Assiut Scientific Nursing Journal
http://asnj.journals.ekb.eg
http://www.arabimpactfactor.com
http://olddrji.lbp.world/indexedJournals.aspx
DOI: 10.21608/ASNJ.2022.118171.1310

Health Promotion Program Regarding Lifestyle Behaviors among Bariatric Surgery Patients at Assuit University Hospital

Hiam Hamad Mohammed[1], Safaa Ahmed Mohammed Kotb[2], Safaa Rabea Osman[3]
[1.] Nursing Specialist in operating room at Assiut University Hospital, Master degree in Community Health Nursing
[2.] Professor of Community Health Nursing, Faculty of Nursing, Assiut University, Egypt.
[3.] Assistant Professor of Community Health Nursing, Faculty of Nursing, Assiut University, Egypt.

Abstract
Background: Obesity is a growing public health concern in developed countries. Bariatric surgery combined with lifestyle modification is currently the most successful weight loss intervention for the treatment of obesity and it's associated with co-morbidities. **Aim of the study:** Evaluate the health-promoting program regarding lifestyle behaviors among bariatric surgery patients. **Method and subjects:** Quasi-experimental research design was used. **Sample:** Purposive sample included 70 patients from out-patients surgery clinic Assiut University Hospital. An interview structured questionnaire was used which included tool I: Socio-economic status scale and tool II: Health-Promoting Lifestyle Profile II (HPLP II). **Results:** The mean age of patient's was 34.50 ± 12.52 (16.0-65.0), and 55.7% of them were nonworking/housewives. The mean pre-test health-promotion score was significant with the mean post-test (P-value= 0.000). According to the pre-test nutrition subscale, it was 14.74 ± 2.18 while in post-test 22.97 ± 3.08. The physical activity subscale increased from 8.07 ± 0.43 in the pre-test to 17.83 ± 3.82 in the post-test. Also, it was observed that the highest value was seen in health responsibilities (27.17 ± 2.70) while the lowest value was in physical activity (12.49 ± 1.07). **Conclusion:** There was a noticeable improvement in health promotion subscale score in the posttest which included health responsibilities, physical activity, spiritual growth, nutrition, inter-personal relation, and stress management. **Recommendations:** Dissemination of healthy lifestyle recommendations and materials about obesity as a part of primary prevention efforts in the health care and community setting .

Keywords: Bariatric Surgery, Health Promoting, Lifestyle & Obesity.

Introduction:
The rise in the prevalence of overweight and obesity in recent years has seen an extraordinary increase which has reached epidemic proportions in many countries worldwide. Obese individuals had a crucial chance for comorbidities diseases as; heart disease, cancer, kidney failure, pulmonary disease, and diabetes **(WHO, 2021).**

More than 1.9 billion adults, 18 years and older, were overweight, and over 650 million were obese in 2016. Furthermore, the number of Africans' overweight children under five has increased by nearly 24% since 2000. Almost half of the children under five years who were overweight or obese in 2019 lived in Asia. Egypt is the fattest African country. It's also the 14th fattest country in the world, according to the most recent World Health Organization statistics issued for the year 2010 **(WHO, 2021).**

Bariatric surgery with post-operative lifestyle modification is the most effective treatment for reducing weight, improving comorbid conditions, and enhancing qualify of life. Achieving sustainable weight loss following bariatric surgery can be challenging **(Abbasi & Aghaamiri, 2020)**.

Unfortunately, some degree of weight regain (WR) is common after patients reach their nadir weight, where about 20–25% of patients struggle with considerable weight regain (WR) after bariatric surgery. It is also important to mention that WR is associated with the deterioration of the quality of life and the reappearance or worsening of obesity-associated comorbidities, e.g., hypertension and type 2 diabetes (T2D) which necessitate close monitoring and appropriate management. Research suggests that the implementation of lifestyle changes is one of the key requirements for successful weight loss post-bariatric surgery **(Ansari & Elhag, 2021)**.

Increased physical activity, a low-calorie diet, and the adoption of healthy lifestyle behavior are the most essential elements in maintaining weight loss. Controlling all behaviors that may affect an individual's health and organizing daily activities by adopting habits appropriate for his or her health state are defined as healthy lifestyle. Individuals take an active role in their own health, living a health-promoting lifestyle, and participating in activities that fit this lifestyle. Spiritual growth, health responsibility, physical activity, nutrition interpersonal

relationships, and stress management are all healthy lifestyle activities or habits (**Ustundag et al., 2020)** . Patient education is considered as a key role of nurses in the health care services. Previous studies have shown that nurse-led education and follow-ups reduce hospital readmission rates, as well as improve quality of life, self-care behavior, and adherence to treatment in different patient groups **(Güven & Akyolcu, 2020).**

Significance of the study

Obesity reduce work performance, social relationships, and quality of life and affect various co-morbidities associated with obesity as type 2 diabetes mellitus, hypertension, elevated serum, cholesterol, gallbladder disease, and coronary heart disease **(Stygar et al., 2021)**.

