operative readmissions can range from \$5,000 to \$20,000 per patient annually **Finks et al., (2020)**. A targeted, hybrid nursing intervention that improves knowledge, perception, and eating patterns can potentially reduce these costs and improve quality of life.

Therefore, this study is significant not only in advancing nursing education practices but also in improving patient outcomes, reducing healthcare costs, and addressing a critical gap in post-bariatric patient care. By assessing the effects of hybrid nursing instruction, the research provides evidence for integrating modern educational approaches into standard bariatric follow-up protocols.

Aim of the study

This study aimed to evaluate the effect of hybrid nursing instruction on patients' outcomes post gastric sleeve surgery.

Research hypotheses:

- H1:** The knowledge scores will be higher among the study group than the control group post the application of hybrid nursing instruction.
- H2:** Eating pattern will be improved among the study group than the control group post the application of hybrid nursing instruction.
- H3:** Perceptions will be improved among the study group than the control group post the application of hybrid nursing instruction.
- H4:** Postoperative complications will be decreased among the study group than the control group post the application of hybrid nursing instruction.

Operational definition:

Hybrid nursing instruction: combining in-person and virtual support, has a positive impact on post-gastric sleeve surgery outcomes. Specifically, hybrid guidance using printed materials and virtual platforms like WhatsApp or Telegram can improve patient satisfaction and self-image perception. It enhances patients' knowledge, improves eating habits, perceptions, and reduces postoperative complications.

Patients' Outcomes: It includes assessment patients' knowledge, eating pattern practice, perceptions, and postoperative and complications.

Method:

Design:

A quasi-experimental design was implemented using pre- and post-test assessments of both study and control groups.

Setting:

The study was conducted at the Surgery department, of gastrointestinal center at Mansoura university hospital.

Sample Size Calculation:

Sample size was calculated using G*Power 3.19.7 software. Parameters included: independent t-test analysis, 95% confidence interval, type I error (α) of 0.05, power ($1-\beta$) of 86%, effect size (d) of 0.8, two-tailed test, and allocation ratio ($N2/N1$) of 1.

Subjects:

Purposive sample of sixty patients equally divided into two equal groups:

- Control group ($n=30$): patients who receiving routine hospital care
- Study group ($n=30$): patients who receiving care as designed by researcher (hybrid nursing instruction).

Inclusion Criteria

- Adults' patient of both genders aged 20 -60 years. Patients post-gastric sleeve surgery who able to communicate, have a smart phone and willingness to participate in the study.

Exclusion Criteria

- Mental or cognitive impairment.

Tools:

Data collection consisted two tools based on a comprehensive literature review.

Tool I: Structured Interview Questionnaire sheet

This tool was developed by researchers based on recent literature review, which includes the following two parts:

Part (1): Patients' demographic characteristic and health relevant data: demographic characteristic address personal data such as age, gender, educational level, occupation, and length of hospital stays.

Part (2): Post-gastric sleeve patients' knowledge: This part of tool was used to assess patients' knowledge related to healthy eating regimen, different activities related lifestyle postoperative complications, medical consultation, and other activities **Lespessailles, (2019) and Cheng et al., (2021).**

Scoring system: one-score was given for "correct answer or yes question" & zero for "incorrect answer or no question. The total knowledge score was scored as following: < 50.0% for poor knowledge, 50.0 - < 75.0% for fair knowledge and $\geq 75.0\%$ for good knowledge.

Tool II: Post-gastric sleeve patients' outcomes.

This tool was consisted of five parts as follows:

Part (1): Three-Factors Eating Questionnaire: It was developed by **Kirac et al., (2015)**. It's a self-report instrument used to evaluate three dimensions of eating behavior: cognitive restraint in eating, susceptibility to periodic disinhibition of control over eating, and perceived hunger. The questionnaire contains 51 items in two parts: 36 items ask for true/false judgment, and 15 items are scored in a 4-point Likert-type scale.

