

Determinants of Sexual Health and Sexual Quality of Life after Cardiovascular Surgeries: An Integrative Review

Shahzad Inayat, BSN, MHR^a, Faisal Aziz, BSN, MPH, PhD^{b,c},
Ahtisham Younas, BSN, MN, PhD^{d,*}, Angela Durante, RN, PhD^{e,f}

^aFaculty of Nursing, University of Calgary, Calgary, Alberta, Canada

^bInterdisciplinary Metabolic Medicine Trials Unit, Medical University of Graz, Graz, Styria, Austria

^cDivision of Endocrinology and Diabetology, Medical University of Graz, Graz, Styria, Austria

^dFaculty of Nursing, Memorial University of Newfoundland, St. John's, Newfoundland and Labrador, Canada

^eHealth Science Interdisciplinary Center, Scuola Superiore Sant'Anna, Pisa, Italy

^fSITRA, Fondazione Toscana G. Monasterio, Pisa and Massa, Italy

Received 15 November 2023; received in revised form 13 May 2024; accepted 23 May 2024; online published-ahead-of-print xxx

Background and Aim

Sexual health and sexual quality of life are key components of psychosocial adjustment after cardiac surgeries and are often linked with improving the general quality of life. Reviews have been conducted to highlight the associations between cardiovascular diseases and sexual dysfunctions, but no review reported determinants of sexual health and sexual quality of life in patients after cardiovascular surgeries. We aimed to comprehensively examine the determinants of sexual health and sexual quality of life among individuals with cardiovascular surgeries.

Methods

Literature was searched within PubMed, CINAHL, Scopus, Web of Science, and OVID databases. In total, 816 records were identified from database searches, 279 records were screened, and 11 empirical studies were included for review. Relevant data were extracted using literature summary tables and synthesised using an inductive approach.

Results

The core determinants of sexual health and sexual quality of life were type of surgery and comorbidities, fears and uncertainties regarding sexual activity, sexual health education and counselling, spousal relationship and communication, and demographic factors such as advanced age and literacy levels. Major surgeries performed were coronary artery bypass grafting (CABG) and heart valve surgeries. The data collection tools used to collect data for sexual health and sexual quality of life were the International Erectile Function Questionnaire (IEFQ), International Index of Erectile Function (IIEF), Female Sexual Function Index (FSFI), Sexual Knowledge CABG Scale (SKS-CABG), Sexual Quality of Life Questionnaire (SQOL), SKS-Myocardial Infarction Scale (SKS-MI), and Couple Communication Scale (CCS).

Conclusions

Despite their importance, sexual health and quality of life are frequently overlooked during patient rehabilitation after cardiovascular surgeries. The lack of adequate education and counselling from healthcare professionals frequently leads to increased fear and uncertainties among individuals and their partners. Therefore, more person-centred educational and counselling approaches should be developed to address the sexual concerns of individuals and their partners.

Keywords

Cardiac care • Cardiac surgery • Sexual health • Sexual quality of life • Cardiac rehabilitation

*Corresponding author at: Room H2930 Health Sciences Center, 300 Prince Philip Drive, St. John's, Newfoundland and Labrador A1B 3V6, Canada; Email: ay6133@mun.ca; [@Antisham04](https://www.x.com/Antisham04)

© 2024 The Author(s). Published by Elsevier B.V. on behalf of Australian and New Zealand Society of Cardiac and Thoracic Surgeons (ANZSCTS) and the Cardiac Society of Australia and New Zealand (CSANZ). This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

Introduction

Sexual health and sexual quality of life are key components of psychosocial adjustment after cardiac surgeries and are often linked with improving the general quality of life [1]. Sexual health refers to a state of physical, emotional, mental, and social well-being about sexuality. It encompasses the ability to enjoy sexual experiences free of coercion, discrimination, and violence, as well as the ability to make informed responsible decisions about one's sexual behaviour [2]. Sexual quality of life is an individual's subjective perception of their sexual functioning and satisfaction, as well as their ability to engage in sexual activities without experiencing physical or emotional distress [3]. It includes factors such as sexual desire, arousal, orgasm, sexual satisfaction, and the ability to communicate effectively with sexual partners and maintain a healthy sexual relationship [4].

Cardiovascular surgeries often have a significant impact on the sexual health of patients, as the surgery itself and the underlying cardiovascular disease can affect sexual functions in various ways [5,6]. The commonly reported sexual health problems in men include erectile dysfunction, reduced libido or sexual desire, impotence, premature ejaculation, and difficulty achieving orgasm. Women, on the other hand, frequently report sexual problems such as vaginal dryness, lack of desire, difficulty getting aroused, pain during intercourse, and overall sexual dissatisfaction [7]. Healthcare providers can guide how to manage sexual issues and recommend treatments that are effective in improving sexual functions [8] if patients after cardiac surgeries report these sexual health problems. However, authors reported that sexual problems in cardiac patients often go underreported and untreated, which can harm intimate relationships, emotional well-being, and physical recovery [9].

Factors that could influence the resumption of sexual activity in patients after cardiac surgery include lack of communication between partners and with healthcare providers, as they may feel uncomfortable discussing sexual concerns, fear of complications such as chest pain, shortness of breath, or fear of another heart attack, being hesitant to resume sexual activity until full recovery [10,11]. Additionally, patients after cardiac surgeries can experience anxiety and depression which can negatively influence their libido and desire to engage in sexual activity [9]. Several medications prescribed to manage post-cardiac surgery conditions can have side effects that compromise their sexual functions [9,12].

Various reviews examined the relationship between cardiovascular diseases and sexual dysfunction [7,13]. In a systematic review, authors identified that erectile dysfunction is an indicator of systemic endothelial dysfunction and may precede cardiovascular disease [13]. In another systematic review, Nascimento *et al.* [7] identified that women experienced all types of sexual dysfunctions, including in desire, arousal, vaginal lubrication, and orgasm, and men experienced erectile dysfunction, difficulty achieving orgasm, and premature ejaculation. Although reviews have

been conducted to highlight the associations between cardiovascular diseases and sexual dysfunctions, no review reported determinants of sexual health and sexual quality of life in patients after cardiovascular surgeries.