Bariatric surgery is the only durable and effective way for most humans to lose a significant amount of weight, and see improvement in obesity-related comorbidities. It can improve quality of life, prevent a number of cancers, and decrease overall mortality **(Al-Najim et al., 2018; Tettero et al., 2018 & Aly et al., 2019; Aly et al., 2019).**

Weight regain is generally occurring between 12 and 24 months after surgery. It is generally attributed to the failure of individuals to adopt or maintain the necessary lifestyle changes. The most common factors leading to weight regain after bariatric surgery are insufficient exercise and returning to per-operative eating behaviour s. Increasing physical function outcomes; Therefore, adopting an active lifestyle is fundamental **(Cadena-Obando et al., 2020) (Abbasi & Aghaamiri, 2020).** An educational program will increase the percentage of bariatric surgery success and enhance their loss of weight **(Tettero et al., 2018).**

Aim of study

The current study aimed to evaluate the effect of health-promotion program regarding lifestyle behaviors among bariatric surgery patients.

Research hypothesis (H1): There is positive effect between lifestyle behaviors program and weight regain after bariatric surgery.

Null hypothesis (H0): There is no effect between lifestyle behaviors program and weight regain after bariatric surgery.

Subjects and Methods

Research design: Quasi-experimental (pre-posttest) research design was used in this study.

Setting: This study was conducted at the surgical clinic in the main Assiut University Hospital.

Sample: Purposive sample was used. The sample was collected for one year, increased to one and a half years due to COVID 19, and stopping the bariatric operations. It included 70 patients who prepared for bariatric surgery.

Tools of study

A structured Interview Questionnaire contained two tools: Tool (I): Socio-economic status scale (SEE) developed by **El-Gilany et al., 2012.** It involved seven domains, educational & cultural, occupation, family, family possessions, economic, home sanitation, and health care. The total score was 84 and was classified into four-level, very low level of socio-economic status (score < 21 marks), low level from (22- 42), middle level from (43-63), and high level (64-84). Also, personal characteristics as name, age, sex, marital status, height, weight, and Body mass index (BMI) were collected **(El-Gilany et al., 2012)**.

Tool (II): Health-Promoting Lifestyle Profile II 52 item (HPLP II)

This 52-item tool contained six sub-scales to measure behaviors in the theorized dimensions of health-promoting lifestyle: spiritual growth, interpersonal relations, nutrition, physical activity, health responsibility, and stress management. The 52-item summated behavior rating scale employs a 4-point response (Never (N) = 1, Sometimes (S) = 2, Often (O) = 3, Routinely (R) =4. The total score of health-promoting lifestyle was calculated by the mean of the individual's responses to all 52 items. The six subscale scores are obtained similarly by calculating the mean score for subscale items **(Walker et al., 1995).**

Validity and reliability:

All tools were submitted to three experts in the field of Community Health Nursing and public health for content validity and the necessary modifications were incorporated accordingly. In this study, the Cronbach's alpha for HPLP-II was 0.901 and 0.66 for the socioeconomic scale.

Preparation phase:

The researchers obtained all approvals from the executives of Assiut University Hospital. All the studied patients gave their oral agreement or participation in the study after being thoroughly informed on the assumptions and aims of the study. Research proposal endorsed by the ethical committee in the faculty of Nursing, Assiut University. There was no threat for the studied sample; also confidentiality and anonymity were confirmed to all participants.

The researchers designed the educational program after reviewing the related literature. Medical and nursing experts reviewed the program outline, objectives, strategy, and evaluation plans.

A pilot study was carried out before starting data gathering on ten patients. The researchers examined the clarity of the tools and appraised the necessary time to fill the questionnaire.

The researchers determined the time of the educational sessions according to the patients attending the outpatient clinic. Other facilities were checked and arranged during this phase as the teaching place, audiovisual aids, and handout. The researcher prepared a handout that included a summarized content of the program.

Implementation phase:

The researcher started to collect data from May 2019 to December 2019 and stopped data collection from January 2020 until May 2020 due to covid 19. After that data collection continued and ended in September 2020. The researcher met patients in the surgical clinic (one – two patients one day per week). Each patient had two sessions according to the education program schedule and the time availability.

An orientation session was applied to all patients and a pretested form was filled which included detailed socio-demographic characteristics, anthropometric measurements, and patients' lifestyles behaviors. Each interview took from 55- 60 minutes. The second session involved an explanation about a healthy diet, physical activity, and stress management. At the end of the session, the researcher summarized it, answer their questions and evaluate their response orally .

Evaluation phase: It was done after 3 months postoperative. the effect of the educational program evaluated by the same questionnaire which used in the pretest

Statistical analysis:

The data obtained were reviewed, prepared for computer entry, coded, analyzed, and tabulated. Descriptive statistics (i.e., frequencies, percentage and mean, standard deviation, etc) were done using the computer program SPSS version 22. Chi-square and exact fissure test were used to compare differences in the distribution of frequencies among different groups. It is considered * significant when P-values were less than 0.05. One-way analysis of variance (ANOVA), post hoc t-test, and Mann–Whitney U-test were used to test between-group differences. Measures correction was applied within each set of responses to guard against inflated Type I errors. Thus, the P-level was set for within-group comparisons, for comparisons between two groups. Paired samples t-test was done to compare quantitative data between pre-test and post-test while in the case of non-parametric data. Spearman correlation between quantitative variable P-value considered statistics statistically significant when $P < 0.05$.