Scoring system: There are 0 or 1 points assigned to each item. Therefore, the maximum attainable score of 21-16-14 is the required minimum for factors I, II, and III. The possible scores from the questionnaire's variables are 5–20 for degrees of uncontrolled eating, 3–12 for emotional eating, 6–24 for intentional calorie restriction, and 4–16 for hunger sensitivity increases in all but one of the scores.

Part (2): The Body Image Perception Questionnaire (BIPQ) Secord, & Jourard,

created this questionnaire in 1953. It included patient perception on comorbidities and complications, patient perception on motivations for surgery, patient perception on other weight loss methods tried, patient perception on gastric sleeve effect on exercise and diet, and patient perception on gastric sleeve effect on relationships are some of the topics covered in this article. I am not satisfied at all, I am not satisfied, I am neither satisfied nor unsatisfied, I am satisfied, and I am quite satisfied in response to this question. A higher BIPQ score indicates a larger percentage of extremely satisfied 5 degrees.

Scoring system: High levels of discontent are indicated by low scores on this questionnaire's 40 items, each of which has a 5-point Likert scale. Each item's score, which includes responses like "I am not at all satisfied," "I am not satisfied," "I am neither satisfied nor dissatisfied," "I am satisfied," and "I am very satisfied," can range from 1 to 5, while the overall score can range from 40 to 200.

Part (3): Patients' anthropometric measurement: includes Body Mass Index (BMI). It was calculated by dividing the weight in kilogram on the square of height in meter (kg/m^2). Standards classify BMI into several categories; below 18.5 / underweight, 18.5-24.9 / normal, 25-29.9 / overweight, 30-39.9 / obese, and above 40 / morbid obese **Kobel, (2022) and Carrión-Martínez et al., (2022).**

Part (4): Patients' laboratory investigation: it includes total protein =6.0 to 8.3 (g/dL), Ferritin =30 to 400 (ng/mL) for men and =13 to 150 ng/mL for women, Calcium = 8.5 to 10.2 (mg/dL) (referan).and lipid profile such as cholesterol levels are under 200 milligrams per deciliter (mg/dL), LDL less than 100 mg/dL, and High LDL levels are 160-189 mg/dL **Turgeon, (2022).**

Part (5): Complications post-gastric sleeve surgery: This part of tool was used to assess presence of complications such as GERD, nausea, vomiting, infection, nutritional deficiencies, and staple line leak **Elrefai et al., (2022).**

Ethical considerations:

Following an explanation of the study's purpose and advantages to each patient, oral consent was obtained. Each patient has the right to withdraw from the study at any time without providing a reason, the researchers emphasized, that participation is entirely voluntary. Additionally, the data were coded and tabulated to ensure anonymity and secrecy.

Validity of the tools: The tools were developed by the researchers after reviewing related literature. They were tested for content validity by a panel of six experts from the fields of medicine and nursing. The necessary modifications were made based on their feedback.

Reliability: The knowledge assessment sheet was tested for reliability using Cronbach's alpha coefficient with reliability scores of 0.85 and 0.88 respectively.

Three-Factors Eating Questionnaire have consistently supported its test-retest reliability, making it a stable measure over time show good internal consistency, with Cronbach's alpha values typically above 0.70 for each factor **de Lauzon et al., (2004).**

Internal consistency (Cronbach's alpha) values for BodyImage Perception Questionnaire (BIPQ) subscales are typically above 0.70, which is considered acceptable **Weinman et al. (2006).**

A pilot study was conducted with 6 patients (10% of the sample) prior to data collection to assess the tools' relevance, feasibility, applicability, reliability, and clarity, as well as to determine the time required to collect data from each participant. Based on the pilot study results, the tools were modified accordingly. These patients were not included in the main study.

Fieldwork

The framework of the study was carried out from August 2021 to August 2022 into three consecutive phases as the following:

1. Assessment phase:

- Patients who accepted to be involved in the study and fulfilled the inclusion criteria were interviewed individually to collect the necessary data using all the study tools after clarified the purpose of the study and tools components to all patients of both groups.
- The researchers interviewed the studied patients at the time of preparing the patient for operation of the above-mentioned setting

throughout the morning and afternoon shifts to collect baseline data using all the study tools.