This review aims to comprehensively understand the determinants of sexual health and sexual quality of life among individuals with cardiovascular surgeries.

Methods

Design

An integrative review methodology was employed as it is a valuable approach to integrating a range of qualitative, quantitative, and mixed methods research sources to gain a comprehensive understanding of a phenomenon [14]. The integrative review was conducted in the following steps: identifying the problem, conducting a literature search, evaluating the data, and analysing the data [15]. The review findings were reported in accordance with the PRISMA guidelines (Supplementary File 1).

Search Strategy

A comprehensive literature search was conducted in five databases, namely PubMed, CINAHL, Scopus, Web of Science, and OVID. Studies published from 2000 to September 2023 were considered to be included in the review. Indexed terms and controlled vocabulary were used to ensure a thorough search, these terms were "sexual health," "sexual quality of life," "cardiac surgeries," "cardiovascular surgeries," "sexual health AND cardiac rehabilitation," "sexual activity AND cardiac rehabilitation," "sexual health AND cardiac rehabilitation AND cardiac surgery,". Initially, the search was developed in PubMed, and once finalised it was replicated in all the identified databases. The keywords used in the search were consistent across all databases, and subject headings were selected based on the thesaurus of each database. In addition, the "reference list" and "cited by" lists were also searched for additional records.

Search Outcomes

A total of 816 search results were obtained from all the databases initially searched. However, 537 of these records were identified as duplicates and excluded from the analysis. Following this exclusion, 279 sources were screened based on their abstracts and titles. During the screening process, two independent reviewers assessed the records (SI, AY), with a third reviewer (AD) consulted in cases where discrepancies arose. As a result of this screening, a total of 261 records were excluded because these were discussions, dissertations, conference proceedings, commentaries, book chapters, and editorials. The full-text screening of 18 records was completed by two independent reviewers (SI, AY), resulting in the selection of 11 studies for final review, appraisal, and synthesis. Seven (7) full-text articles were excluded from the analysis as they did not meet the criteria for inclusion, either because they did not explicitly focus on sexual health and quality of life from

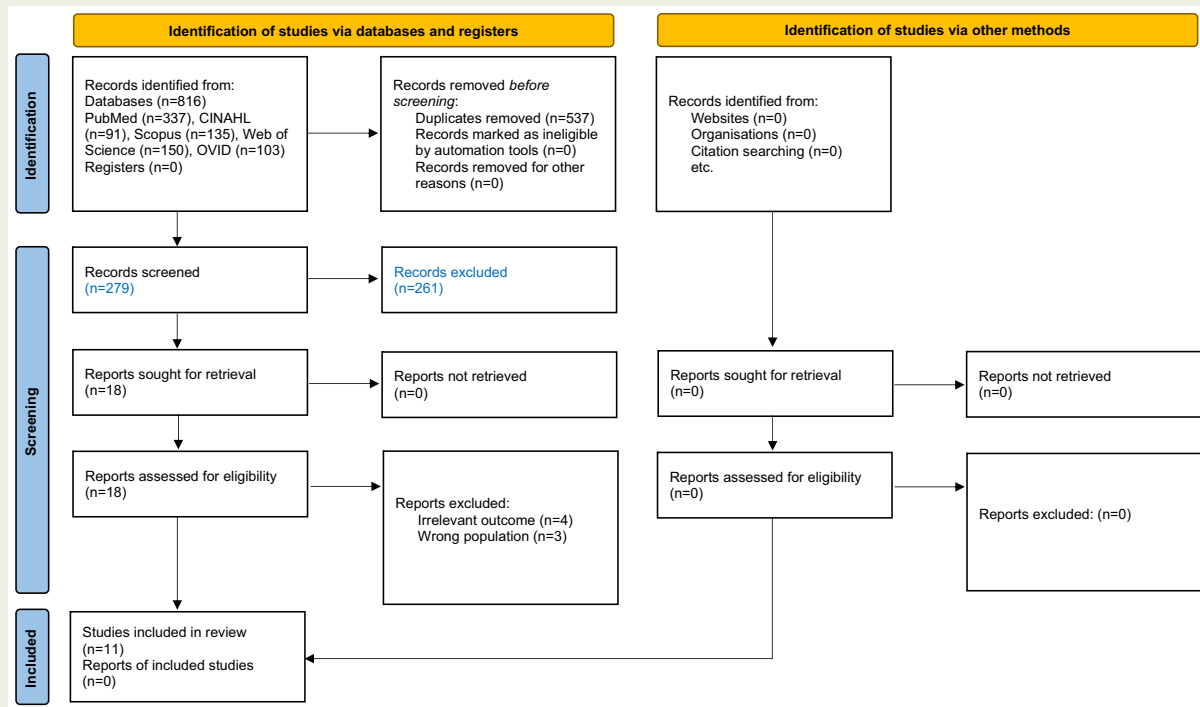


Figure PRISMA 2020 flow diagram for new systematic reviews which included searches of databases, registers and other sources.

Abbreviation: PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

patients' perspectives or because they explored the perspectives of healthcare professionals on sexual counselling (Figure). Studies were included based on the following criteria: (1) published in the English language; (2) studies in which authors focussed on individuals who underwent cardiovascular surgeries; (3) studies in which authors focussed on examining individuals' perspectives and experiences related to sexual health and/or sexual quality of life following cardiac surgery. Studies in which authors focussed on examining the general quality of life were excluded.