Results

Table (1): Socio-demographic characteristics of bariatric surgery patients at the surgery clinic, No. (70)

Socio-demographic characteristics	No. (70)	%
Age: (years)		
< 30	30	42.9%
30	17	24.3%
> 40	23	32.9%
Mean ± SD (Range)	34.50 ± 12.42 (18.0-65.0)	
Sex:		
Male	21	30.0%
Female	49	70.0%
Educational level:		
Less than secondary	20	28.5%
Secondary	21	30.0%
More than secondary	29	41.5 %
Occupation:		
Nonworking/housewife	39	55.7%
Unskilled manual worker	4	5.7%
Skilled manual worker/farmer	1	1.4%
Trades/business	5	7.1%
Semiprofessional	18	25.7%
Professional	3	4.3%
Residence:		
Slum	31	44.3%
Rural	19	27.1%
Urban	20	28.6%
Social class:		
Very low	6	8.6
Low	24	34.3
Middle	34	48.6
High	6	8.6

Table (2): Means of weight, height, and body mass index among the studied bariatric surgery patients at the surgery clinic , No. (70)

Items	Mean
Height Cm	165.24 ± 7.59
Weight Kg	124.89 ± 17.80
Preoperative BMI	45.79 ± 6.13
Postoperative BMI	36.91 ± 5.47

Table (3): Means of health promotion score pre & post-test among the studied bariatric surgery patients at the surgery clinic, No. (70)

Health promotion subscale	Pre-test (n= 70)	Post-test (n= 70)	P-value
	Mean ± SD	Mean ± SD	
Health responsibilities	15.30 ± 3.58	27.17 ± 2.70	0.000*
Physical activity	8.07 ± 0.43	17.83 ± 3.82	0.000*
Nutrition	14.74 ± 2.18	22.97 ± 3.08	0.000*
Spiritual growth	16.47 ± 3.66	25.40 ± 2.86	0.000*
Inter-personal relation	17.59 ± 3.38	23.84 ± 2.24	0.000*
Stress management	14.60 ± 1.94	20.83 ± 2.03	0.000*
Total Health promotion	86.77 ± 12.01	138.04 ± 14.29	0.000*

Paired samples t-test P value statistically significant < 0.05*

Table (4): The relationship between personal data and health promotion score (pre and post-test) among bariatric patients at the surgery clinic, No. (70)

Personal data	Health promotion score	
	Pre-test	Post-test
	Mean ± SD	Mean ± SD
Sex:		
Male	84.71 ± 11.08	140.81 ± 16.38
Female	87.65 ± 12.39	136.86 ± 13.30
P-value	0.352	0.292
Age: (years)		
< 30	86.07 ± 10.25	142.90 ± 14.61
30 – 40	84.88 ± 14.60	133.76 ± 15.87
> 40	89.09 ± 12.24	134.87 ± 10.89
P-value	0.508	0.044*
Educational level:		
Less than secondary	77.90 ± 7.16	127.55 ± 9.40
Secondary	85.38 ± 7.25	136.29 ± 12.33
More than secondary	93.90 ± 13.15	146.55 ± 13.36
P-value	0.000*	0.000*
Residence:		
Slum	82.35 ± 8.51	134.94 ± 11.89
Rural	82.63 ± 8.85	133.84 ± 14.14
Urban	97.55 ± 12.80	146.85 ± 14.62
P-value	0.000*	0.004*

P value statistically significant*

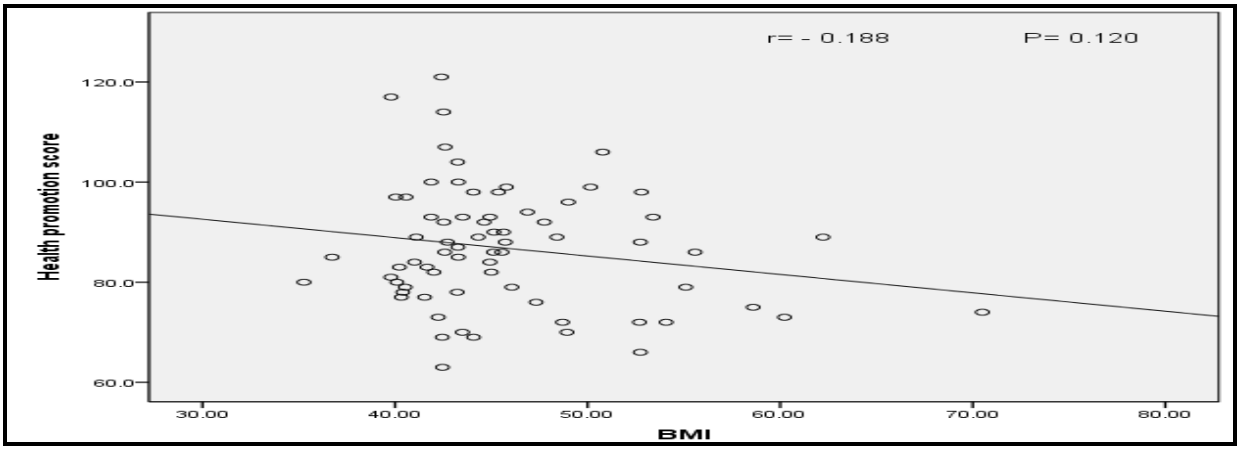

Fig. (1): Correlation between health promotion mean score and BMI in preoperative among bariatric patients at the surgery clinic, No. (70)