2. Implementation phase:

- This phase started by implementing the hybrid nursing instruction for the study group only throughout the researchers. It was implemented in form of four sessions as following:
- *First session:* consisted of knowledge about gastric sleeve surgery; definition, benefits, and complications.
- *Second session:* consisted of immediate nursing instruction post gastric sleeve surgery such as pain management, wound care, and monitor vital sings.
- *Third session:* This session consisted of measures to improve the eating practice pattern and perception post gastric sleeve surgery It covers dietary and fluid adjustments, medicines, vitamin supplementation, lifestyle modifications, and the importance of medical follow-up care.
- The content of the hybrid guidance applied into two methods face-to-face nursing guidance and virtual support, to improve post-gastric sleeve surgery outcomes.
- Face-to-face nursing guidance session carried out in the morning shift. Each session was lasts 35 minutes. Each patient was interviewed individually. The instructional media used are power point presentation, videos, and colored handout. A colored booklet was given to the study group to help them in reviewing and understanding educational content.
- Hybrid guidance virtual support applied through platforms like WhatsApp with continual communication with the researchers to providing feedback to improve patient satisfaction and self-image perception. The researchers created WhatsApp group for studied patients through the telephone number of each patient to communicate virtually with all patients or his family member in case of the patient cannot use the smart phone applications. The nursing guidance re-present for the patient WhatsApp group to be reference for remember them and follow up as a continuous educational method. Virtual meeting determined one day weekly to contact with the patients or his family members to

allow for open discussion for approximately 45 minutes.

- The researchers follow up the studied patient at outpatient clinic when the patients came to the hospital for follow up care to collect data using tool I part 2 and tool II.
- Control group exposed to hospital routine care. After finishing the data collection of posttests, the researchers distributed a colored booklet to the participants in the control group.

3. Evaluation phase:

Study and control group was evaluated to evaluate using tool I part 2 and tool II as following:

- After one months from the gastric sleeve surgery as post test
- After six months from the gastric sleeve surgery as follow up.

Data Analysis:

Categorical variables were described by number and percent (N, &%), where continuous variables described by the mean and standard deviation (Mean, SD). Chi-square test and Fisher exact test used to compare categorical variables where compare between continuous variables by Independent sample t-test, also ANOVA test was used. Statistical significance was defined as $P \leq 0.05$, with $P < 0.01$ considered highly significant.

Results

Table (1): Illustrates the demographic characteristics of the study and control groups, each consisting of 30 participants. There were no statistically significant differences between the study and control groups in terms of age, gender, marital status, education, or occupation, indicating baseline homogeneity. The age group 30–<40 years was the most represented in both groups (50.0% in the study group and 53.3% in the control group). Females constituted the majority in both groups. Most participants were married and had completed at least secondary education. Equal proportions of working and non-working individuals were observed in the study group, while a slightly higher percentage of working individuals was present in the control

group. These findings suggest that the two groups were demographically comparable at baseline, ensuring the validity of post-intervention comparisons.

Fig. (1): Demonstrates that, at baseline (Pre), there was no statistically significant difference between the groups ($p = 0.233$), with 30.0% of the control group and 36.7% of the study group demonstrating satisfactory knowledge. One-month post-intervention, the study group showed a significant improvement to 56.7%, compared to 40.0% in the control group ($p = 0.005$), indicating the early effect of the intervention. At six months, the knowledge retention in the study group increased dramatically to 90.0%, while the control group remained unchanged at 36.7%. This difference was highly significant ($p = 0.001$), suggesting sustained impact of the hybrid nursing instruction.

Table (2): Shows that, there were no significant differences between the study and control groups across all eating behavior domains at baseline. However, after one month and especially after six months, the study group showed significant improvements in all aspects of eating behavior: reduced uncontrolled and emotional eating, improved conscious limitation of intake, and decreased hunger sensitivity. In contrast, the control group showed deterioration or stagnation in these areas. The total TFEQ-R21 score also significantly improved in the study group but worsened in the control group.