Data Appraisal and Evaluation

Both qualitative and quantitative studies were included in this review. The quality appraisal of the included studies was done using the Mixed Methods Appraisal Tool (MMAT) [16]. Studies were rated as high, moderate, or low quality based on the relevance of the research question and methods used, consistency of the data analysis process, clear description and relevance of the findings, and research reflexivity. Quality scores were not assigned as this is not recommended by the authors of MMAT. Findings from the studies rated as high or moderate were more weight, while those from low-rated studies were used to support the arguments. The strengths of moderate to high-rated studies were the use of appropriate study design, justified sample size, valid and

reliable tools, an adequate description of study variables, and appropriate statistical analysis (Table). The full-text studies were reviewed by three independent reviewers (SI, AY), and discrepancies were resolved through discussion and consensus with the third reviewer (FA).

Data Analysis and Synthesis

Two (2) independent reviewers (SI, AY) extracted the data using a literature summary table [17]. The table contains details about the authors, country, study purpose, design, research methods, sample characteristics, major findings, and strengths and limitations of the included studies (Table). The data were synthesised, and major findings were interpreted using coding, thematic analysis, and narrative summaries. Synthesis of the findings from the quantitative studies was achieved using narrative summaries, while codes were extracted from the qualitative studies. An overview of each article's key findings was condensed into a one-page summary. Qualitative and quantitative findings were compared using joint matrixes and findings were grouped into themes. Following the development of the themes, the third researcher (AD) validated the themes by cross-checking them with the primary study findings. The interrater agreement was evaluated using the Kappa statistic and showed an almost perfect agreement score of 0.95 [18].

Table. Literature summary table.

Authors/yr/country	Purpose	Methods	Major findings	Critical appraisal
Çağlar et al. [19] 2021 Turkey	“To examine the self-efficacy and sexual function of patients undergoing open heart surgery and the factors affecting it” (p. 376)	<i>Age:</i> (Mean 63.1, SD±7.9 yrs) <i>Surgery:</i> CABG, open valve surgery <i>Sampling Method:</i> Not provided <i>Sample size:</i> 76 patients <i>Study design:</i> Descriptive cross-sectional <i>Setting:</i> Outpatient clinic in a hospital <i>Data collection method:</i> BEES, BDI, IIEF, and FSFI <i>Data analysis:</i> (Mean, SD, Mann–Whitney U test, Spearman Correlation	30.3% of the patients reported being sexually inactive (73.9% female and 26.1% male) and they did not receive any sexual counseling/ education. A weak-to-moderate positive correlation existed between IIEF and BEES scores ($r=0.34$, $p<0.001$). Negative correlation between BEES and FSFI scores ($r= -0.27$, $p=0.01$).	<i>Strengths:</i> Appropriate study design, valid and reliable tools, justified sample size, an adequate description of study variables, and appropriate statistical analysis. <i>Limitations:</i> Recall bias could have affected results. Data collection from only a single center. <i>Quality rating:</i> High
Chaddha et al. [20] 2015 USA	“To assess activity, mental health, and sexual function in acute aortic dissection survivors” (p. 652)	<i>Age:</i> Mean 55.9, SD±13.7 yrs <i>Surgery:</i> Acute aortic dissection <i>Sampling methods:</i> Not specified <i>Sample size:</i> 197 patients were approached (81 returned the survey, response rate of 42%) <i>Study design:</i> Cross-sectional survey <i>Setting:</i> Single academic medical centre <i>Data collection method:</i> A self-developed structured questionnaire <i>Data analysis:</i> Mean±SD, chi-square test, Fisher’s exact test	AAD caused significantly reduced sexual activity among patients. Prior to AAD, 38% were engaged in sexual activity which reduces to 11% after AAD. Almost, 33% of patients feel their diagnosis limits their current sexual activity, 13% of patients express fear of adverse aortic events resulting from sexual activity, 15% of patients feel a loss of libido, and 20% suffer from erectile dysfunction.	<i>Strengths:</i> Appropriate study design and data analysis, an adequate description of study variables <i>Limitations:</i> Recall bias could have affected results. Data collection from only a single centre. Low response rate, lack of use of reliable and valid tools. <i>Quality rating:</i> Low

Table. (continued).

Authors/yr/country	Purpose	Methods	Major findings	Critical appraisal
Firoozjaei et al. [21] 2021 Iran	“To evaluate the sexual quality of life and its related factors” (p. 261)	Age: Mean 46.0, SD±19.3 yrs Surgery: CABG Sampling method: Not provided Sample size: 200 CABG patients Study design: Cross-sectional study Setting: Hospital Data collection method: (SKS-CABG), (SQOL)-female and SQOL-male, (SKS-MI), and (CCS) Data analysis: Mean, ±SD, t-test, ANOVA, Pearson correlation	The mean score of SQOL of the participants was 50.02±22.57. The SQOL and CCS were positively correlated ($r=0.54$ $p\leq 0.01$). A weak positive correlation was seen between SKS-CABG ($r=0.17$, $p=0.04$). patient age and education have a significant relationship with SQOL ($p=0.001$)	<i>Strengths:</i> Appropriate study design, validated and reliable tools, an adequate description of sample size calculation, appropriate statistical analysis <i>Limitations:</i> The single-setting, cross-sectional design may affect the causal relationship between study variables <i>Quality rating:</i> High
Foruzan-Nia et al. [22] 2011 Iran	“To determine the incidence and type of sexual dysfunction in patients with cardiac surgeries” (p. 89)	Age: Mean 55.7, SD±10.7 yrs Surgery: CABG (84.2%), valvular surgeries (11.8%), other cardiac surgeries (4%) Sampling method: Consecutive sampling Sample size: 279 patients Study design: Descriptive analytical Setting: Hospital Data collection method: IIEF Data analysis: Mean, ±SD, Kappa test, ANOVA, chi-square	Sexual functions decreased significantly after cardiac surgeries. The incidence of sexual dysfunction decreased by 20.1% before, to 76.4%, after 12 weeks of surgery ($p=0.001$). Types of sexual dysfunction were impotence (before surgery 6.5%, after surgery 34.8%), premature ejaculations (before surgery 4.3%, after surgery 21.5%), and loss of libido (before surgery 9.3%, after surgery 20.1%). Age, CABG, and on-pump surgery were significant predictors of sexual dysfunction ($p=0.001$)	<i>Strengths:</i> validated and reliable tools, appropriate statistical analysis, and adequate description of the study variables <i>Limitations:</i> Lack of adequate description of sample size calculation, the single setting. <i>Quality rating:</i> Moderate

Table. (continued).

