

QUALITY OF LIFE, SEXUAL FUNCTION, AND BARIATRIC SURGERY: A SYSTEMATIC REVIEW



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BACKGROUND: Obesity is associated with numerous comorbidities and affects various aspects of life, including quality of life (QOL) and sexual function (SF). Bariatric surgery (BS) is an effective treatment for obese people. Also QOL and SF after BS in the people are not well known.

AIMS: To provide insight in the available prospective evidence regarding the short and long-term effects of BS on QOL and SF.

MATERIALS AND METHODS: A systematic multi-database search was conducted for 'quality of life', 'Sexual function' and 'Bariatric surgery'. Only prospective studies with QOL or SF before and after BS were included. The 'quality assessment tool for before–after studies with no control group' was used to assess the methodological quality.

RESULTS: Twenty-four studies met the inclusion criteria. Most studies were assessed to be of 'fair' to 'good' methodological quality. Seven different questionnaires were used to measure both QOL and SF. A significant increase in QOL after BS and light increase in SF were found in all studies ($P \leq 0.05$).

CONCLUSIONS: Both QOL and SF are increased after BS on both the short and long term. However, due to the heterogeneity of the studies and the generality of the questionnaires are them hard to make a distinction among different BS and difficult to see a relation with medical profit. Therefore, designing QOL and SF measurements to the post BS population are recommended as the focus of future studies.

KEYWORDS: *quality of life; sexual function; bariatric surgery.*

КАЧЕСТВО ЖИЗНИ, ПОЛОВАЯ ФУНКЦИЯ И БАРИАТРИЧЕСКАЯ ХИРУРГИЯ: СИСТЕМАТИЧЕСКИЙ ОБЗОР

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Обоснование. Ожирение связано с многочисленными сопутствующими заболеваниями и влияет на различные аспекты жизни, включая ее качество (КЖ) и сексуальную функцию (СФ). Бариатрическая хирургия (БХ) – эффективный метод лечения людей с ожирением. Тем не менее влияние БХ на КЖ и СФ еще мало изучено.

Цель. Сформировать представление о доступных проспективных данных, касающихся краткосрочных и долгосрочных эффектов БХ на КЖ и СФ.

Методы. Был проведен систематический поиск в базах данных с использованием ключевых слов: «качество жизни», «сексуальная функция» и «бариатрическая хирургия». Были включены только проспективные исследования с КЖ или СФ до и после БХ. «Инструмент оценки качества до/после исследований без контрольной группы» был использован для оценки методологического качества.

Результаты. Двадцать четыре исследования соответствовали критериям включения. Методологическое качество большинства исследований было оценено как «удовлетворительное» и «хорошее». Семь различных опросников были использованы для измерения КЖ и СФ. Во всех исследованиях было обнаружено значительное увеличение КЖ после БХ и небольшое улучшение СФ ($P \leq 0.05$).

Заключение. КЖ и СФ улучшаются после БХ как в краткосрочной, так и в долгосрочной перспективе. Тем не менее из-за неоднородности исследований и общности вопросников, их трудно различить между разными БС и увидеть связь с медицинской прибылью. Поэтому разработка измерений КЖ и СФ для населения после БХ рекомендуется в качестве основного направления будущих исследований.

КЛЮЧЕВЫЕ СЛОВА: *качество жизни; сексуальная функция; бариатрическая хирургия.*

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BACKGROUND

The prevalence of obesity has increased among adults which living in developed or developing countries [1]. Obesity is related with a diversity of diseases such as diabetes mellitus, hypertension, dyslipidemia, obstructive sleep apnoea syndrome or osteoarthritis and thereby impairing life expectancy and Quality of life (QOL) [2–4]. QOL can be used to mention the 'physical, psychological, and social sections of health'. Obesity also decreases the QOL including sexual quality of life (SQOL) [5]. The negative effect of obesity on general health and socioeconomic issues results in increased commercial burden on the whole community [6]. These can be seen as separate areas which can be influenced by someone's experiences, beliefs, expectations and perceptions [3]. Medication for weight loss is limited and shows minimal success in the treatment of obesity [7]. Lifestyle programs are ordinary, but successful long-term weight loss remains unsure [8].

