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# Efficacy of Combined Lifestyle Interventions as a Complement to Bariatric Surgery (ECLIBS): Short Term Outcomes of a Pilot Study

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## ABSTRACT

**Purpose:** Combined lifestyle interventions (CLI) is a program designed to treat (morbid) obesity and can possibly be an adjunct to bariatric surgery. Bariatric surgery can lead to 25–50% total weight loss (TWL) and up to 71% excess weight loss, yet the longevity of the weight reduction remains variable, primarily attributed to a lack of lifestyle change. This pilot study aims to assess the effect of a 3-year structured CLI program, additional to a 5-year bariatric surgery program in a regional hospital, on the short-term outcome following bariatric surgery.
**Materials and Methods:** A single-center prospective cohort study was performed on patients who underwent bariatric surgery between September 2021 and October 2022 (n=28). A structured CLI program was organized and offered by an official out-of-hospital CLI provider. CLI participants were matched with patients following regular follow-up. Primary outcome was quarterly measured excess weight loss (EWL). Secondary outcomes were TWL, fat measurements, sports participation and comorbidities.
**Results:** There were significant differences in sports participation after 1 year (92.9% vs. 62.5%; P=0.050), EWL at 21 months (18.3 kg; 95% confidence interval [CI], 0.14–36.4; P=0.049), fat mass at 18 months (−8.7 kg; 95% CI, −14.1, −3.3; P=0.008) and fat percentage at 18 months (−10.0%; 95% CI, −17.9, −2.0; P=0.017) in the CLI group compared to the control group.
**Conclusion:** Preliminary short-term results show that a structured additional CLI program to bariatric surgery could benefit in terms of weight loss, perhaps due to better sports participation, but long-term results have to be awaited for.

**Keywords:** Obesity; Bariatric surgery; Healthy lifestyle; Weight loss; Longevity

## INTRODUCTION

Lifestyle interventions and bariatric surgery are 2 important pillars in the treatment of (morbid) obesity. Current literature shows that lifestyle interventions and bariatric surgery can lead to up to 5–15% and 25–50% total weight loss (TWL) respectively, with excess weight loss of up to 71% following bariatric surgery [1-4]. However long-term results following bariatric surgery show a tendency to regaining weight after 1–2 years post-surgery in 20–30% of patients [5]. Combining lifestyle interventions and bariatric surgery leads to more

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weight reduction than lifestyle interventions alone [6-8]. Furthermore, it leads to improved glycemic control and reduces use of anti-hypertensive, anti-diabetic medication and lipid-reducing medication [7]. The effects of bariatric surgery and lifestyle interventions appear to complement each other, though little medical research has been published supporting the combined use of a dedicated bariatric combined lifestyle interventions (CLI) program and bariatric surgery [8-10]. A study evaluating the effect of lifestyle interventions and bariatric procedures using an endoscopic gastric balloon, found a greater effect on short-term weight loss [10]. In this pilot study, we aim to assess the effect of CLI as a complement to bariatric surgery on (short-term) weight reduction in the treatment of obesity. We hope to gain a better insight in the positive effects of CLI to improve the treatment of obesity, hypertension, Obstructive Sleep Apnea Syndrome and type II diabetes.

## MATERIALS AND METHODS

### 1. Study design and setting

This study was conducted at the Albert Schweitzer Hospital in Dordrecht and Your Health Spot. Patients aged 18–66 who underwent a gastric bypass or gastric sleeve reduction between September 2021 and October 2022, and participated in the CLI program provided by Your Health Spot were included. They were individually matched to a control patient who underwent bariatric surgery without participating in the CLI program in the same period. Matching was based on age, gender, amount and type of comorbidities (i.e., suffering from arthrosis, but not diabetes), medical history and starting body mass index (BMI). When patients had no perfect match for type of comorbidities, they were matched on number of comorbidities. Exclusion criteria were a follow-up of less than nine months, insufficient understanding of the Dutch language and age lower than 18. We were only able to include a relatively small number of patients (14 out of 16 available in each arm), due to restrictions imposed by health insurance companies. Furthermore, due to local coronavirus disease restrictions a cohort of seven additional patients were unable to start the CLI program and were therefore excluded for participation. Two patients were excluded due to explicit non-consent, one in each group. Usually, patients are only able to receive compensation from the health insurance company for one form of treatment at any given time, however for this study they were able to receive compensation for both treatments.