Authors/yr/country	Purpose	Methods	Major findings	Critical appraisal
Klein et al. [23] 2007 Israel	“To assess the impact of a sexual therapy module on male patients participating in phase 2 cardiac rehabilitation after a cardiac event” (p. 672)	Age: Mean 58 yrs Surgery: CABG Sampling method: Not provided Sample size: 92 patients Study Design: Randomised controlled trial (RCT) Setting: Cardiac rehabilitation centre Data collection method: IIEF, Olson’s ENRICH Marital Satisfaction Scale Data analysis: Mean, \pm SD, chi-square, t-test, Mann-Whitney U-test	Patients who received sexual therapy resumed sexual activity within 1 month compared with patients in the control group (87% vs 50% in control). Quality of sexual function (libido, confidence to attain erection, satisfaction with the sexual relationship, frequency of erection, and enjoyment of sex) was improved in the sexual therapy group. Overall, patients who received sexual therapy in cardiac rehabilitation were highly satisfied.	<i>Strengths:</i> RCT design is useful to establish causal relationships between sexual health and sexual therapy. the validated and reliable tools, and appropriate statistical analysis. <i>Limitations:</i> lack of justified sample size could lead to an under-powered study. <i>Quality rating:</i> Moderate
Lai et al. [24] 2011 Taiwan	“This study aimed to investigate the associations of demographic and disease characteristics, psychosocial factors, and sexual quality of life in patients before and after CABG surgery” (p. 487)	Age: Mean 62 yrs Surgery: CABG Sampling method: Convenience sample Sample size: 70 patients Study design: Descriptive study Setting: A cardiac centre Data collection method: EuroSCORE, SKS, SCS, HADS, SQLS Data analysis: Mean, \pm SD, paired t-test, ANOVA, Wilcoxon Signed Ranked, Pearson correlation	CABG negatively influenced patients’ Sexual health and sexual desire. Before surgery, patients’ age, spouse communication, and disease duration were significant predictors of sexual quality of life. After surgery, disease duration, sexual knowledge, and EuroSCORE were significant.	<i>Strengths:</i> Appropriate study design for study objectives. The validated and reliable tools, justification for sample calculation and power analysis, and appropriate statistical analysis. <i>Limitations:</i> Single-setting, descriptive design may affect the causal relationship between study variables <i>Quality rating:</i> High

Table. (continued).

Authors/yr/country	Purpose	Methods	Major findings	Critical appraisal
Ghazy et al. [25] 2021 Germany	“To explore the effect of undergoing coronary artery bypass grafting on sexual quality of life as an integral part of patient’s health-related quality of life” (p. 480)	Age: Median 55 yrs Surgery: CABG Sampling method: Not provided Sample size: 402 patients agreed to participate, and 265 returned the questionnaire (66% response rate) Study design: Cross-sectional retrospective Setting: Hospital Data collection method: SQOL Data analysis: Mean, \pm SD, un-paired <i>t</i> -test, linear regression	Patients reported that no sexual counselling was done in the pre (83%) and post-operative (77%) periods. The sexual satisfaction scores decreased significantly ($p < 0.001$) in the post-operative period. A significant decline in masturbation frequency ($p = 0.006$), and sexual intercourse frequency ($p < 0.001$) was observed. Preoperative counselling was significantly correlated with sexual quality of life. Whereas sternal pain ($p < 0.001$), erectile dysfunction ($p < 0.001$), and fear of excessive cardiac burden ($p < 0.001$) correlated negatively.	<i>Strengths:</i> Excellent response rate, validated and reliable tools, and appropriate statistical analysis. <i>Limitations:</i> The single-setting, retrospective design may lead to recall bias. <i>Quality rating:</i> Moderate
Reese et al. [26] 2012 USA	“To examine associations among sexual quality of life, fear of sexual activity, and receiving information from providers about sexual activity in CABG patients” (p. 721).	Age: Mean 58.9, SD \pm 10.7 yrs Surgery: CABG Sampling method: Not provided Sample size: 149 patients were approached, and 115 enrolled in the study (response rate 77.2%) Study design: Prospective study Setting: Not provided Data collection method: self-structured questionnaire to assess the frequency of sex, sexual interest, sexual satisfaction, and difficulty becoming aroused. (PCS), (MCS) scales of the SF-36 Data analysis: Mean, \pm SD, paired <i>t</i> -test, McNemar test, linear regression	After surgery patients were afraid to resume sexual activity. The fear was associated with lower sexual activity. The information/sexual counselling from healthcare professionals were helpful to resume sexual activity and significantly reduced fear ($p = 0.03$), and greater satisfaction and sexual interest ($p = 0.04$).	<i>Strengths:</i> Appropriate design, appropriate statistical analysis, and adequate description of the study variables <i>Limitations:</i> Invalid and unreliable tools, prospective descriptive design limits the causal relationship between variables. <i>Quality rating:</i> Moderate

Table. (continued).