Bariatric surgery (BS) is currently the most effective method to resolve comorbidities and to acquire sufficient weight loss [9]. In spite of that, little is known about the effect of weight loss after BS on SQOL. A desire for improving QOL and SQOL is often seen as an important factor for seeking BS [10]. Anderson et al. [11] showed that BS has a positive long-term effects (minimum of 5 years) on QOL. The impacts of BS are usually expressed in excess weight loss or comorbidity reduction [12]. However, QOL is becoming increasingly important topic [10], up to the present day there is no standard in measuring QOL and sexual function (SF) in BS patients.

However, the relationship between obesity and disturbances in sexual function is not well defined. Changes in SQOL and QOL after BS have only been assessed by a few authors, with conflicting results [13]. There is a need to explore this neglected area of bariatric care so that changes in overall QOL after surgical weight loss can be better understood. For that reason, the aim of this systematic review was to provide insight in the available prospective evidence regarding effects of BS for obese adults on QOL and SF.

AIM

The aim of this systematic review was to provide insight in the available prospective evidence regarding effects of BS for obese adults on QOL and SF.

METHODS

A systematic literature search was conducted, according to guidelines obtained from the Cochrane Reviewers' Handbook for Systematic Reviews of Interventions. In this study, eligibility criteria were designed and used to select relevant studies.

Search strategy and data sources

The PubMed, Cochrane library, Medline, PsycInfo, CINAHL and Web of Science were searched from the earliest data of each database up to May 2017. The explore line used for the literature search contained a composition of the following keywords (or headings): Quality of Life, Bariatric surgery and sexual function.

Selection of studies

Studies were first selected on heading, subsequently studies were selected on abstract and lastly on full text. Two researchers reviewed the articles separately. Eventually, dissents were explored until agreement was obtained. Inclusion and exclusion criteria were defined. The following inclusion criteria were followed: the population had to have a body mass index (BMI) of ≥ 35.0 kg/m² with obesity related comorbidities, aged 18–60 years, designs needed to be prospective, QOL and sexual problems data needed to be available for both pre and post-surgery, and follow-up needed to exceed at least 6 months [14]. Only having a potential design was included as it is regarded as a reliable and valid way to collect data that can be used to assess temporality and causal relationships [15]. The outcome of focus was QOL and SF after BS. Studies that used QOL and SF as primary or secondary outcome measure were included. Interventions that were included were all bariatric procedures; rouxeny gastric bypass, adjustable gastric banding, biliopancreatic diversion, vertical banded gastroplasty and sleeve gastrectomy. Articles in English and Portuguese were selected. Studies without surgical intervention were excluded. Furthermore, there was no limitation in the number of patients, type of surgery, country where the surgery was performed or instrumentation utilized.

Methodological quality of included studies

For grading the methodological quality, the 'quality assessment tool for before – after studies' with no control group was used [16]. This tool assesses the risk of unfairness with 12 questions. These comprise the risk for different kinds of bias, such as selection bias, reporting bias or observer bias. Two authors independently assessed the methodological quality of the included studies. Both authors defined the quality of each study as 'poor', 'fair' or 'good'. To specify the level of agreement between authors, a Cohen's kappa score was calculated. A Cohen's kappa score between 0.40–0.75 was considered to be fair to good. Kappa's above 0.75 are considered excellent and below 0.40 are considered to be poor [17].

Data extraction

Detailed information was pulled out from studies that met the inclusion criteria. Study and intervention characteristics were extracted as well as outcome data. To review the specifications of the studies, the following information was extracted: the study population and number of participants followed-up, type of surgery and QOL and SF instruments used. Besides, the difference in QOL and SF scores preoperative versus postoperative were calculated. When possible the pooled summary score was computed by multiplying both QOL and SF mean with the number of subjects and divide these by the number of participants in the total study population. Both reviewers were blinded for journal and authors. Studies varied in recruitment method, setting and measurement of effects.