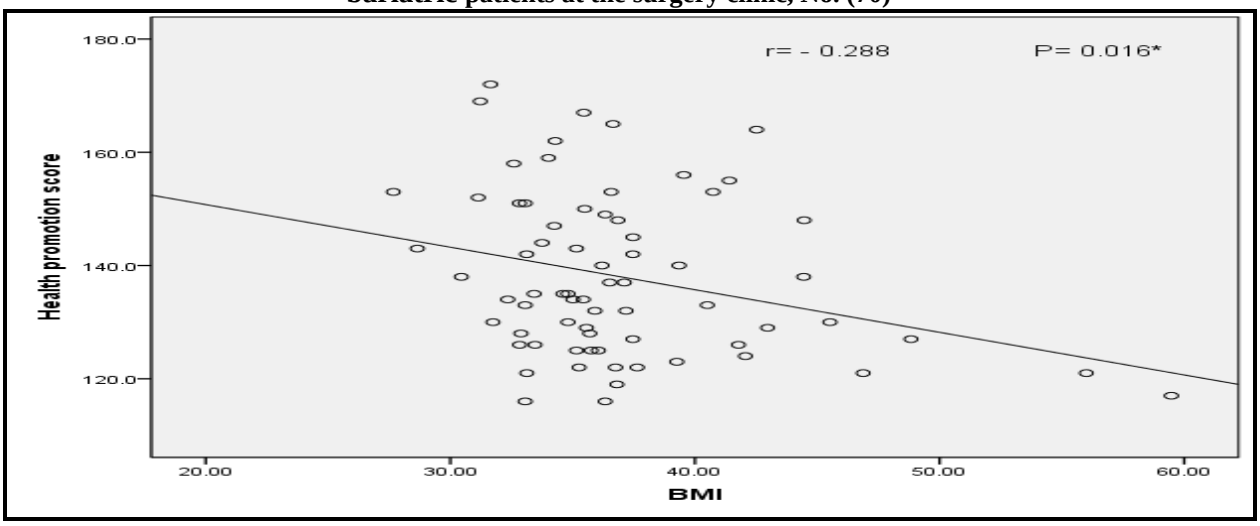

Fig. (2): Correlation between health promotion mean score and BMI in postoperative among bariatric patients at the surgery clinic, No. (70)

Table (1): Showed that less than three-quarters (70%) of bariatric patients were female, 42.9% of them aged <30 also, 55.7% of them were nonworking/housewives. According to their educational level, 11% of the studied sample were illiterate while 30.0% of them were secondary educated. Related to the socio-economic level, less than half of them (48.6%) were in the middle level.

Table (2): Illustrated that the mean height and weight of the studied sample were (165 ± 7.59), & (124.89 ± 17.80) respectively and the preoperative body mass index BMI was (45.79 ± 6.13) while after surgery it decreased to 36.91 ± 5.47.

Table (3): Demonstrated that the mean pre-test total health promotion score had a statistically significant difference with the mean post-test (P-value= 0.000). According to the pre-test nutrition subscale, it was 14.74 ± 2.18 while in post-test 22.97 ± 3.08. The physical activity subscale increased from 8.07 ± 0.43 in the pre-test to 17.83 ± 3.82 in the post-test. Also, it was observed that the highest value was seen in health responsibilities (27.17 ± 2.70) while the lowest value was in physical activity (12.49 ± 1.07).

Table (4): Displayed that there was a statistically significant difference between educational level, residences, and health promotion score (P-value= 0.000). While, in the posttest, there was a significant relationship between age, educational level, residences, and health promotion score (P-value= 0.044, 0.000, 0.004) respectively.

Figure (1): Revealed that there was positive correlation between BMI in preoperative and health promotion lifestyle mean score (P value= 0.120, r value= 0.188) while in

Figure (2): There was positive correlation between BMI in preoperative and health promotion lifestyle mean score with statistical significant difference (P value= 0.016, r value= 0.288).

Discussion

Bariatric surgery is now considered an effective treatment option for severe and complex obesity and is recommended by national bodies such as the National Institute for Health and Care Excellence **(Olsen et al., 2021)** (**Nuijten et al., 2021).** The diversity ineffectiveness of bariatric surgery may relate to variances in adopting a healthful lifestyle after surgery which include diet, physical activity, and improved quality of life **(Thompson & Farrell, 2020 & Ustundag et al., 2020)**. This study aimed to evaluate the health-promoting program regarding lifestyle behaviors among bariatric surgery patients.

The findings of the present study showed that the range of bariatric patients' ages was (18- 65) years and the mean age was 34.50 ± 12.52. Also, it showed that the prevalence of obesity was significantly higher in females than males. Also, related to the socio-economic level, less than half of them were in the middle level. Moreover, it showed that more than one-tenth of them had an illiterate level of education while more than one-fifth had university graduates. According to the residence two-fifths of them are from slum areas while more than one-quarter are from urban.

These results are similar to **Ustundag et al., 2020** who showed that the average age of the participants was 37.36 ± 9.45 years. More than three quarters were female, more than two-fifths were primary school graduates, and slightly less than three-fifths were unemployed. Also, the present study is in the same line with **Dafalla et al., 2020** who showed that the age of the participants ranged from <20 to >60 years. More than three-fifths were female, but the majority of the sample was university graduates and employed.