Authors/yr/country	Purpose	Methods	Major findings	Critical appraisal
Yan et al. [27] 2022 China	“The objective of this research was to investigate the effects of totally endoscopic mitral valve surgery on health-related quality of life and sexual function in male patients and to provide possible recommendations” (p.1).	<p><i>Age:</i> Mean 45.56, SD±9.41 yrs</p> <p><i>Surgery:</i> Totally endoscopic mitral valve surgery, conventional mitral valve surgery</p> <p><i>Sampling method:</i> Not provided</p> <p><i>Sample size:</i> 156 patients participated, and 112 completed the questionnaire (response rate 71.79%)</p> <p><i>Design:</i> Descriptive cross-sectional</p> <p><i>Setting:</i> Hospital</p> <p><i>Data collection method:</i> MOS 36-item short-form health survey, and IIEF-5</p> <p><i>Data analysis:</i> Mean, ±SD, t-test, Spearman correlation, Mann-Whitney U-test, Chi-square</p>	The incidence of sexual dysfunction was lower in patients who had minimally invasive mitral valve surgery than in those with conventional surgery. The participants scored better on the IIEF-5 (p<0.001). Post-operative sexual dysfunction was associated with physical functioning and mental health.	<p><i>Strengths:</i> Valid and reliable tools. Appropriate design, appropriate statistical analysis, and adequate description of the study variables</p> <p><i>Limitations:</i> The single setting and descriptive design influence the causal relationship between study variables, selection bias,</p> <p><i>Quality rating:</i> Moderate</p>
Tuncer and Oskay [28] 2023 Istanbul	“To determine the effect of sexual counselling on sexual function and quality of sexual life with the PLISSIT model (ie, permission, limited information, specific suggestions, intensive therapy) for women undergoing open heart surgery” (P. 1010)	<p><i>Age:</i> Sexual counselling group participants: Mean 60.25, SD±8 yrs, control group participant: Mean 62.21, SD±5.96 yrs,</p> <p><i>Surgery:</i> Open heart surgery</p> <p><i>Sampling method:</i> Not provided</p> <p><i>Sample size:</i> 70 patients</p> <p><i>Design:</i> Randomised controlled trial</p> <p><i>Setting:</i> Hospital</p> <p><i>Data collection method:</i> Female Sexual Function Index, Sexual Quality of Life Questionnaire-Female</p> <p><i>Data analysis:</i> Mean, ±SD, t-test, Wilcoxon signed-rank test, Mann-Whitney U-test, chi-square test</p>	Sexual quality of life improved significantly in women after receiving sexual counselling. The frequency of sexual intercourse increased in women who received sexual counselling and 65.6% of women reported sexual intercourse compared to 18.8 % in those who did not receive sexual counselling. In addition, concerns regarding returning to sexual activity after surgery were lesser (34.4%) in the sexual counselling group compared to (81.3%) in the control group.	<p><i>Strengths:</i> Adequate sample size, valid and reliable tools. Appropriate design, appropriate statistical analysis, and adequate description of the study variables</p> <p><i>Limitations:</i> Single setting</p> <p><i>Quality rating:</i> High</p>

Table. (continued).

Authors/yr/country	Purpose	Methods	Major findings	Critical appraisal
Pourebrahimi et al. [29] 2021 Iran	“This study was performed to explain the experiences of male patients with sexual problems after coronary artery bypass graft surgery” (p.1).	Age: Range 55–66 yrs Surgery: CABG Sampling method: Targeted sampling Sample size: 12 patients Design: Qualitative descriptive Setting: Hospital Data collection method: Semi-systematic face-to-face interviews Data analysis: Content analysis	Patients shared their perspectives that after CABG surgery they felt confused about sexual intercourse. The major concerns were related to the first intercourse after surgery, the ambiguity of sexual issues after surgery, the ambiguity in obtaining information, and the spouse has concerns about sexual intercourse.	<i>Strengths:</i> Adequate sample, appropriate analysis, member checking, audit trail, and contextual information is provided <i>Limitations:</i> Lack of information about researcher reflexivity, a lack of contextual information, premature closure of data analysis, no rich description of narratives, no bracketing <i>Quality rating:</i> Moderate

Abbreviations: SD, standard deviation; CABG, Coronary Artery Bypass Grafting; BEES, Barnason Efficacy Expectation Scale; BDI, Beck Depression Inventory; IIEF, International Index of Erectile Function; FSFI, Female Sexual Function Index; USA, United States of America; AAD, Acute aortic dissection; SQOL, Sexual Quality of Life Questionnaire; CCS, Couple Communication Scale; SKS-CABG, Sexual Knowledge CABG Scale; SKS-MI, Sexual Knowledge Post-Myocardial Infarction Scale; ANOVA, analysis of variance; RCT, randomised controlled trial; EuroSCORE, European System for Cardiac Operative Risk Evaluation; SCS, Spouse Communication Scale; HADS, Hospital Anxiety and Depression Scale; SQLS, Sexual Quality of Life Scale; PCS, Physical Component Summary; MCS, Mental Component Summary; MOS, Medical Outcomes Study; IEFQ, International Erectile Function Questionnaire; PLISSIT, Permission, Limited Information, Specific Suggestions, Intensive Therapy.

Results

Study Characteristics

Of the 11 included studies, ten studies were quantitative [19–28] and only one study was qualitative [29]. Three (3) studies were conducted in Iran [21,22,29], two studies in the United States of America [20,26] and one study in Turkey [19], Germany [25], Israel [23], Taiwan [24], Istanbul [28], and China [27] each. Most of these quantitative studies were cross-sectional descriptive [19–22,24–27], one was descriptive analytic [22], and two were randomised controlled trials [23,28]. The age of the participants ranged between 45.5 and 66 years. The cardiac surgeries considered by the authors of the studies were open valve surgery, coronary artery bypass grafting (CABG), acute aortic dissection, and endoscopic mitral valve surgery. Studies used different tools to measure sexual health and sexual quality of life such as Physical Component Summary (PCS), Mental Component Summary (MCS), International Erectile Function Questionnaire (IEFQ), Barnason Efficacy Expectation Scale (BEES), Beck Depression Inventory (BDI), International Index of Erectile Function (IIEF), Female Sexual Function Index (FSFI), Sexual Knowledge CABG Scale (SKS-CABG), Sexual Quality of Life Questionnaire (SQOL)-Female and SQOL-Male, SKS-Myocardial Infarction Scale (SKS-MI), Couple Communication Scale (CCS), Spielberger's State-Trait Anxiety Inventory, and Olson's evaluation and nurturing relationship issues, communication and happiness (ENRICH) Marital Satisfaction Scale. The majority of the studies were of high to moderate quality, with only one study rated as low quality [20].