Data analysis

As long as the data in the studies could not be presented in a consistent format and systematic reporting

of comparable outcome variables was lacking, a meta-analysis was not conducted and only a systematic review will be undertaken. After careful consideration by the authors, questionnaires were divided in physical and mental components. This was done by studying original validation literature of the questionnaires.

RESULTS

Study selection

The multi-database search resulted in 1221 records. There were five records identified through other resources, namely reference list. After removing duplicates, 542 records remained. Subsequently, articles were screened on title and abstract and the remaining 55 articles were assessed for eligibility. Then, 31 articles were excluded for various reasons. Twenty-seven were excluded due to the research design [18–36], and 4 studies had poor methodological quality [37, 38], Twenty-four studies met inclusion criteria and were included in this review. The total study selection process is shown in the PRISMA diagram in Figure 1.

Risk of bias

Quality of methodology was assessed using the 'quality assessment tool for before–after studies' with no control group. The Cohen's kappa was 0.61, which is considered to be a good agreement. Most of studies were assessed as having a 'fair' to 'good' methodological quality. One study [39] was assessed as having a 'poor' methodological quality. Table 1 gives an overview of the methodological quality of the included studies.

Data extraction

Attributable to the heterogeneity of the studies in QOL and sexual function instruments and also surgical techniques, a meta-analysis was not performed. This decision is in accordance with a recent systematic review which concluded that it is extremely difficult to synthesize the results of bariatric surgery studies due to poor study design and reporting of patient reported results such as QOL but not for sexual dysfunction. A summary of the results of the 24 included studies is provided in Table 2. The follow-up times for measuring QOL and SF post BS varied from 3 months to 5 years.