The CLI program was provided by Your Health Spot, a paramedical organization specializing in lifestyle coaching. The CLI program is a group-based coaching program, in which participants receive training regarding diet, exercise, sleep, stress- and time management. The CLI program additionally focuses on coaching participants in creating a physical and social environment that promotes and stimulates a healthy lifestyle and consists of 16–20 group sessions where participants can share their experiences and pitfalls, and bimonthly dietary- and lifestyle education sessions, where participants improve their health literacy. All sessions are guided by professional health coaches, and advice is in accordance with local dietary and physical activity guidelines. It is a 3-year program specifically designed to complement bariatric surgery, to enhance and prolong the weight reducing effect of bariatric surgery in the treatment of obesity. The 3-year duration was specifically chosen for the post-bariatric surgery participants to encompass the 2-year pivotal point at which former bariatric patients have reported to experience a relapse into their unhealthy behaviors.


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## 2. Variables and data collection

Demographical and clinical data was collected from Electronic Health Records (EHR's), and patients were matched using this data. Patients were classified as either CLI participants or non-CLI participants regardless of the type of surgery.

The primary outcome was quarterly measured effective weight loss (EWL) in percentage and kilograms. Secondary outcomes were sports participation after 1-year, TWL in percentage fat mass in kilograms, fat percentage, fat free mass (FFM) in kilograms and comorbidities. All data was collected during 3-monthly follow-up as part of the standard of care provided by our hospital.

## 3. Definitions

History of cardiovascular disease was defined as the presence of hypertension, congestive heart disease, heart failure or congenital heart disease prior to or at the time of presenting. History of pulmonary disease was defined as the presence of obstructive or restrictive pulmonary disease, chronic bronchitis, tuberculosis, or interstitial lung disease prior to or at the time of presenting. Sports participation was evaluated by the researchers of the CLI program and was defined as all regularly performed (at least once per week) physical activities including ball sports, endurance spots (i.e., track, swimming, cycling), dancing, extreme sports (i.e., skateboarding, mountainbiking, rock climbing) and/or weight lifting, excluding walking <10 km and activities of daily living, e.g., gardening, for a combined total of at least 120 minutes per week. Body composition measurements were made using DXA scans.

## 4. Statistical analysis

Descriptive statistics were presented as numbers and percentages, means and standard deviations. When variables were not normally divided, medians and Interquartile ranges were used. Comparisons between groups were done using the $\chi^2$ test for categorial variables. For continuous variables independent t-tests were used. A 2-sided P value <0.05 was considered statistically significant. Binary logistic regression models were used to identify and adjust for confounders for statistically significant categorical outcomes, linear regression models were used to identify confounders for non-categorical outcomes.

## 5. Ethics

The Efficacy of Combined Lifestyle Interventions as a Complement to Bariatric Surgery (ECLIBS) study was approved by the Medical Ethics Committee Utrecht and the scientific committee for judging local feasibility (Wetenschappelijk Onderzoek Advies Commissie [WOAC]) of the Albert Schweitzer Hospital. Informed consent to use data was required and acquired via participation forms and/or verbal consent. When we received no acknowledgement of (non)consent after multiple attempts, EHR's were consulted to check for permission to use collected date for scientific research, as all patients undergoing treatment in the hospital are required to opt-in or -out for the use of data for medical research. Only patients who opted in were included. This study is exempt from Institutional Review Board oversight, as the CLI program is a public service program complementary to standard of care and uses no medical interventions on its participants. Approval of exemption was acquired by the WOAC.


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## RESULTS

A total of 15 patients participated in the CLI program, 14 of whom consented to their data being used for this study. Two groups were created (CLI-participant [n=14] and non-CLI participant [n=14]) for a total number of 28 patients. The baseline characteristics are depicted in **Table 1**.

### 1. Primary outcomes

The baseline characteristics of both groups are shown in **Table 1**. There we no significant differences between both groups regarding in age, gender, starting weight, starting BMI, ideal weight, amount overweight, comorbidities and patient history. A full overview of comorbidities is shown in **Table 2**. Only 1 sleeve gastrectomy was performed in the CLI group, 3 were performed in the control group. The EWL in kg was higher in the CLI-group compared to the non-CLI group at 21 months (18.3; 95% confidence interval [CI], 0.14, 36.4; P=0.049), however there was no statistically significant percentual difference (**Figs. 1** and **2**). This effect was not consistent over all time points.