Determinants of Sexual Health and Sexual Activity

Fears and uncertainties regarding sexual activity: One of the primary determinants detected among both men and women was fear and uncertainty related to sexual activity. This theme was primarily evident in studies of individuals with CABG, open valve surgeries, and surgeries for acute aortic dissection [19,20,25,26]. The individuals feared that engaging in sexual activity would negatively affect their hearts and long-term post-operative recovery. Çağlar et al. [19] surveyed 78 individuals and reported that 78.9% of individuals feared that sexual activity may trigger a heart attack. Additionally, 6.3% of men believed that sexual activity would negatively affect heart disease and 11.4% of women believed that it would adversely affect post-operative recovery. Chaddha et al. [20] reported that of 197 individuals who underwent aortic surgery, 13% expressed fear of adverse aortic events and sexual activity. Ghazy et al. [25] surveyed 265 men with CABG and found that 42% reported a sense of fear and uncertainty regarding sexual activity. The fear of sexual intercourse severely affected the sexual quality of life in 13% of individuals and moderately in 36% of individuals.

According to Reese et al. [26], the frequency of sexual activity was lower in patients who experienced greater fear of sexual activity after the surgery ($\beta=-0.46$, $p=0.001$)

Sexual Health Education and Counselling

Individuals' fears and uncertainties concerning sexual activity were directly related to limited sexual education and counselling after surgeries. Individuals with CABG, open valve surgeries, and surgeries for acute aortic dissection mainly reported inadequate sexual health education and counselling [19–21,24–29]. Two studies reported that sexual education after the surgery effectively improved the sexual health of the patients. For example, Reese et al. [26] examined the relationship between sexual quality of life, fear of sexual activity, and receiving information from providers in 42 patients after CABG surgery. They reported that patients who received adequate information reported greater sexual satisfaction ($\beta=0.42$, $p=0.02$). Lai et al. [24] reported that sexual knowledge ($r=0.32$, $P=0.01$) after surgery was one of the significant predictors of improved sexual quality of life in 70 patients. Tuncer and Oskay [28] conducted a pilot randomised controlled trial to evaluate the effectiveness of sexual counselling on the quality of life and sexual functioning of women undergoing open heart surgery. These authors reported that sexual counselling had a significant improvement in the rate of sexual intercourse in women who received sexual counselling compared with the control group (65.6% vs 18.8%; $p<0.001$). Similarly, the majority of the women who received sexual counselling (66%) were sexually satisfied compared with (18%) who did not receive sexual counselling ($p<0.001$). In addition, a smaller percentage of women who received sexual counselling (34%) raised concerns about resuming sexual activity than those (81.3%) who did not receive sexual counselling ($p<0.001$).

Despite these noted benefits of health education, six studies [19–21,23,25,29]. Chaddha et al. [20] reported that individuals did not receive adequate sexual education which affected their sexual activity and quality of life. For example, Ghazy et al. [25] reported that 77.4% of the individuals reported not receiving any personal or printed information regarding sexuality after surgery. Only 7.5% of individuals received sexual health education from their family physicians, 7.5% from hospital physicians, 2% from nursing personnel, and 12.1% from printed material. About 15% of the patients sought health information independently. Pourebrahimi et al. [29] in their qualitative study reported that patients did not have adequate knowledge about initiating sexual activity after surgery and they did not receive adequate education regarding the resumption of sexual activity.

Spousal Relationship and Communication

Four (4) studies highlighted the spousal relationship and communication gap, specifically regarding the fear of sexual

activity, as a major determinant of the delay in the initiation of sexual activity after CABG and open valve surgeries [21,25,26,29]. For example, in a study by Pourebrahimi et al. [29] individuals reported that spousal communication gap and confusion, and fears about sexual activity affected their sexual activity and relationship. This, in turn, affected their sexual health and quality of life. Ghazy et al. [25] reported that 28% of individuals shared that their partner's fears interfered with their sexual activity, thereby affecting their quality of life. Lai et al. [24] reported spousal communication as an independent predictor of sexual quality of life accounting for 6.3% of the variance in overall sexual quality of life.

Type of Surgery and Comorbidities

The type of surgeries and comorbidities were reported as determinants of sexual dysfunction and sexual quality of life in two studies only. Foruzan-Nia et al. [22] surveyed 279 men with various cardiovascular surgeries and reported higher odds of reduced sexual dysfunction after CABG (OR 2.7, 95% CI 1.1–6.6; $p=0.025$) and on-pump surgery (OR 9.3, 95% CI 4.5–19; $p<0.01$). Lai et al. [24] reported that patients who underwent robot-assisted CABG had a better sexual quality of life than those who had median sternotomy (108.83 vs 88.37; $p<0.05$). Chaddha et al. [20] discussed that sexual activity was reported by 38% of patients before undergoing acute aortic dissection surgery but this decreased to 11% post-surgery. Foruzan-Nia et al. [22] reported that sexual functions decreased significantly after cardiac surgeries. Before the operation, the incidence of sexual dysfunction was 20.1% which increased to 76.4% after surgery ($p=0.001$). Comorbidities such as hypertension and diabetes were found to affect sexual health and quality of life. Firoozjaei et al. [21] reported that diabetes reduced sexual quality of life with mean sexual quality of life scores of 41.64 ± 23.42 among those with diabetes and 55.15 ± 20.48 among those without diabetes ($p<0.01$). However, as only one study reported on this, no definitive conclusions can be drawn.