Furthermore, the results are in the same line with **Maghrabi et al., 2019** who showed that more than half of the studied sample was female, and the mean age was 37.3 (SD 10.6) years. Approximately two-fifths of patients were classified in the lowest income category of income, and three-fifths were educated to at least a Bachelor's degree level.

As related to review literature, as a general rule for the selection of bariatric patients, the widely accepted range of age was 18–60 years **(Alam & Agrawal, 2016)**.

This study agreed with **Omar et al., 2020** who stated that females represent the majority of the participants who complained about obesity and mentioned that in Egypt, there is a remarkable increase in obesity with more than one-third of the whole population being obese. A particular issue in Egypt is that prevalence of obesity is more than double among females as compared to males. Also, **Kamel et al ., 2016** reported that the prevalence of obesity was higher in female but male patients one fifth. Moreover, **Tabrizi et al., 2018,** stated that the majority of the sample were women who had central obesity**.** This finding is similar to **Kamel et al., 2016** who mentioned that the prevalence of obesity was higher in women than in men with a highly statistically significant difference.

According to the related literature review, women are more affected than men because of their anatomy, physiology, and metabolism which predispose them to obesity, in addition to the fact that in Africa, they often have a sedentary lifestyle of central obesity than males. Moreover, it has been reported that the prevalence of obesity in adults is very high in Egypt, particularly among women **(Mehanna et al., 2020**).

In contrast to our result, **Chung et al., 2018** who conducted a study in South Korea, and found significantly elevated levels of obesity in men compared with women. It may be interpreted by, the contrast between the present study and those studies that came from the differences in sample size. In addition, there were different socioeconomic circumstances in the countries. Moreover, the researchers in those studies used other tools to detect the prevalence in both sexes.

According to the bariatric patients' residence, the results of the present study agreed with **Tabrizi et al, 2018** who conducted the study in Iran, and **Craig et al, 2020** who mentioned that overweight and obesity were prevalent in the urban area and urbanization has been significantly associated with obesity.

According to the residence, the present finding is similar to **Tabrizi et al., 2018** who found that the prevalence of overweight, obesity, and central obesity in the urban and regional areas and abdominal obesity were significantly different in the urban and regional areas (P<0.05). Also, **Porcelli et al., 2019** identified the association between residential area (urban) and obesity. Moreover, the result is in the same line with **Coen et al., 2018** who identified that urbanization has been significantly associated with obesity.

Additionally, this is due to the significant modification in the lifestyle in particular dietary habits and limited physical activity in both urban and rural regions. The consumption of carbonated drinks and fast food is higher their youth consume these products more than three times a week compared to eight percent of those in rural areas.

This result similar is to **Mosli et al., 2020** who found that there was an association between education and obesity among wealthier individuals. The findings indicate that lower education and higher income are positively associated with obesity. This finding is

similar to **Cadena-Obando et al., 2020 & Panteliou & Miras , 2017** who stated that women with low education (primary school or less) were more likely to be obese than those with higher education.

Moreover, it is supported by **Köhler et al., 2020** who showed that women's educational level had a significant positive association with obesity: a low level of education means a significantly increased likelihood for obesity. Otherwise, the current study contract with **Tabrizi et al., 2018** who said there was no connection between education and obesity in his study.

In pretest before surgery, the body mass index was 45.79 ± 6.13 while, after three months from bariatric surgery and the implementation of the educational program, BMI was 36.91 ± 5.47. Those results agreed with **Yung et al., 2016 & Aly et al., 2019** mentioned that the diagnosis of these obese subjects was achieved based on the calculation of body mass index (BMI) beyond 30 Kg/m². Also, the results agreed with **Olsén et al., 2021** who conducted a study under the title " Long-term effects of physical activity prescription after bariatric surgery: A randomized controlled trial" and found that BMI in preoperative was 43.5 (4.4) while after two months from operation, it became 36.6 (3.6).

In the current study, there was statistically a significant relationship between the mean score of BMI in pre and post-test (post-bariatric) (P-value =0.000). This result was confirmed by **Mohamed et al., 2018** who stated that there were statistically significant changes in body weight, waist circumference, hip circumference, WHR, abdominal subcutaneous adipose tissue. Also, **Westerdahl & Peebles, 2021** mentioned that there was a statistically significant reduction in weight and BMI from baseline to pre-surgery, post-surgery to final, and baseline to final (p=0.016, p=0.003, p=0.000 respectively). Additionally, this result is supported by **Panteliou & Miras , 2017** who found that a meta-analysis has reported mean BMI reduction in randomized controlled studies of patients who underwent gastric bypass after 2-years of follow-up**.**

The weight loss of the bariatric sample in the present study was primarily due to the bariatric procedures, but the compliance with a healthful lifestyle detected is a positive feature and definitely should be considered a positive outcome factor.

On other hand **Cadena-Obando et al, 2020** identified that a fifth of the patients undergoing bariatric surgery may not lose enough weight to be considered successful by current standards. However, one year after surgery, a third of the sample had lost < half of the excess body weight (EBW).