### 2. Secondary outcomes

There was a significant difference in sports participation in favor of the CLI group at 12 months (61.5% vs. 92.9%; P=0.05) (**Table 3**). There was a trend but no significant difference in sports participation at 6 months (71.4% vs. 92.9%; P=0.139). There were no significant differences between groups regarding comorbidities at 6 months, 12 months or number of comorbidities lost after 12 months (**Table 4**). The CLI group showed a significantly lower fat percentage (−9.9; 95% CI, −17.5, −2.5; P=0.017) and fat mass (−8.7; 95% CI, −14.1, −3.2; P=0.008) at 18 months compared to the non-CLI group. There were no significant differences between both groups in BMI, TWL and FFM (**Figs. 3-7**). A survey was conducted to assess the benefits experienced by participants of the CLI program (**Table 5**).

### 3. Regression models

There were no statistically significant confounders identified for sports participation at 6 and 12 months of follow-up. For EWL (kg) at 21 months and fat percentage at 18 months, no

**Table 1.** Baseline characteristics

| Characteristics | CLI | Non-CLI | P value |
|---|---|---|---|
| Demographics | | | |
| Age at surgery (years) | 49.8 (13.5) | 48.6 (12.6) | 0.943 |
| Female gender | 11 (78.6) | 11 (78.6) | 1.000 |
| Physical | | | |
| Starting BMI (kg/m²) | 41 (38.4–45.5) | 40.5 (39.5–42.6) | 0.752 |
| Starting weight (kg) | 123.7 (108.3–126.4) | 121.2 (116.1–127.9) | 0.506 |
| Amount overweight (kg) | 47.2 (35.9–57.8) | 46.6 (42.6–53.5) | 0.986 |
| Ideal weight (kg) | 70.6 (68.1–78.8) | 72.7 (70.8–81.1) | 0.308 |
| Comorbidities | 1.5 (1–3.3) | 3 (1–3.3) | 0.634 |
| Patient history | | | |
| History of CVD | 7 (50.0) | 5 (35.7) | 0.445 |
| History of PD | 1 (7.1) | 3 (21.4) | 0.280 |
| History of diabetes | 6 (42.9) | 4 (28.6) | 0.430 |
| Type of surgery | | | |
| Gastric bypass | 13 (92.9) | 11 (78.6) | 0.271 |

Values are presented as number (%) or median (interquartile range). No significant differences were found between the CLI and non-CLI group.
CLI = combined lifestyle interventions, BMI = body mass index, CVD = cardiovascular disease, PD = pulmonary disease.


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**Table 2.** Comorbidities at baseline, 6 months and 12 months

| Comorbidity | CLI (n=14) | Non-CLI (n=14) |
|---|---|---|
| Baseline | | |
| Arthrosis | 3 (21.4) | 10 (71.4) |
| Diabetes mellitus type II | 7 (50.0) | 4 (28.6) |
| Dyslipidemia | 5 (35.7) | 4 (28.6) |
| Hypertension | 7 (50.0) | 7 (50.0) |
| OSAS | 5 (35.7) | 3 (21.4) |
| Reflux | 5 (35.7) | 4 (28.6) |
| 6 months | | |
| Arthrosis | 1 (7.1) | 6 (42.9) |
| Diabetes mellitus type II | 2 (14.3) | 2 (14.3) |
| Dyslipidemia | 4 (28.6) | 4 (28.6) |
| Hypertension | 3 (21.4) | 4 (28.6) |
| OSAS | 2 (14.3) | 2 (14.3) |
| Reflux | 3 (21.4) | 3 (21.4) |
| 12 months | | |
| Arthrosis | 1 (7.1) | 4 (28.6) |
| Diabetes mellitus type II | 1 (7.1) | 1 (7.1) |
| Dyslipidemia | 3 (21.4) | 2 (14.3) |
| Hypertension | 1 (7.1) | 4 (28.6) |
| OSAS | 0 (0.0) | 0 (0.0) |
| Reflux | 2 (14.3) | 3 (21.4) |

Values are presented as number (%).
CLI = combined lifestyle interventions, OSAS = Obstructive Sleep Apnea Syndrome.