Demographic Factors

Among demographic factors, age was reported as a significant determinant in three studies [21,22,24]. Foruzan-Nia et al. [21] reported greater odds of reduced sexual dysfunction with increasing age (OR=1.5, 95% CI=1.01–2.4; $p=0.036$). Lai et al. [24] reported age as the most significant predictor of sexual quality of life explaining 17% of the variance. Only one study reported literacy level as a determinant of sexual health and quality of life [21]. Therefore, no conclusive interpretations can be drawn about this factor.

Discussion

This review synthesised literature on determinants of sexual health and quality of life of individuals with cardiovascular surgeries. The critical determinants of sexual health and sexual quality of life include a range of psychological, interpersonal, and physical factors. Psychological

determinants included fears and uncertainties regarding sexual activity. Interpersonal determinants were sexual health education and counselling, spousal relationship, and communication. Physical determinants included types of surgical procedures and comorbidities. Of the reviewed studies, more conclusive interpretations can be drawn about psychological and interpersonal determinants but not for physical determinants, because of the difference in the quality of studies included in this review.

Fears and uncertainties about sexual health and activity and limited sexual health education from healthcare professionals were interrelated determinants. Individuals' fears and doubts about sexual health and activity are heightened due to inadequate knowledge about when and how to initiate sexual activity after surgeries, and its potential impact on general health [21,29]. Fear of uncertainties and poor sexual quality of life can have direct negative implications on stress, coping, and general quality of life in patients. Despite this, healthcare professionals and patients focus more on the clinical outcomes of the surgery while neglecting sexual health and quality of life [27]. These findings emphasise the need for quality sexual health education from healthcare professionals such as primary surgeons, rehabilitation consultants, and nurses. Healthcare professionals must focus on delivering adequate health education after surgeries along with education about clinical outcomes and potential complications. Given that healthcare professionals did not provide adequate sexual health education to these patients, it is essential to explore interpersonal, contextual, and systemic barriers affecting healthcare professionals' ability to offer timely and adequate sexual health education.

Cardiac rehabilitation (CR) staff can play a critical role in providing sexual education to cardiac surgery patients. As discussed, patients who undergo cardiac surgery may have concerns about resuming sexual activity after the procedure. CR staff can provide patients with information about how to safely and comfortably resume sexual activity, as well as advice on when to begin and how to gradually increase the intensity of activity. CR staff can consider providing education on the effects of medication and lifestyle changes on sexual health. In addition, education on how to manage issues related to erectile dysfunction, loss of libido, or other sexual problems that may arise from cardiac surgery. Including discussion about managing stress and anxiety related to sexual activity is an integral component for patients recovering from major cardiac surgeries. Effective communication between spouses can help them navigate the physical and emotional challenges of post-surgery sexual activity and enhance their intimacy and satisfaction with each other [30].

In terms of research implications and evidence quality, most of the reviewed studies were rated as moderate to high quality, and only a small number of exploratory studies were identified which indicates a dearth of research on the very topic. Therefore, more descriptive and experimental research explores in-depth the fears, uncertainties, and sociocultural factors affecting sexual health and interventions to address the

fears and uncertainties of individuals with cardiovascular surgeries and their spouses. A wide range of qualitative, quantitative, and mixed methods approaches are needed to explore and understand various aspects of sexual health and sexual quality of life such as the effect of sexual health and quality of life on family dynamics, interpersonal relationships among health care professionals, patients, and their families, sexual health and sexual quality of life as impacted by social factors and forces, and person-centred approaches to improving the sexual health and quality of life of individuals.

Limitations

Only English language studies published were included in the review resulting in missed potential studies published in other languages. During literature synthesis and analysis, personal interpretations and judgements were incorporated which could affect the quality of synthesis. However, to address and prevent any potential bias the independent review and peer debriefing were used to compare the interpretations and a consensus was reached. Furthermore, the studies included in this have not explicitly compared sexual health and sexual quality of life among cardiovascular surgery types. Also, several medications could have adversely influenced the sexual activity among these patients which was not reported on in the included studies. Further, the included studies either examined different components of sexual health or used different tools for measuring sexual health, which makes the comparison among studies a great challenge. Last, this review comprised only 11 studies due to the unavailability of published evidence, which might further undermine the generalisability of the findings of this review.

Conclusions

Despite their importance, sexual health and quality of life are frequently overlooked during patient rehabilitation after cardiovascular surgeries. The lack of adequate education and counselling from healthcare professionals frequently leads to increased fear and uncertainties among individuals and their partners. Therefore, more person-centred educational and counselling approaches should be developed to address the sexual concerns of individuals and their partners. The findings of this review should be interpreted cautiously, as there could be several other determinants of sexual health and sexual quality of life that were not examined by the included studies. Therefore, further research with robust methodology is needed to identify such determinants of sexual health and sexual quality of life.

Funding Sources

This review received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Conflict of Interest

The authors report there are no competing interests to declare.

Appendices

Supplementary data associated with this article can be found, in the online version, at <https://doi.org/10.1016/j.hlc.2024.05.010>.