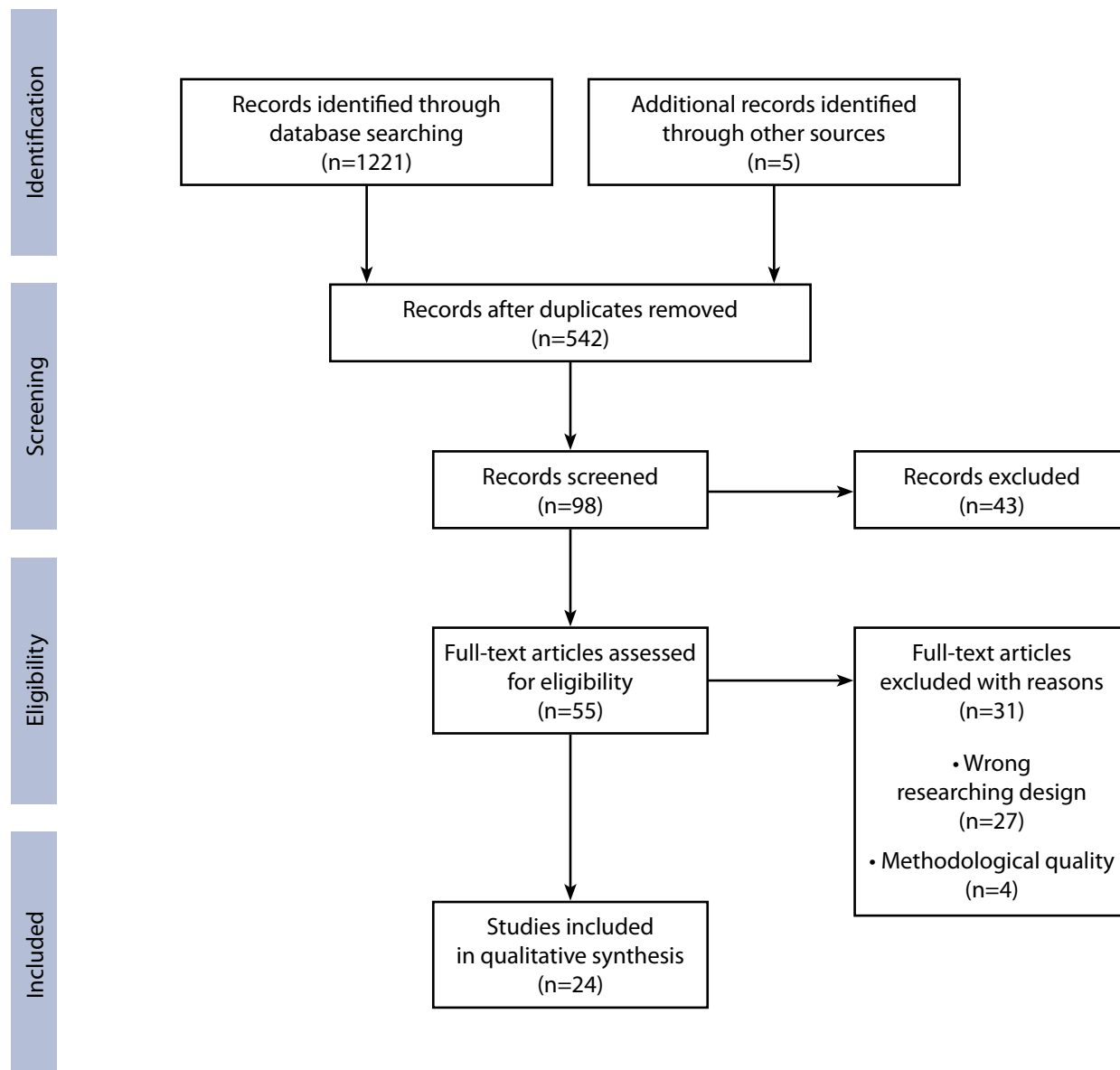


Figure 1. PRISMA flowchart

Table 1. Methodological quality of the included studies using the 'Quality Assessment Tool for Before-After Studies'

Authors	Criteria*												Quality rating
	1	2	3	4	5	6	7	8	9	10	11	12	
1 Müller et al. [52]	Y	Y	Y	CD	N	N	Y	NA	Y	Y	N	NA	Good
2 McLeod et al. [53]	Y	Y	Y	N	N	N	Y	NA	Y	Y	N	NA	Fair
3 Faria et al. [54]	Y	Y	Y	N	N	N	Y	NA	N	N	N	NA	Fair
4 Lier et al. [55]	Y	Y	Y	N	N	N	Y	NA	Y	Y	N	NA	Good
5 Livingston et al. [56]	Y	Y	Y	Y	N	N	Y	NA	N	Y	N	NA	Fair
6 Khawali et al. [57]	Y	Y	Y	CD	N	Y	Y	NA	N	Y	N	NA	Fair
7 Nadalini et al. [58]	Y	Y	Y	Y	N	N	Y	NA	Y	Y	N	NA	Fair
8 Strain et al. [59]	Y	Y	Y	CD	N	N	Y	NA	N	Y	N	NA	Fair
9 Loux et al. [60]	Y	Y	Y	Y	Y	Y	Y	NA	Y	Y	N	NA	Good
10 Kolotkin et al. [61]	Y	Y	N	N	N	Y	Y	NA	Y	Y	Y	NA	Fair
11 Hee Oh et al. [62]	Y	Y	Y	Y	N	Y	Y	NA	Y	Y	N	NA	Good
12 Annemieke et al. [63]	Y	Y	Y	N	N	Y	Y	NA	Y	Y	N	NA	Fair
13 Strain et al. [59]	Y	Y	Y	N	CD	Y	Y	N	N	Y	N	NA	Fair
14 Raaijmakers et al. [64]	N	Y	Y	N	N	Y	Y	NA	Y	Y	N	NA	Fair
15 Müller et al. [52]	Y	Y	Y	CD	N	N	Y	NA	Y	Y	N	NA	Good
16 Moorehead et al. [65]	Y	Y	Y	N	N	N	Y	NA	N	Y	Y	NA	Fair
17 Folope et al. [66]	Y	N	Y	N	Y	Y	Y	NA	N	Y	Y	NA	Fair
18 Nobre et al. [67]	Y	Y	Y	Y	N	Y	Y	NA	Y	N	N	NA	Fair
19 Abdolmanafi et al. [68]	Y	Y	Y	Y	N	Y	Y	NA	Y	Y	N	NA	Good
20 Adams et al. [69]	Y	Y	N	Y	N	N	Y	NA	Y	Y	N	NA	Fair
21 Carpenter et al. [70]	Y	Y	Y	Y	CD	Y	Y	NA	Y	Y	Y	NA	Fair
22 Cyranowski et al. [71]	Y	Y	Y	Y	CD	Y	Y	NA	Y	Y	Y	NA	Fair
23 Rosen et al. [72]	Y	Y	Y	N	N	N	Y	NA	N	Y	N	NA	Fair
24 Tang et al. [39]	Y	N	N	CD	N	Y	Y	NA	Y	Y	N	NA	Poor