Fig. (2) Illustrates the progression of mean scores of patient perception questionnaire across three time points (preoperative, 1 month and 6 months postoperative) for the studied groups. Initially, both groups showed comparable baseline scores indicating no significant difference prior to intervention. At 1 month, the study group demonstrated a notable improvement (109.82 ± 16.4) compared to the control group (99.72 ± 11.57), with a statistically significant difference ($p = 0.005$). By 6 months, the study group's scores significantly outstripped those of the control group (171.56 ± 14.5 vs. 101.16 ± 12.5 ; $p = 0.001$), reflecting the effectiveness of the intervention over time.

Table (3): Clarifies statistically significant improvements in lipid profile (\downarrow total cholesterol and LDL-C, \uparrow HDL-C) with p value < 0.001 and BMI p value 0.031, alongside significant reductions in total protein, ferritin, and calcium levels at 6 months post-intervention at p value

<0.001 in study group compared to the control group. Moreover, there was significant improvement in body mass index post six month which reflect importance of hybrid guidance

Table (4): Demonstrates that, post-intervention, the study group showed significantly fewer cases of GERD at 6 months and nausea/vomiting at 1 month compared to the control group at p value (0.047 and 0.045 respectively), with no significant differences in other complications.

Table 1. Frequency distribution of studied groups according to demographic (N=60).

Demographics	Study group (N=30)		Control group (N=30)		Chi-Square	
	N	%	N	%	X ²	P
Age						
21 < 30	7	23.3	6	20.0	7.601	0.564
30 < 40	15	50.0	16	53.3		
40 < 50	5	16.7	6	20.0		
50 – 60	3	10.0	2	06.7		
Gender						
Male	10	33.3	6	20.0	12.033	0.966
Female	20	66.7	24	80.0		
Marital Status						
Married	25	83.3	22	73.3	20.825	0.834
Un married	5	16.7	8	26.7		
Educational Level						
Illiterate	3	10.0	1	3.3	6.025	0.420
Basic	4	13.3	6	20.0		
Secondary	12	40.0	11	36.7		
Higher Education	11	36.7	12	40.0		
Occupational status						
Working	15	50.0	16	53.3	5.750	0.124
Not working	15	50.0	14	46.7		

Chi-Square test

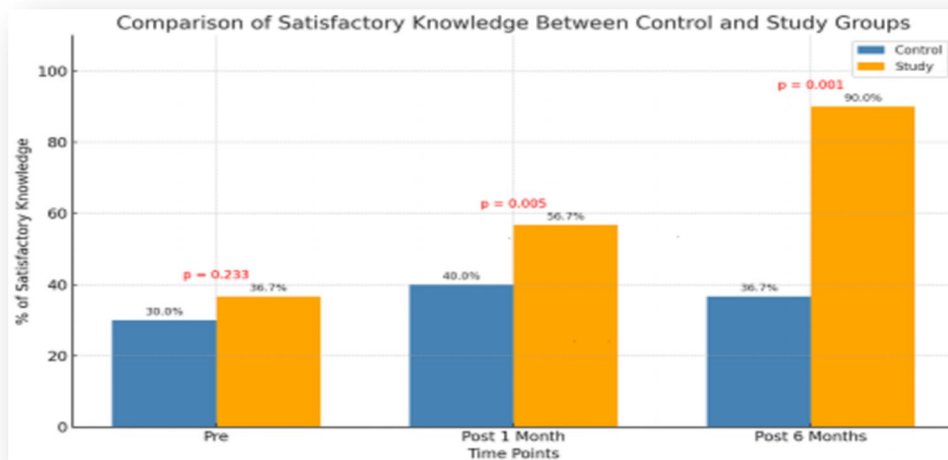


Figure 1. Comparison of total satisfactory knowledge scores between studied groups pre and post intervention

Table 2. Comparison of Eating Pattern among studied groups pre and post intervention(N=60).