The dissimilarity of results due to unsuccessful surgery was associated with many other factors as older age, previous history of hypertension, abdominal surgery, or depression/anxiety, also the number of comorbidities and unemployment affected the results. Moreover, much-related literature indicated that the patients lose enough weight to improve some of their comorbidities, but they are more prone to regain weight 2 years after surgery **(Cadena-Obando et al., 2020).**

Bariatric surgery is the only durable and effective way for most humans to lose a significant amount of weight, and see improvement in obesity-related comorbidities. It can improve quality of life, prevent several cancers, and decrease overall mortality **(Al-Najim et al., 2018; Tettero et al., 2018 & Aly et al, 2019; and Panteliou & Miras , 2017).**

According to the related literature review, the indications to undergo bariatric surgery are based on body mass index (BMI) as well as the presence of comorbidity. Patients with a BMI of 40 kg/m2 or greater without coexisting medical problems, and for whom bariatric surgery would not carry an excessive risk, should be candidates for one of the surgeries mentioned above **(Lawson *et al.*, 2020)**. Also, surgical patients who practiced healthy lifestyles, which include controlled eating and regular physical exercise, had better post-surgical weight loss

According to the health promotion score (pre & post-test) for bariatric surgery patients, the mean pre-test health promotion score was a statistically significant difference from the mean score of post-test (P-value=0.000). Also, displayed that there was a significant relationship between educational level, residences, and health promotion score (P-value= 0.000). While in the posttest, there was a significant relationship between age, educational level, residences, and health promotion score (P-value= 0.044, 0.000, 0.004) respectively.

These results are in the same line with **Yang et al., 2018** who study " Health-Promoting Behavior and Quality of Life among Community-Dwelling, Middle-Aged Women: A Comparative Study between Overweight and Normal-Weight Groups " and showed that the total HPLP-II scores were lower in the overweight group than normal-weight group, but did not differ significantly by group. Some HPLP II subscales include stress management (P=0.029). Also, **Vuorinen et al., 2017** showed that learning to enjoy health-promoting behaviors after bariatric surgery may not match with improved weight loss outcomes before 2 years have passed.

Moreover, **Nho, 2021** who conducted a study under the title " Effects of a Lifestyle Intervention on Health-Promoting Behavior, Psychological Distress and Reproductive Health of Overweight and Obese

Female College Students" agreed and indicated that the overall HPLP-II scores in the experimental group were significantly higher than the control with a slight improvement in the posttest.

Also, this result agreed with **Abbasi & Aghaamiri, 2020** who identified that the mean score for male nurses' HPL was good. The highest mean was from spiritual growth and the lowest was from physical activity. Approximately more than one-fifth of participants were overweight and obese. The mean of HPL in normal-weight people was better than that of obese ones. While, there was no significant relationship between age (p = .14), marital status (p = .32), educational level (p = .95), job experience (p = .17), hospital type (p = .43), and HPL variable in participants which disagreed with the current study.

This result agreed with **Leung et al., 2020** who revealed that the mean scores for all HPLP-II dimensions indicated positive responses. The highest values were seen in the spiritual growth and interpersonal relations subscales, while the lowest was in the physical activity sub-dimension. Furthermore, **Westerdahl & Peebles, 2021** found that over the course of the program, there was an observable improvement in lifestyle-related factors, as well as overall self-efficacy compared to Baseline. Correspondingly, the results agreed with **Ustundag et al., 2020** who stated that the total HPLP II score was above average; participants after sleeve gastrectomy had the highest and lowest scores for the subscales spiritual growth and physical activity, respectively.

The researcher's thought that individuals need to acquire and maintain health-promoting behaviors after bariatric surgery for the goal of surgical intervention to be achieved and sustained.

Limitation of the study:

The sample size of the study was small due to the highest cost of bariatric operation so, the study results cannot be generalized.

All patients undergoing bariatric surgery may not lose enough weight to be considered successful by current standards during three months for follow-up. Some patients may benefit from the surgery in the short term, but they are more likely to regain weight after 2 years according to the related literature **(Güven & Akyolcu, 2020).**

Early detection of the patients that are more likely to fail is imperative to establish additional therapeutic strategies, without denying them the opportunity of surgery or waiting for weight re-gain to occur. Those patients should be followed up with a referral to a service that provides long-term follow-up with a focus on lifestyle change rather than just weight loss and should include consideration of an individual's health literacy.

Strength of the study:

The study had some strong points which comprised that the researchers collected all data which influence on weight regain as eating, physical activity, and health-promoting lifestyle. The weight loss of our bariatric sample was due primarily the bariatric procedures, but compliance with the healthful lifestyle detected is a positive feature and definitely should be considered a positive outcome factor. Comprehensive lifestyle interventions that incorporate portion-controlled foods, physical activity, and daily weighing are effective at promoting weight loss over the short and long term.

The educational sessions increased patient adherence to lifestyle recommendations and the establishment of education were the permanent element of bariatric surgery. Also, the researchers used a quasi-experimental research design which is important to the nature of the study issue having one or more groups who observed pre and post manipulation of the program and measured its effect.

Nursing implication:

In this study, maintaining healthy lifestyle behaviors after bariatric surgery was shown to improve patients' lifestyle behaviors. Nurses play a crucial role in the provision of education and counseling for patients before and after surgery. They should support and encourage patients to adhere to maintaining healthy lifestyle behaviors after surgery. They should also monitor whether patients adhere to these behaviors during all stages of healing and conduct intervention to increase the patient's motivation when detecting a problem. The results of this study will enhance patients' awareness about the positive effect of acquisition and maintenance of healthy lifestyle behaviors on the quality of life after bariatric surgery. Also, the study emphasized patients" compliance to all healthy behaviors to maintain their weight loss.