Abbreviations: Y – yes; N – no; CD – cannot determine; NA – not applicable.

***Criteria:**

- | | |
|---|---|
| 1. objective clearly stated; | 7. outcome measures specified; |
| 2. eligibility criteria described; | 8. outcome assessor blinded; |
| 3. representative patient population; | 9. loss to follow- up; |
| 4. all eligible participants enrolled in study; | 10. statistical analysis of outcome measures before and after intervention; |
| 5. sample size sufficient; | 11. interrupted time series design; |
| 6. invention description; | 12. individual data used for group-level effects. |

Measurement questionnaires

Seven different instruments were used to measure QOL and sf. Nine studies used 36-item short-form health survey (SF-36). This generic scale assesses eight health concepts [41]. Four studies made use of the short form of impact of weight on QOL (IWQOL)-Lite measure, which is a 31-item, self-report, obesity-specific measure of health-related QOL [42]. Another study used the Obesity and weight loss QOL (OWQOL). This study also used the weight related symptom measure (WRSM) that measures 20 obesity specific symptoms using two sets of items [43]. Three studies used the Moorehead-Ardelt quality of life questionnaire (MAQOLQII), which is part of the bariatric analysis and reporting outcomes (BAROS) [44]. Three studies used sexual dysfunctional beliefs questionnaire. It is a 40-item self-reported measure constituted by two versions (female and male) rated on a five point Likert scale [45]. Two studies made use of the sexual self-schema questionnaire (SSS). This scale is cognitive generalizations about sexual aspects

of oneself [46, 47]. In order to assess the relationship between our measures and sexual functioning we also used the international index of erectile function (IIEF) in two studies [48].

Quality of Life Outcomes.

Overall, a significant incline in QOL after BS was found in all studies. Seventeen studies found an increase in QOL after the gastric bypass procedure, five after gastric banding and six studies found an improvement after sleeve gastrectomy. Some studies included multiple techniques. Furthermore, Grans et al [49] used the general term 'BS'. Most studies show significant results after a follow-up of one year. Studies with a longer follow-up period stated that the maximum increase in QOL was reached after one year. After one year patients reach a plateau phase. Freys et al. [50] stated that the increase in QOL was significant 3 months after surgery. One study did not show a significant increase in the mental component part of QOL [51].

Table 2. Quality of life and Sexual function instruments and outcomes compared preoperative versus postoperative

	Authors	QOL and Sexual function instruments	Change scores pre-op vs post-op
1	Müller et al. [52]	QOL / SF-36	+17
2	McLeod et al. [53]	QOL / SF-36	+15.6
3	Faria et al. [54]	QOL / SF-36	+9.39
4	Lier et al. [55]	QOL / SF-36	+12.5
5	Livingston et al. [56]	QOL / SF-36	+15.1
6	Khawali et al. [57]	QOL / SF-36	+27.9
7	Nadalini et al. [58]	QOL / SF-36	+33.4
8	Strain et al. [59]	QOL / SF-36	+22.6
9	Loux et al. [60]	QOL / SF-36	+19.3
10	Kolotkin et al. [61]	QOL / IWQOL	+6.8
11	Hee Oh et al. [62]	QOL / IWQOL	+6
12	Annemieke et al. [63]	QOL / IWQOL	+6.2
13	Strain et al. [59]	QOL / IWQOL	+5.8
14	Raaijmakers et al. [64]	QOL / OWQOL	+16.8
15	Müller et al. [52]	QOL / Moorehead-Ardelt	+2.4
16	Moorehead et al. [65]	QOL / Moorehead-Ardelt	+2.1
17	Folope et al. [66]	QOL / Moorehead-Ardelt	+2.7
18	Nobre et al. [67]	Sexual Function / SDBQ	+2.9
19	Abdolmanafi et al. [68]	Sexual Function / SDBQ	+2.5
20	Adams et al. [69]	Sexual Function / SDBQ	+3.1
21	Carpenter et al. [70]	Sexual Function / SSS	+1
22	Cyranowski et al. [71]	Sexual Function / SSS	+1.9
23	Rosen et al. [72]	Sexual Function / IIEF	+2
24	Tang et al. [39]	Sexual Function / IIEF	+1.8