Eating Pattern Questionnaire (TFEQ-R21)	Study group (N=30)			Control group (N=30)			Test of significance		
	Pre-intervention	Post- 1 month	Post- 6 month	Pre-intervention	Post- 1 month	Post- 6 month	ANOVA test		
	Mean ±SD			Mean ±SD			P(1)	P(2)	P(3)
Uncontrolled eating.	14.75±3.57	11.51±2.66	9.52±2.23	15.37±2.58	17.52± 2.87	18.42±1.81	0.606	<0.001*	<0.001*
Emotional eating levels.	9.70±2.30	5.66±2.42	4.33±1.26	9.77±2.70	10.26±1.33	10.42±2.11	0.843	<0.001*	<0.001*
Limiting food intake consciously	10.15±2.76	19.38±3.78	20.66±2.21	10.72±2.26	12.08±5.71	13.36±3.58	0.882	0.008*	<0.001*
Hunger sensitivity	14.90±1.77	9.28±2.52	5.63±1.57	14.60±2.07	19.68±4.52	21.34±5.27	0.382	<0.001*	<0.001*
Total Score	48.70±9.87	44.54±11.37	39.16±6.55	49.63±11.48	60.84±14.65	67.44±13.87	0.667	<0.001*	<0.001*

ANOVA test

Significant difference at p .value <0.001

(P1) p value for comparing between the studied groups pre.

(P2) p value for comparing between the studied groups post one month.

(P3) p value for comparing between the studied groups post six month.

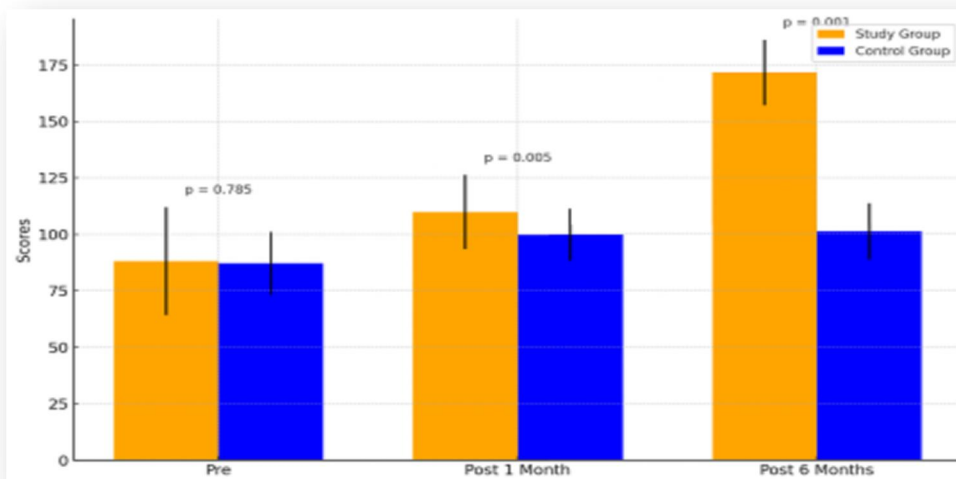


Figure 2. Comparison of Mean score of patient perception questionnaire among studied groups pre and post intervention

Table 3. Comparison of lab investigation and anthropometric measurements among studied groups pre and post intervention (N=60)