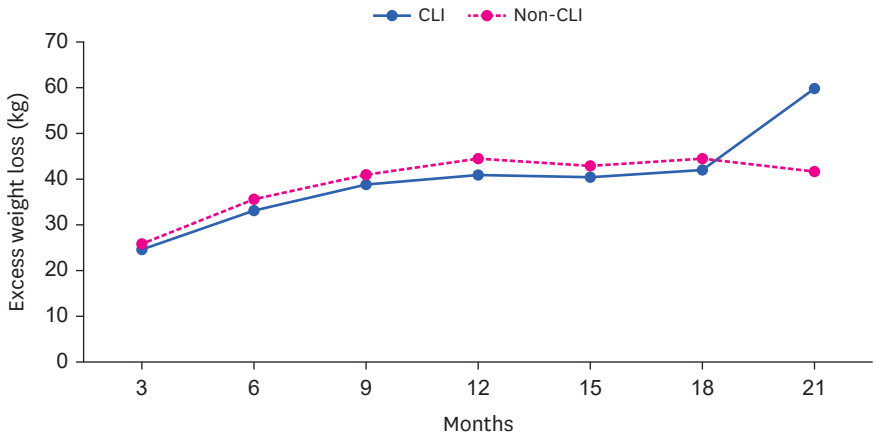


**Fig. 1.** Excess weight loss (kg) at 3–21 months. Excess weight loss was higher in the CLI group (P=0.049).
CLI = combined lifestyle interventions.

confounders were identified in the full regression models. For fat mass (kg), starting weight and starting BMI were identified as confounders, however after adjusting for amount of excess weight at baseline, this effect was no longer statistically significant. The full models are shown in the supplements (**Supplementary Tables 1-5**).

## DISCUSSION

In this study, we compared the sports participation and parameters commonly used to follow up weight-related diseases to assess the potential benefit of a CLI program as a complement to bariatric surgery. We found significant differences in sports participation after 1 year and EWL (in kg) after 21 months in favor of CLI-participation. The significant difference in


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EWL (kg) between both groups was not replicated in the more widely used measurement for weight reduction, EWL (%), and was not consistent across all time points. Furthermore, we found fat percentage and fat mass were significantly lowered in the CLI-participation group

**Table 3.** Sports participation after 6 and 12 months

| Sports participation | 6 months | | 12 months | |
|---|---|---|---|---|
| | CLI | Non-CLI | CLI | Non-CLI |
| Yes | 13 (92.9) | 10 (71.4) | 13 (92.9) | 8 (61.5) |
| No | 1 (7.1) | 4 (28.6) | 1 (7.1) | 5 (38.5) |
| P value | 0.139 | | 0.05 | |

Values are presented as number (%). A significant difference was found in sports participation after 12 months in favor of the CLI group. There was so statistically significant effect after 6 months.
CLI = combined lifestyle interventions.

**Table 4.** Comorbidities at 6 months and 12 months

| Outcome | CLI | Non-CLI | P value |
|---|---|---|---|
| Comorbidities after 6 months | 1.00±0.88 | 1.50±1.51 | 0.29 |
| Comorbidities after 12 months | 0.64±0.84 | 0.86±1.10 | 0.57 |
| Comorbidities lost after 12 months | 1.50±1.22 | 1.36±1.08 | 0.75 |

Values are presented as mean ± standard deviation.
CLI = combined lifestyle interventions.

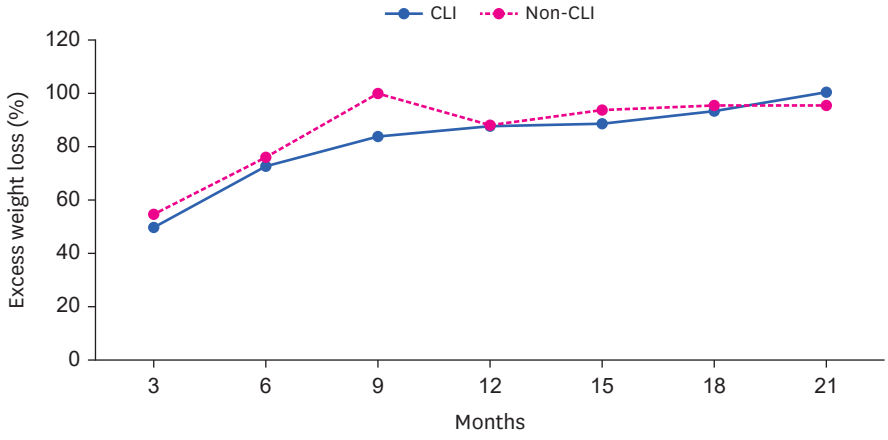


**Fig. 2.** Excess weight loss (%) at 3–21 months. No difference was found between groups (P=0.276).
CLI = combined lifestyle interventions.