Conclusion

Based on the present study's findings, it was concluded that there was a noticeable improvement in health promotion subscale score in the posttest which included health responsibilities, physical activity, spiritual growth, nutrition, inter-personal relation, and stress management.

Recommendations

Based on the results of the present study, the researcher suggested the following recommendations:

1. Dissemination of healthy lifestyle recommendations and materials about obesity as a part of primary prevention efforts in the health care and community setting .

2. Using evidence-based techniques, such as healthy behavioral and lifestyle counseling, within the health care setting to treat patients identified as overweight or obese.
3. Participation in multi-sector obesity prevention and treatment initiatives to achieve policy and systems goals.
4. Further researches should be implemented to measure the effect of bariatric surgery in long term.

Acknowledgments:
The researchers would like to thank all participating patients and all the employees in surgery clinic.

References:

- **Abbasi, N. & Aghaamiri, M. (2020):** 'Relationship Between Health-Promoting Lifestyle and Body Mass Index in Male Nurses Based on Demographic Variables', American Journal of Men's Health, (November-December), pp. 1 –10. doi: 10.1177/1557988320966519.
- **Al-Najim, W., Docherty, N., & Roux, C., (2018):**2018https://doi.org/10.1152/physrev.00021.2017, 02 MAY, & •. (2018). food intak after bariatric.
- **Ansari, W. & Elhag, W. (2021):** 'Weight Regain and Insufficient Weight Loss After Bariatric Surgery: Definitions, Prevalence, Mechanisms, Predictors, Prevention and Management Strategies, and Knowledge Gaps—a Scoping Review', Obesity Surgery 2021 31:4, 31(4), pp. 1755–1766. doi: 10.1007/S11695-020-05160-5.
- **Cadena-Obando, D., Ramírez-Rentería, C., & Ferreira-Hermosillo, A. (2020):** Are there really any predictive factors for a successful weight loss after bariatric surgery?. BMC Endocr Disord **20,** 20 (2020). https://doi.org/10.1186/s12902-020-0499-4
- **Chung W, Kim J, Lim S-j, & Lee S (2018):** Sex-specific role of education on the associations of socioeconomic status indicators with obesity risk: A population-based study in South Korea. PLoS ONE 13(1): e0190499. https://doi.org/10.1371/journal.pone.0190499
- **Coen, P., Carnero, E. & Goodpaster, B. (2018):** 'Exercise and Bariatric Surgery: An Effective Therapeutic Strategy', Exercise and Sport Sciences Reviews, 46(4), pp. 262–270. doi: 10.1249/JES.0000000000000168.
- **Craig M. Hales, M.D., Margaret D. Carroll, M.S.P.H., Cheryl D. Fryar, M.S.P.H., & Cynthia L. Ogden, P. D. (2020):** 'Products - Data Briefs - Number 360 - February 2020'.
- **Dafalla S., BinYamin A. , Nagadi S. , Ardawi A. , Alqarni M. , Alardhawy S. , Alghamdi A. (2020):** 'Lifestyle and bowel habits after bariatric surgery in Saudi Arabia', International Journal of Medicine in Developing Countries, 4(August), pp. 1745–1751.
- **El-Gilany A. , El-Wehady A. & El-Wasify M. (2012):**"Updating and Validation of the Socioeconomic Status Scale for Health Research in Egypt." Eastern Mediterranean Health Journa 18(9):962–68.
- **Güven B., Akyolcu N., Bariatric Surgical Practice & Patient Care. Jun (2020):** .81-87.http://doi.org/10.1089/bari.2019.0025
- **Kamel A, Abuhegazy H, Ismaila A, Sherra K, Ramadan M, & Mekky A, (2019):** The prevalence of obesity in a sample of Egyptian psychiatric patients' 2016 [cited 2019 F. 26];37:157-65. A. from: http://new. ejpsy. eg. net/text. asp?2016/37/3/157/19554. (2016) '
- **Köhler, H. (2020): '**Specific Health Knowledge and Health Literacy of Patients before and after Bariatric Surgery: A Cross-Sectional Study', Obesity Facts, 13(2), pp. 166–178. doi: 10.1159/000505837.
- **Lawson, J. (2020):** 'Physical activity and psychosocial correlates following bariatric surgery among patients with loss-of-control eating', Mental Health and Physical Activity, 19(January), p. 100343. doi: 10.1016/j.mhpa.2020.100343.
- **Leung, Y. (2020):** 'Association between obesity , common chronic diseases and health promoting lifestyle profiles in Hong Kong adults : a cross-sectional study', BMC Public Health, 20, pp. 1–9.
- **Maghrabi, A. (2019):** 'Nutritional Education for Patients Undergoing Bariatric Surgery Improves Knowledge of Post-Bariatric Dietary Recommendations Nutritional Education for Patients Undergoing Bariatric Surgery Improves Knowledge of Post-Bariatric Dietary Recommendations', International Journal of Medical Research & Health Sciences, 8(9), pp. 82–88.
- **Mehanna A., Ali M., Dabbous N.,& Kholoud (2020):** Knowledge of Female University Students about Obesity and its Adverse Effects on Reproductive Health, p. Article 3, Volume 50, Issue 1, Spring 2020, Page 1.
- **Mohamed RA, Yousef AM & Ata HK (2018):.** Effect of electro acupuncture versus low level laser therapy on lipid profile in obesity**.** Physical Therapy Rehabilitation. 2018; **5**:9. http://dx.doi.org/10.7243/2055-2386-5-9
- **Mosli, H. (2020):** 'Understanding the Interrelationship between Education, Income, and Obesity among Adults in Saudi Arabia', Obesity Facts, 13(1), pp. 77–85. doi: 10.1159/000505246.