Abbreviations: SF36 – 36-item short form health survey; IWQOL – impact of weight on quality of life; OWQOL – obesity and weight loss quality of life; SDBQ – sexual dysfunctional beliefs questionnaire; SSS – sexual satisfaction scale; IIEF – the international index of erectile function.

Sexual Dysfunction Outcomes

Mainly, an increase in SF after BS was found in all studies. This improvement in SF did not just depend on surgery type or weight loss amount and appears to be an additional benefit for women undergoing BS [73]. In addition to the well documented medical and QOL benefits of the BS, there is also clear improvement in patients' SF, both physical and psychosexual. Subjects who lost weight after BS felt more attractive and comfortable with themselves. This improvement in self-esteem and reduction in anxiety may result in more interest in sex and including more intense feelings of desire and arousal.

Comparison with general population reference samples

Pooled scores are calculated for the SF-36 and the SDBQ. These provide a comprehensive overview of the QOL and SF outcomes. The pooled summary score for the SF-36 is

+19.19, when preoperative and postoperative outcomes are compared. This indicates that patients experience an increase in QOL after BS. In addition, the pooled summary score of the SDBQ indicates an increase in SF postoperatively of +2.83. Table 2, indicates that all questionnaires show a positive change in QOL and SF postoperatively. The SF-36 includes a mental and a physical part. Comparing all studies that used the SF-36, it can be seen that all showed a higher score on the physical component compared with the mental component (Table 2).

DISCUSSION

The aim of this study was to obtain a better understanding of the impacts of BS on QOL and SF, in terms of short and long-term results. The findings of this systematic review were consistent across all studies despite the use of multiple

QOL and SF measures and different countries. The incline in QOL during the first year after surgery was shown to be important and remained stable in the subsequent years. This is in line with the findings of an earlier review about QOL after BS in long-term studies [74]. The increase in QOL during the first year can be explained by the experience that patients lose an impressive amount of weight and experience the feeling that they are in control of their obesity. Something which is new for them.

Patients experience more mobility and less complications of joint pain due to their weight loss. However, the weight loss will stabilize after 1 or 2 years, which causes the correlating stabilization in QOL as well. Long-term follow-up of QOL is not described very often. The evaluation of QOL after the first year is important. This is the period of weight regain and stabilization, so you might expect a reduction in QOL. When the physical and mental ingredients of the QOL questionnaires are compared, it is seen that the items measuring the physical components of QOL show higher scores. This guarantees the conclusion that BS has a higher impact on physical components of QOL compared with mental components. This suggests that QOL questionnaires should focus more on these physical components. No differences in QOL results were seen among different techniques. All techniques showed an increase of QOL postoperative.

SF is another important area of QOL [75, 76]. QOL, body image and SF are intricately related constructs [76]. An individual with extreme obesity may be so dissatisfied with her body image that she is reluctant to let her partner see her undressed or engage in sexual behaviour. At the same time, extreme obesity, common comorbidities (i.e. hypertension, type 2 diabetes) and their treatments may make sexual activity unpleasant, difficult, painful or even impossible. SF also can be impacted by the quality of a romantic or sexual relationship. Problems or issues in a romantic relationship can contribute to the development and maintenance of a sexual dysfunction, just as the presence of dysfunctional sexual behavior can negatively impact the quality of a romantic relationship.