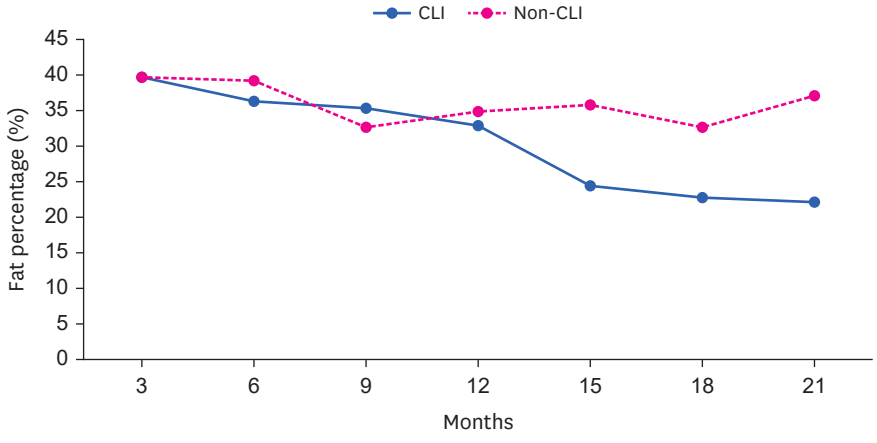


**Fig. 3.** Fat percentage at 3–21 months. Fat percentage was lower in the CLI group (P=0.017).
CLI = combined lifestyle interventions.


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compared to non-CLI participants after 18 months. We hypothesize the greater reduction in fat percentage and fat mass can be contributed to the education in healthy diet-choices

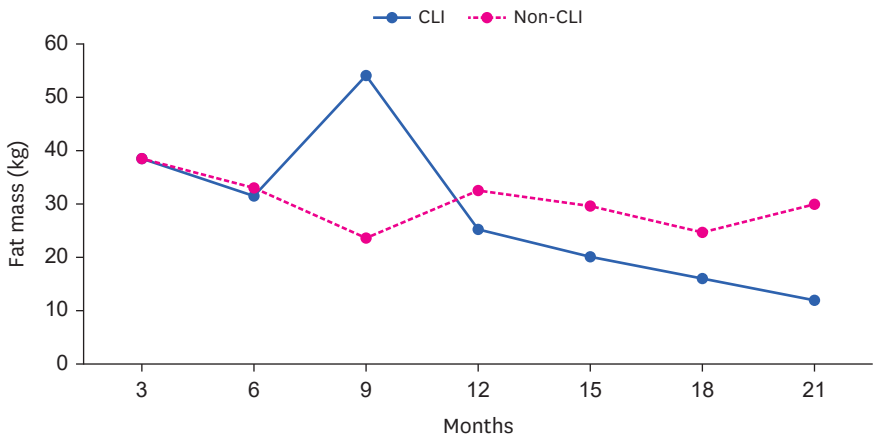


**Fig. 4.** Fat mass (kg) at 3–21 months. Fat mass was lower in the CLI group (P=0.008).
CLI = combined lifestyle interventions.

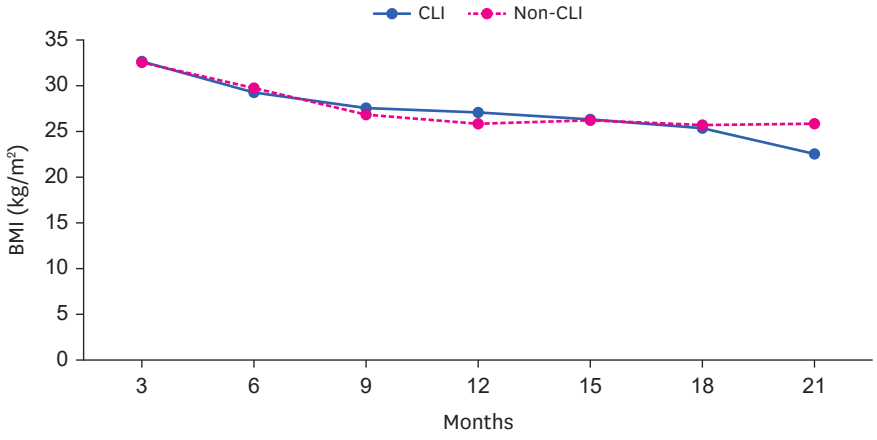


**Fig. 5.** BMI (kg/m$^2$) at 3–21 months. No differences were found between groups (P=0.404).
BMI = body mass index, CLI = combined lifestyle interventions.