Time Point	Parameter	Study Group (N=60) Mean \pm SD	Control Group (N=60) Mean \pm SD	p-value
	Lipid profile			
Pre-operative	Total Cholesterol	213.95 \pm 3.45	213.70 \pm 3.92	0.421
	LDL-C	147.55 \pm 3.04	147.12 \pm 3.11	0.764
	HDL-C	41.19 \pm 0.87	41.05 \pm 0.89	0.421
1 Month Post-op	Total Cholesterol	208.78 \pm 4.32	215.34 \pm 4.56	0.007*
	LDL-C	136.61 \pm 3.12	146.82 \pm 2.97	0.003*
	HDL-C	41.02 \pm 0.78	41.08 \pm 0.91	0.542
6 Months Post-op	Total Cholesterol	189.07 \pm 19.22	212.11 \pm 5.05	< 0.001*
	LDL-C	112.53 \pm 2.79	143.64 \pm 2.70	< 0.001*
	HDL-C	44.38 \pm 1.74	41.01 \pm 1.11	< 0.001*
	Biochemical investigations			
Pre-operative	Total Protein (g/dL)	7.23 \pm 0.47	7.21 \pm 0.41	0.642
	Ferritin (ng/mL)	111.33 \pm 14.98	110.73 \pm 14.77	0.503
	Calcium (mg/dL)	9.28 \pm 0.40	9.31 \pm 0.38	0.522
1 Month Post-op	Total Protein	6.87 \pm 0.43	7.22 \pm 0.52	0.005*
	Ferritin	94.51 \pm 12.79	109.73 \pm 14.49	0.001*
	Calcium	9.01 \pm 0.40	9.36 \pm 0.43	< 0.001*
6 Months Post-op	Total Protein	6.66 \pm 0.40	7.17 \pm 0.47	< 0.001*
	Ferritin	89.43 \pm 12.95	110.55 \pm 13.43	< 0.001*
	Calcium	8.91 \pm 0.41	9.39 \pm 0.37	< 0.001*
Pre-operative	BMI Mean scores	41.17 \pm 5.04	43.52 \pm 4.66	0.637
1 Month Post-op		37.02 \pm 4.22	38.73 \pm 4.36	0.152
6 Months Post-op		29.64 \pm 3.36	32.56 \pm 3.89	0.031*

Independent samples t-test

Significant difference at $p \leq 0.05$ Significant difference at $p .value < 0.001$

Table 4. Comparison of complications between studied groups (pre- and post-intervention) (N=60)

Complication	Time Point	Study group (N=30)	Control group (N=30)	Chi-square/ Fisher's Exact Test
		N (%)	N (%)	P value
GERD	Pre-intervention	8 (26.7%)	7 (23.3%)	0.77
	Post- 1 month	5 (16.7%)	11 (36.7%)	0.086
	Post- 6 month	3 (10%)	9 (30%)	0.047*
Staple Line Leak	Post- 1 month	0 (0%)	1 (3.3%)	0.31
Nausea/Vomiting	Post- 1 month	3 (10%)	9 (30%)	0.045*
	Post- 6 month	1 (3.3%)	2 (6.7%)	0.55
Nutritional Deficiencies	Post- 6 month	2 (6.7%)	6 (20%)	0.13
Infection	Post- 1 month	1 (3.3%)	2 (6.7%)	0.55

Chi-square/ Fisher's Exact

Significant difference at $p \leq 0.05$

Discussion

Sleeve gastrectomy, one of the most popular bariatric surgeries in the modern era, the patient is required to be evaluated and prepared through continual education guidance to improve operation outcomes. **English et al., (2018)**. Pre and post bariatric surgery self-management requires dietary management, adherence to diet restriction. Hybrid nursing instruction, incorporating both in-person guidance and digital support, can positively impact outcomes for patients after gastric sleeve surgery. This approach, combining education on eating habits, exercise, and ongoing support, has been shown to improve patients' knowledge, eating practices, and overall perception of their situation. Additionally, it can lead to a reduction in postoperative complications and enhance patients' quality of life **Cheng et al., (2021)**.

This study, hypothesized that the hybrid nursing instruction would improve knowledge, eating pattern practice, perceptions and postoperative complications in the study group compared to control group in empowering self-management and potentially improving health outcomes post gastric sleeve surgery.

Gastric sleeve patients participated in this quasi-experimental study, forming a study group and a control group, each with 30 individuals. The study found no statistically significant differences between the groups' demographic variables at the outset. This baseline comparability demonstrates group homogeneity and successful randomization,

bolstering the validity of any outcome differences observed after the intervention involving guides and educational sessions.