References

- [1] Lindau ST, Gavrilova N. Sex, health, and years of sexually active life gained due to good health: evidence from two US population based cross-sectional surveys of ageing. *BMJ*. 2010;340:c810.
- [2] World Health Organization. Sexual health. Available at: https://www.who.int/health-topics/sexual-health#tab=tab_1. [accessed 15.10.23].
- [3] Najimi A, Veisani Y, Azami S, Azadi A. Investigating the sexual quality of life and its relationship with general health in older men in Iran. *J Educ Health Promot*. 2020;9:150.
- [4] Poggiogalle E, Di Lazzaro L, Pinto A, Migliaccio S, Lenzi A, Donini LM. Health-related quality of life and quality of sexual life in obese subjects. *Int J Endocrinol*. 2014;2014:847871.
- [5] Leon AS, Franklin BA, Costa F, Balady GJ, Berra KA, Stewart KJ, et al. Cardiac rehabilitation and secondary prevention of coronary heart disease: an American Heart Association scientific statement from the Council on Clinical Cardiology (Subcommittee on Exercise, Cardiac Rehabilitation, and Prevention) and the Council on Nutrition, Physical Activity, and Metabolism (Subcommittee on Physical Activity), in collaboration with the American Association of Cardiovascular and Pulmonary Rehabilitation. *Circulation*. 2005;111:369–76.
- [6] Schumann J, Zellweger MJ, Di Valentino M, Piazzalunga S, Hoffmann A. Sexual dysfunction before and after cardiac rehabilitation. *Rehabil Res Pract*. 2010;2010:823060.
- [7] Nascimento ER, Maia AC, Pereira V, Soares-Filho G, Nardi AE, Silva AC. Sexual dysfunction and cardiovascular diseases: a systematic review of prevalence. *Clinics (Sao Paulo)*. 2013;68:1462–8.
- [8] Steinke EE, Jaarsma T. Sexual counselling and cardiovascular disease: practical approaches. *Asian J Androl*. 2015;17:32–9.
- [9] Rosman L, Cahill JM, McCammon SL, Sears SF. Sexual health concerns in patients with cardiovascular disease. *Circulation*. 2014;129:e313–6.
- [10] Steinke EE. Sexual concerns of patients and partners after an implantable cardioverter defibrillator. *Dimens Crit Care Nurs*. 2003;22:89–96.
- [11] Steinke EE, Jaarsma T, Barnason SA, Byrne M, Doherty S, Dougherty CM, et al. Sexual counselling for individuals with cardiovascular disease and their partners: a consensus document from the American Heart Association and the ESC Council on Cardiovascular Nursing and Allied Professions (CCNAP). *Eur Heart J*. 2013;34:3217–35.
- [12] Conaglen HM, Conaglen JV. Drug-induced sexual dysfunction in men and women. *Aust Prescr*. 2013;36:42–5.
- [13] Gandaglia G, Briganti A, Jackson G, Kloner RA, Montorsi F, Montorsi P, et al. A systematic review of the association between erectile dysfunction and cardiovascular disease. *Eur Urol*. 2014;65:968–78.
- [14] Younas A, Shahzad S, Inayat S. Data analysis and presentation in integrative reviews: a narrative review. *West J Nurs Res*. 2022;44:1124–33.
- [15] Whittemore R, Knaf K. The integrative review: updated methodology. *J Adv Nurs*. 2005;52:546–53.
- [16] Hong QN, Fàbregues S, Bartlett G, Boardman F, Cargo M, Dagenais P, et al. The Mixed Methods Appraisal Tool (MMAT) version 2018 for information professionals and researchers. *Educ Info*. 2018;34:285–91.
- [17] McHugh ML. Interrater reliability: the kappa statistic. *Biochem Med*. 2012;22:276–82.
- [18] Younas A, Ali P. Five tips for developing useful literature summary tables for writing review articles. *Evid Based Nurs*. 2021;24:32–4.
- [19] Çağlar M, Yeşiltepe Oskay Ü, Arican E, Akyol E. Relationship between self-efficacy and sexual function after open heart surgery. *Eur J Cardiovasc Nurs*. 2021;20:376–82.

- [20] Chaddha A, Kline-Rogers E, Braverman AC, Erickson SR, Jackson EA, Franklin BA, et al. Survivors of aortic dissection: activity, mental health, and sexual function. *Clin Cardiol.* 2015;38:652–9.
- [21] Firoozjaei IT, Taghadosi M, Sadat Z. Determining the sexual quality of life and related factors in patients referred to the department of cardiac rehabilitation: a cross-sectional study. *Int J Reprod Biomed.* 2021;19:261–70.
- [22] Foruzan-Nia SK, Abdollahi MH, Hekmatimoghaddam SH, Namayandeh SM, Mortazavi MH. Incidence of sexual dysfunction in men after cardiac surgery in Afshar hospital, Yazd. *Iran J Reprod Med.* 2011;9:89–94.
- [23] Klein R, Bar-on E, Klein J, Benbenishty R. The impact of sexual therapy on patients after cardiac events participating in a cardiac rehabilitation program. *Eur J Cardiovasc Prev Rehabil.* 2007;14:672–8.
- [24] Lai YH, Hsieh SR, Ho WC, Chiou AF. Factors associated with sexual quality of life in patients before and after coronary artery bypass grafting surgery. *J Cardiovasc Nurs.* 2011;26:487–96.
- [25] Ghazy T, Haeberle E, Kappert U, Petzold S, Plötze K, Mashhour A, et al. Sexual quality of life in men <60 years old after coronary bypass surgery. *Heart Surg Forum.* 2021;24:E480–6.
- [26] Reese JB, Shelby RA, Taylor KL. Sexual quality of life in patients undergoing coronary artery bypass graft surgery. *Psychol Health.* 2012;27:721–36.
- [27] Yan LL, Tang MR, Dai XF, Chen LW, Fang GH. Impact of minimally invasive mitral valve surgery on sexual dysfunction in male patients. *J Cardiothorac Surg.* 2022;17:77.
- [28] Tuncer M, Yeşiltepe Oskay Ü. Effect of sexual counselling on sexual function and sexual quality of life for women undergoing open heart surgery: a pilot randomized controlled trial. *J Sex Med.* 2023;20:1010–7.
- [29] Pourebrahimi M, Fallahi-Khoshknab M, Taghipour H, Ebadi A, Gholizadeh L, Hosseini M. Confusion at the beginning of sexual intercourse, the challenge of patients after coronary artery bypass graft surgery in Iran: a qualitative study. *J Educ Health Promot.* 2021;10:92.
- [30] Wittmann D, Carolan M, Given B, Skolarus TA, Crossley H, An L, et al. What couples say about their recovery of sexual intimacy after prostatectomy: toward the development of a conceptual model of couples' sexual recovery after surgery for prostate cancer. *J Sex Med.* 2015;12:494–504.