- **Nho, J. (2021):** 'Effects of a Lifestyle Intervention on Health-Promoting Behavior , Psychological Distress and Reproductive Health of Overweight and Obese Female College Students'. 2021 Mar 10;9(3):309. doi: 10.3390/healthcare9030309.
- **Nuijten, M. (2021):** 'Changes in Physical Activity in Relation to Body Composition, Fitness and Quality of Life after Primary Bariatric Surgery: a Two-Year Follow-Up Study', Obesity Surgery, 31(3), pp. 1120–1128. doi: 10.1007/s11695-020-05009-x.
- **Olsén, M. (2021):** 'Long-term effects of physical activity prescription after bariatric surgery: A randomized controlled trial', Physiotherapy Theory and Practice, 00(00), pp. 1–11. doi: 10.1080/09593985.2021.1885087.
- **Omar, S. (2020):** 'Prevalence and factors associated with overweight and central obesity among adults in the Eastern Sudan', PloS one, 15(4). doi: 10.1371/JOURNAL.PONE.0232624.
- **Panteliou E. & Miras A. (2017):** What is the role of bariatric surgery in the management of obesity?, Climacteric, 20:2, 97-102, DOI: 10.1080/13697137.2017.1262638
- **Porcelli, D. (2019):** 'oral health promotion in patients with morbid obesity after gastroplasty: a randomized clinical trial', 32(2), pp. 1–6.
- **Stygar, D., Sawczyn, T., Dulska, A. (2021):** Ileal transposition helps to regulate plasma hepatokine levels in obese Zucker (Crl:ZUC(ORL)-Lepr^{fa}) rats. *Sci Rep* **11,** 7774 (2021). https://doi.org/10.1038/s41598-021-87293-w
- **Tabrizi, J., Sadeghi-Bazargani, H., Farahbakhsh, M., Nikniaz, L., & Nikniaz, Z. (2018):** Prevalence and Associated Factors of Overweight or Obesity and Abdominal Obesity in Iranian Population: A Population-based Study of Northwestern Iran. Iranian journal of public health, 47(10), 1583–1592.
- **Tettero, O. (2018):** 'Increase in Physical Activity After Bariatric Surgery Demonstrates Improvement in Weight Loss and Cardiorespiratory Fitness', Obesity Surgery, 28(12), pp. 3950–3957. doi: 10.1007/s11695-018-3439-x.
- **Thompson, R. & Farrell, T. (2020):** 'Importance of a Multidisciplinary Approach for Bariatric Surgery', in Foregut Surgery. Springer International Publishing, pp. 227–235. doi: 10.1007/978-3-030-27592-1_24.
- **Ustundag, H. (2020):** 'Healthy Lifestyle Behaviors and Quality of Life after Sleeve Gastrectomy', Gastroenterology Nursing, 43(6), pp. 456–462. doi: 10.1097/SGA.0000000000000503.
- **Vuorinen A., Michal A., Brian W., & Debra L. (2017):** Safer.Bariatric Surgical Practice and Patient Care.Mar 2017.35-42.http://doi.org/10.1089/bari.2016.0036
- W**alker SN, Sechrist KR, & Pender NJ (1995):** Health promotion model-instruments to measure health promoting lifestyle: health-promoting lifestyle profile [HPLP II](adult version). 1995. https://deepblue.lib.umich.edu/bitstream/handle/2027.42/85349/HPLP_II-background_and_permission.pdf?sequence=1&isallowed=y. Accessed 1 Jan 2018.
- **Westerdahl J., Samantha P., Caitlin M., Olivia M., Lida G., Gurinder B., & Edward B., (2021):** The Effectiveness of a Preoperative Lifestyle-Based Weight Loss Program on Postoperative Outcomes in Bariatric Patients: A Secondary Data Analysis, *Current Developments in Nutrition*, Volume 5, Issue Supplement_2, June 2021, Page 1256, https://doi.org/10.1093/cdn/nzab055_066
- **WHO (2021):** Obesity and overweight, https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight, 9 June 2021.
- **Yang, H., Choo, J. & Kim, H. (2018):** 'Health-Promoting Behavior and Quality of Life among Community-Dwelling , Middle-Aged Women : A Comparative Study between Overweight and Normal-Weight Groups', The Korean Society of Health Promotion and Disease Prevention, 18(4), pp. 159–168.
- **Yung S., Stuart B., Mei F., Anton C., Magdalin C., Yap S., Ling L., Chung H., Su C., Wee Sian O., Jonathan P., Shanker P., Robert S., Mollie S., Grace S., Benedict T., Thiam C., Soo L., (2016):** 'heath promotion with obesity', p. Singapore Med J 2016; 57(6): 292-300 doi: 10.11622.