In relation to the level of knowledge regarding gastric sleeve surgery and its care and management, there was significantly improvement in knowledge level in study group compared control group post intervention. This difference was highly significant, suggesting sustained impact of the hybrid nursing instruction. In this regard, **Aziz & Mohammed, (2022)** clarified that, patients' outcomes have been demonstrated to improve when patients receive up-to-date, complete, and accurate information about bariatric surgery and its care and management.

In this respect, **Sierżantowicz et al., (2020)** stated that, the educational session conducted for study group motivate the patient and indicated how to comply with dietary, physical activity, lifestyle recommendation had significant impact on weight loss.

Similarly, **El-Maghawry et al., (2021)**, stated that majority of patients had unsatisfactory knowledge about life style modification after surgery before applying health education program, while the knowledge of patients was satisfactory after applying the health education program in the first, second and third postoperative assessments. This difference was statistically significant.

Furthermore, **Roche & Jones, (2021)** verified that the teaching sessions which carried out

with the study group following the insertion of gastric sleeves had a substantial influence on patient's weight reduction, as well with differences particularly noticeable items regarding the motivation to follow instructions and check-ups.

This improvement could be due to the feasibility and attractiveness of the teaching methods used, such as videos and colored booklets reinforced by photos. This opinion is supported by **Bhattad & Pacifico, (2022)**, who mentioned that Integrating different media for teaching increases patient knowledge acquisition.

Concerning eating pattern practice, the study group showed significant improvements in all aspects of eating behavior: reduced uncontrolled and emotional eating, improved conscious limitation of intake, and decreased hunger sensitivity. In contrast, the control group showed deterioration or stagnation in these areas. In contrast, the control group showed deterioration or stagnation in these areas. Also, the total score of eating pattern questionnaire significantly improved in the study group but worsened in the control group post gastric sleeve surgery. This result consistent with, **Karlsson et al., (2021)** showed that, the patients with obesity, a three-month liquid followed by three months of food reintroduction, in combination with behavioral group treatment, was associated with a substantial weight loss after six months. Favorable changes in eating behavior were observed as well as extensive short-term improvements in health-related quality of life, comprising the physical, psychosocial, and mental domains.

Otherwise, a study done by **Wiedemann Ivezaj & Grilo, (2018)**. evidence that more frequent emotional eating after sleeve gastrectomy surgery may be a negative prognostic indicator of weight loss outcomes. Greater attention to disordered eating during the post-surgical period is warranted. While in a study done by **David et al., (2020)** reported that after sleeve gastrectomy, the patients' ratings for uncontrollable eating, emotional eating, and hunger sensitivity all dropped, but their scores for actively restricting food intake increased,

Finally, Zaki et al., (2021), mentioned that the present study has shown that bariatric surgery is an effective modality for achieving significant weight loss and treatment for obesity and its co-

morbidities. Our findings showed HDL were significantly lower compared to their mean post-operatively. On the other hand, a non-significant change was observed in LDL levels.

The result illustrates the progression of mean scores of patient perception questionnaire across three time points (pre, one month and six months post hybrid nursing instruction for the studied groups. Initially, both groups showed comparable baseline scores indicating no significant difference prior to intervention. At one month, the study group demonstrated a notable improvement. This consistent with **Barone et al., (2018)**, stated that in post-bariatric patients, the body was shown to be a more objective, improve patient satisfaction and confident measure for evaluating the quality of life of patients following post-bariatric surgery. Moreover, **Yates et al., (2020)** showed that, patients were satisfied with choosing to undergo surgery post-operatively. The positive effect has had on a number of areas (eg improved exercise, more positive and controlled interaction with food, enriched social engagements and improved body image) must be balanced by the reports of the challenging nature of the full lifestyle change, the fear of weight regain and the perceived judgement they received from friends and society.