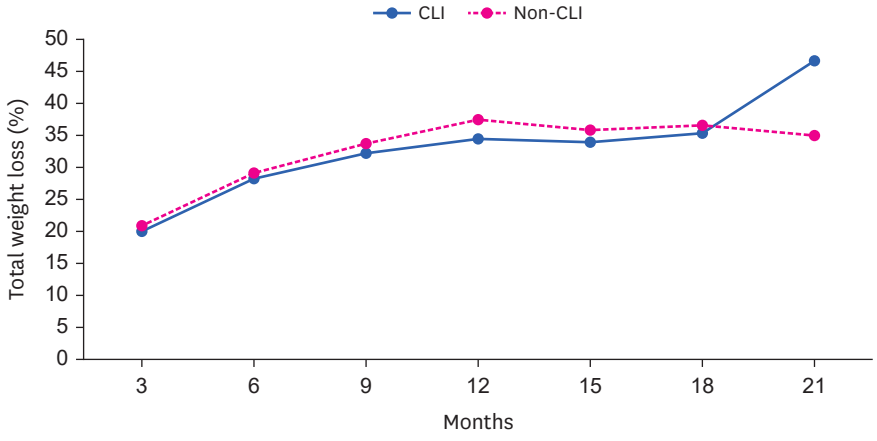


**Fig. 6.** Total weight loss (%) at 3–21 months. No differences were found between groups (P=0.106).
CLI = combined lifestyle interventions.


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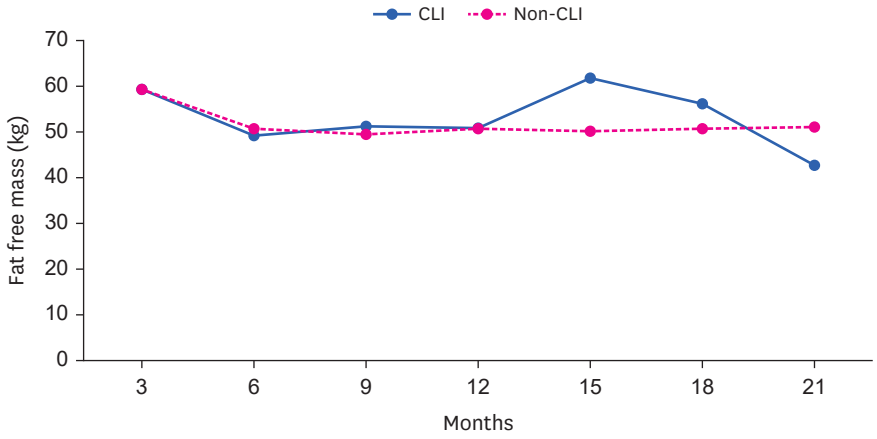


**Fig. 7.** Fat free mass (kg) at 3–21 months. No differences were found between groups (P=0.194).
CLI = combined lifestyle interventions.

**Table 5.** Survey data amongst participants

| Subject | Obstructive (%) | Equal (%) | Beneficial (%) |
|---|---|---|---|
| Weight reduction | 0 | 40 | 60 |
| Healthy weight loss | 0 | 27 | 73 |
| Healthy dietary pattern | 0 | 20 | 80 |
| Dietary health literacy | 0 | 27 | 73 |
| Healthy exercise pattern | 7 | 40 | 53 |
| Exercise literacy | 0 | 47 | 53 |
| Stress handling | 7 | 40 | 53 |
| Time management | 0 | 40 | 60 |
| Self-image | 7 | 20 | 73 |
| Goals & tracking improvement | 0 | 13 | 87 |
| Motivation | 13 | 20 | 67 |
| Help with pitfalls | 0 | 20 | 80 |
| Dealing with social environment | 13 | 53 | 34 |

Subject, questionnaire subject; Obstructive, participants found the CLI program to be obstructive regarding this subject (%); Equal, participants found the CLI program to be equal to standard of care regarding this subject (%); Beneficial, participants found the CLI program to be beneficial regarding this subject (%).
CLI = combined lifestyle interventions.

provided by the CLI program, resulting in a diet more prone to reducing fat mass and building muscle mass. The lack of significance in the other variables used to assess weight reduction gives context to the effect seen in EWL (kg), and suggests similarity of short-term weight reduction, rather than superiority of the CLI program. However, as the CLI program was designed for better maintenance of weight reduction on the long-term, this can be expected but is to be awaited for after longer follow up (5 years).

Though these results imply CLI-participation can be beneficial on some points, these results are only the preliminary findings (short term). The programs last for a total of 5 years (3 years for the CLI program, after which participants will have another 2 years of regular follow-up), and therefore these findings are to be interpreted in that context. Our data shows a trend in favor of the CLI group with regards to weight loss starting from 18 months, and we believe this trend might remain or increase into significance in the long-term results, even with this small number of patients It is important to note that long-term results remain to be evaluated.