Our study compared articles about the SF in patients before and after weight loss surgery. So far, this issue has not been sufficiently explored [77]. However, considering the high prevalence of erectile dysfunction and low SQOL in obese patients, the problem should not be ignored. The authors reported significant improvement in SF within 1 year after surgery [78]. Some studies have looked at changes in SF following BS. Among women, several studies have found improvements in self-reported SF in the first few years after surgery [79–81]. However, there appears to be some erosion of these benefits as women begin to experience some weight regains [81]. An early study of men who underwent gastric bypass reported improvements in all domains of SF within the first few postoperative years [82]. On the other hand, a more recent study on a smaller sample of men did not replicate improvement in SF over the first four postoperative years [81]. The strong positive correlation between SDBQ and SF score proved that improvement in SF should be considered as an additional advantage of surgical weight loss besides its influence on comorbidities.

Our findings in QOL are in line with a recent study done by Lindekilde et al. [83]. QOL and SF was measured using a variety of different instruments. Tayyem et al [84]. and

Nobre et al. [67] showed that neither the generic instruments nor the obesity-specific instruments were adequate instruments in terms of content validity.

Directions for future research

In current QOL and SF research in BS there is heterogeneity in used questionnaires, but most of them contain a physical and mental component. Recent reviews about QOL and SF in BS all showed that the current questionnaires are not specific enough to adequately determine QOL and SF shortly after BS [85, 86]. And the question remains which aspects do patients think are important in their own QOL and SF. In other words, are we measuring the adequate components of QOL and SF in BS patients? Future research should focus on investigating the items that patients find important in their QOL and SF. A way to investigate this matter is to do focus groups with BS patients (at different time periods) to determine important aspects of QOL and SF. Because these aspects can change, due to the earlier mentioned stabilization of weight loss after approximately two years, it is very important to ask patients in different time periods before and after BS. In our opinion, a new instrument to measure the bariatric-specific QOL and SF needs to be composed and has to take into account the physical, mental but also the items identified by patients themselves (items obtained in focus groups).

Limitations

This review has several limitations. First, the studies were inharmonious with respect to QOL and SF instruments, follow-up length and surgical techniques. As outcome of this heterogeneity, a meta-analysis was not performed. Furthermore, publication bias could arise because of inadequate reporting of data. Follow-up rates were high or poor reported and could lead to selection bias and attributes to incomplete data. The instrument used for methodological assessment did not cover all important aspects. For instance, it did not include whether institutional review board approval was given to the studies before start. However, this review has several strengths as well. The whole sample size was relatively large. This has a positive effect on the generalizability of the outcomes. The inclusion of solely prospective studies increases the reliability of the results.

CONCLUSION

This systematic review presented an important improvement of QOL and sexual function for all different types of bariatric surgery in both short-term and long-term outcomes. Current QOL and sexual function questionnaires revealed that patients postoperatively had higher QOL and sexual function outcomes. This could suggest that these questionnaires have a lack of methods to adequately measure of QOL improvement. Therefore, a comprehensive instrument needs to be developed.

ADDITIONAL INFORMATION

Source of funding. Funding was not provided for this study.

Conflict of interests. Authors declare no explicit and potential conflicts of interests associated with the publication of this article.

Authors involvement. All authors contributed equally to the review. All authors have read and approve the final version of the manuscript.

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TO CITE THIS ARTICLE:

Ahmadi S, Teixeira LFM, Domingues JRV, Chacon-Mikahil MPT, Cavaglieri CR, Gutierrez GL. Quality of life, sexual function, and bariatric surgery: a systematic review. *Obesity and metabolism*. 2020;17(1):64-72. doi: <https://doi.org/10.14341/omet10335>

ЦИТИРОВАТЬ:

Ahmadi S, Teixeira LFM, Domingues JRV, Chacon-Mikahil MPT, Cavaglieri CR, Gutierrez GL. Качество жизни, половая функция и бариатрическая хирургия: систематический обзор // Ожирение и метаболизм. – 2020. – Т. 17. – №1. – С. 64-72. doi: <https://doi.org/10.14341/omet10335>