The result of this study stated statistically significant improvements in lipid profile, alongside significant reductions in total protein, ferritin, and calcium levels at six months post-intervention in study group compared to the control group. This result in the same line with **Garay et al., (2021)**, stated that Gastric bypass achieved better mid/long-term results in terms of weight reduction and the resolution of hypercholesterolemia as compared to sleeve gastrectomy. While gastric bypass improved all lipid profile parameters, sleeve gastrectomy only improved HDL and triglyceride levels.

Moreover, **Guzel & Ikizek, (2021)** measured lipid changes at 3 and 12 months after bariatric surgery and demonstrated that although serum LDL-C concentrations were elevated preoperatively, they significantly decreased 12 months post-surgery. In another study, **Arnáiz et al., (2021)**, reported that a significant decrease in LDL and non-HDL-C was observed with the biliopancreatic diversion technique. In conclusion, **Mahmoud et al., (2022)**, showed that bariatric surgery improves weight loss and can help with managing or treating comorbid illnesses through reducing triglyceride

level and increasing HDL level, both of which improve patients' long-term cardiac and hepatic status. Finally, **Schauer et al., (2022)** the post-bariatric surgery improvement of several biochemical parameters has been demonstrated in several studies.

Moreover, the present study stated there was significant improvement in body mass index post six month which reflect importance of hybrid guidance This result was consistent with **Mahran et al., (2022)**, revealed that change in mean BMI, preprogram, two weeks and two-month post-program in sleeve gastrectomy were seriously/morbidly obese, moderate, and mild obese respectively. So, there is a significant change in BMI in the two operations two weeks and two-months post-program.

This study demonstrates that, post-intervention, the study group showed significantly fewer cases of GERD at six months and nausea/vomiting at one month compared to the control group, with no significant differences in other complications. As well as **Elrefai et al., (2022)**, a study entitled "Comparative study between single anastomosis sleeve jejunal bypass, sleeve gastrectomy and one anastomosis gastric bypass: a prospective randomized trial at Mansoura University", who reported that after six months of surgery, majority of all patients had stopped taking oral supplements and multivitamins with no postoperative nutritional complications at six months follow up.

Otherwise, **Giannopoulos et al., (2022)**, in a study entitled "Management of gastrointestinal bleeding following bariatric surgery, who emphasized that when bleeding develops within 30 days of surgery, it is characterized as early. Bleeding complications most frequently occur in immediate postoperative period.

The improvement in patients', eating pattern practice, perceptions, and postoperative complications, occur as a result of patients knowledge improvement ,increase the awareness of patients about their condition, and presence of printed colored materials, Moreover, hybrid virtual electronic methods used help to ask any question when needed. This supported by **Senbekov et al., (2022)** stated that up to eighty percent of the information provided to patients through traditional educational methods may be forgotten. Virtual modeling is more effective in

improving patients' knowledge than standard perioperative education, it also helps change negative emotions and bodily responses by altering inappropriate thoughts.

Finally, we found that hypothesis of this study, the hybrid nursing instruction achieved their goal in the study group compared to control group in empowering self-management and potentially improving health outcomes post gastric sleeve surgery.

Limitations of the study:

Despite the encouraging results of this study, it's important to acknowledge that the limited sample size (60 patients) may restrict the generalizability of its findings. Furthermore, the study's short-term follow-up period does not provide information about the long-term effects of the educational guide. Despite these limitations, the study provides valuable insights into the benefits of educational interventions.

Conclusion:

The study concluded that implementation of hybrid nursing instruction positively affect on outcomes of patients 'post-gastric sleeve regarding knowledge, eating pattern, complications, and perception comparing to pre intervention. Study group had marked improvement in knowledge level, while they had significant statistical reduction in the incidence of complications and their mean weight as well BMI compared to control group post one and six months from implementation of hybrid nursing instruction which confirmed the study hypotheses

Recommendations:

- Availability of written printed guidance regarding post-gastric sleeve nursing instruction to improve patient's outcomes.
- Incorporate educational nursing guidance for nurses caring patients' undergoing gastric sleeve surgery to improve their competencies that indirectly affect on patients' outcomes
- Future research is needed with larger and more diverse samples to generalize the results.

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