Our study shows comparable weight loss expressed as BMI, TWL and EWL (kg) as previously reported in other studies [1-3,11-14]. Both our CLI and control groups performed better than

can be expected according to previous studies in EWL (%), however no significant difference was found between both groups [1,11-13]. This can be contributed to selection bias, resulting from the relatively heathy and motivated participants who opted for the CLI program and their matched controls. The change in body composition following bariatric surgery was comparable in our cohort compared to other studies [15,16]. Sjöström [17] previously reported 80–90% of subjects being physically active 1 year after surgery, which was similar to the CLI group in our study, however a significantly lower percentage was physically active in the control group, similar to a study by Ruiz-Tovar et al. [18].

We hypothesize that a group-based program causes a stronger support system and increases the likelihood of maintaining diet and exercise following bariatric surgery. The CLI program enhances health literacy and prepares participants for the physical and social changes following bariatric surgery. In our hospital the aftercare lacks on these points. The group-based nature of the program also allows for a mutual experience leading up to and following the procedure, allowing patients to share their problems with each other. These factors together allow for an increased likelihood of maintaining lifestyle changes following bariatric surgery. A survey was conducted amongst participants of the CLI program to assess the benefits of the group-format of the program. The CLI participants reported they experienced the group-format in the follow-up of post-surgery as beneficial in weight reduction (60%), health literacy with regards to healthy diet (73%) and healthy eating patterns (80%), self-image (73%), motivation (67%) and pitfalls (80%) (**Table 3**). Though we believe the CLI program is beneficial for mental support in this type of treatment compared to standard follow-up, there remained at least one person who indicated mental health should have a bigger role in the program.

Although we believe the findings of this study show a potential benefit of a group-based program as a complement to bariatric surgery, our study has limitations. Firstly, the CLI program has not yet reached its full-length follow-up, and therefore our data is incomplete. Secondly, due to the recent implementation of this program, only 14 participants have been included in this pilot study, and only one center is participating. Furthermore, this study is susceptible to selection bias, as the more motivated patients are more likely to participate in the program and could therefore more likely to maintain the weight reduction after surgery. Two patients from the CLI group who underwent a gastric bypass were matched with controls who underwent sleeve gastrectomy. Although studies (just to name a few here) show that on the long-term weight loss seems higher after a gastric bypass then a sleeve gastrectomy, the type of surgery does not affect the short term primary endpoints [9,12], and we therefore believe these matches are accurate. For long-term analysis an analysis with correction for type of surgery might be relevant, although patient numbers remain very low for such analysis.

We have identified several confounders in our linear regression models, however after adjusting for the amount of excess weight, this effect was no longer statistically significant. Patients were matched based on several variables which had a non-significant trend towards confounding, therefore we expect any confounding effect to be minimal when comparing our groups. Lastly, the significant differences in the parameters were only present at 18 and 21 months respectively, as insufficient data was available to accurately compare both groups beyond those points in time.

In this study we have shown that the short-term weight loss following bariatric surgery while participating in the CLI program has similar efficacy as the regular follow-up. Our results


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show that the CLI program could be beneficial for retained weight loss, demonstrated by the early significant differences in fat percentage and fat mass. Most importantly, these preliminary results show a significant difference in sports participation after 12 months in favor of the CLI group. This supports our hypothesis that CLI-participation could result in better compliance of post-surgery instructions to maximize and maintain long-term weight loss following bariatric surgery in the treatment of obesity.

## CONCLUSION

This pilot study shows a potential benefit of CLI participation on longevity of weight reduction following bariatric surgery in the treatment of obesity, but long-term results have to be awaited for.

## SUPPLEMENTARY MATERIALS

**Supplementary Table 1**
Binary logistic regression model for sports participation after 6 months

**Supplementary Table 2**
Binary logistic regression model for sports participation after 12 months

**Supplementary Table 3**
Linear regression model for excess weight loss (kg) after 21 months

**Supplementary Table 4**
Linear regression model for fat percentage after 18 months

**Supplementary Table 5**
Linear regression model for fat mass (kg) after 18 months

## REFERENCES

1. Kheniser K, Saxon DR, Kashyap SR. Long-term weight loss strategies for obesity. J Clin Endocrinol Metab 2021;106:1854-66. PUBMED | CROSSREF
2. Sjöström L. Review of the key results from the Swedish Obese Subjects (SOS) trial - a prospective controlled intervention study of bariatric surgery. J Intern Med 2013;273:219-34. PUBMED | CROSSREF
3. Sjöström L, Narbro K, Sjöström CD, Karason K, Larsson B, Wedel H, et al. Effects of bariatric surgery on mortality in Swedish obese subjects. N Engl J Med 2007;357:741-52. PUBMED | CROSSREF
4. Ionut V, Bergman RN. Mechanisms responsible for excess weight loss after bariatric surgery. J Diabetes Sci Technol 2011;5:1263-82. PUBMED | CROSSREF
5. Seckin D, Cebeci F. Bariatric surgery and weight gain: bibliometric analysis. Obes Surg 2024;34:929-39. PUBMED | CROSSREF
6. Dixon JB, O'Brien PE, Playfair J, Chapman L, Schachter LM, Skinner S, et al. Adjustable gastric banding and conventional therapy for type 2 diabetes: a randomized controlled trial. JAMA 2008;299:316-23. PUBMED | CROSSREF
7. Schauer PR, Kashyap SR, Wolski K, Brethauer SA, Kirwan JP, Pothier CE, et al. Bariatric surgery versus intensive medical therapy in obese patients with diabetes. N Engl J Med 2012;366:1567-76. PUBMED | CROSSREF


https://doi.org/10.17476/jmbs.2025.14.1.65

8. Vaccaro S, Itani L, Scazzina F, Bonilauri S, Cartelli CM, El Ghoch M, et al. Do lifestyle interventions before gastric bypass prevent weight regain after surgery? A five-year longitudinal study. Nutrients 2022;14:3609. PUBMED | CROSSREF
9. Elmaleh-Sachs A, Schwartz JL, Bramante CT, Nicklas JM, Gudzune KA, Jay M. Obesity management in adults: a review. JAMA 2023;330:2000-15. PUBMED | CROSSREF
10. Courcoulas A, Abu Dayyeh BK, Eaton L, Robinson J, Woodman G, Fusco M, et al. Intragastric balloon as an adjunct to lifestyle intervention: a randomized controlled trial. Int J Obes 2017;41:427-33. PUBMED | CROSSREF
11. Biter LU, 't Hart JW, Noordman BJ, Smulders JF, Nienhuijs S, Dunkelgrün M, et al. Long-term effect of sleeve gastrectomy vs Roux-en-Y gastric bypass in people living with severe obesity: a phase III multicentre randomised controlled trial. Lancet Reg Health Eur 2024;38:100836. PUBMED | CROSSREF
12. Pedroso FE, Angriman F, Endo A, Dasenbrock H, Storino A, Castillo R, et al. Weight loss after bariatric surgery in obese adolescents: a systematic review and meta-analysis. Surg Obes Relat Dis 2018;14:413-22. PUBMED | CROSSREF
13. Ibramhim R, Fadel A, Ahmad L, Ballout H, Ahmad HH. Long-term outcomes of bariatric surgery: an eight-year study at a tertiary care hospital in Lebanon. Surg Open Dig Adv 2024;14:100135. CROSSREF
14. Peterli R, Wölnerhanssen BK, Peters T, Vetter D, Kröll D, Borbély Y, et al. Effect of laparoscopic sleeve gastrectomy vs laparoscopic Roux-en-Y gastric bypass on weight loss in patients with morbid obesity: the SM-BOSS randomized clinical trial. JAMA 2018;319:255-65. PUBMED | CROSSREF
15. Jimenez JM, Ruiz-Tovar J, López M, Marc-Hernandez A, Carbajo MA, Cao MJ, et al. Assessment of body composition in obese patients undergoing one anastomosis gastric bypass: cross-sectional study. Sci Rep 2020;10:18884. PUBMED | CROSSREF
16. Tałałaj M, Bogołowska-Stieblich A, Wąsowski M, Binda A, Jaworski P, Wrzosek M, et al. The influence of laparoscopic sleeve gastrectomy on body composition and fat distribution in obese caucasian men and women. Obes Surg 2020;30:3974-81. PUBMED | CROSSREF
17. Sjöström L, Lindroos AK, Peltonen M, Torgerson J, Bouchard C, Carlsson B, et al. Lifestyle, diabetes, and cardiovascular risk factors 10 years after bariatric surgery. N Engl J Med 2004;351:2683-93. PUBMED | CROSSREF
18. Ruiz-Tovar J, Zubiaga L, Llavero C, Diez M, Arroyo A, Calpena R. Serum cholesterol by morbidly obese patients after laparoscopic sleeve gastrectomy and additional physical activity. Obes Surg 2014;24:385-9. PUBMED | CROSSREF