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KEYWORDS

Medical factors, Cardiac/Cardiovascular patients, Quality of life, Comorbidities.

ABSTRACT

Many factors affect the quality of life of cardiac patients. Medical factors are very important in this respect. Hence, this review aimed to systematically assess recent studies on the medical factors influencing the quality of life in cardiac patients, broadening its focus to encompass all cardiac and cardiovascular diseases. Papers relevant to the review topic were identified from Google Scholar using the review topic itself as the search term. The identified papers were screened for a set of exclusion criteria using the PRISMA process to select the targeted 25 papers. They were described and discussed to conclude. A spreadsheet with the relevant details was prepared and used to extract some quantitative trends that were useful for discussions. It was found that nearly all other chronic conditions have been linked to a diminished quality of life in these patients. However, few papers specifically addressed medical factors associated with quality of life. As a result, some studies relied on medical conditions noted in baseline data, while others referenced these conditions to elucidate findings related to quality of life. In certain instances, cardiac or cardiovascular issues were just one part of the analysis, with medical factors impacting the quality of life for all patients being analysed separately. A significant limitation identified in 11 of the studies was the deficiencies in research design, which future researchers should consider carefully. Most studies depended on self-reported data gathered through surveys. The authors could have leveraged the vast amounts of data available from healthcare facilities and analysed it using big data analytics or machine learning techniques; however, no studies utilising these methods were found. Only three of the examined papers employed randomised controlled trials, with a clear preference for surveys and qualitative reviews.

Introduction

Cardiovascular diseases (CVDs) are the primary cause of death around the world. In 2019, approximately 17.9 million individuals lost their lives to CVDs, accounting for 32% of all global fatalities. Among these, 85% were attributed to heart attacks and strokes. More than 75% of these deaths occurred in low- and middle-income nations. Of the 17 million premature deaths (those under 70) linked to noncommunicable diseases in 2019, 38% were due to CVDs (WHO, 2024).

It is widely accepted that some medical factors affect the quality of life among cardiac patients. According to a recent report from the World Heart Federation (WHF) (WHF, 2023), deaths caused by cardiovascular disease (CVD) increased from 12.1 million in 1990 to 20.5 million in 2021. In 2021, CVD was the top cause of death globally, with 80% of these deaths occurring in low- and middle-income countries (LMICs). Contributing medical factors that increase the risk of heart disease include high blood pressure, elevated fasting plasma glucose, excessive body mass index, high levels of low-density lipoprotein (LDL) cholesterol, and diabetes, all of which also impact individuals' quality of life.

Specifically, depression and anxiety were the major factors affecting the quality of life among patients with extrasystolic arrhythmia (Mikhaylov, et al., 2022). In an Iranian review, Yaghoubi, et al. (2012) found suffering from some background diseases (Hypertension, diabetes, Hyperlipidaemia), suffering duration of cardiac disease, referring frequency or hospitalisation frequency, and a family history of heart diseases in some investigated studies had a significant relationship with patient quality of life.

A Greek survey of 300 hospitalised heart failure patients by Audi, et al. (2017) revealed many factors affecting their quality of life. The medical factors were medication with antidepressants, anxiolytics, hospitalised before and its frequency, suffering from another disease, unaware of their problem, if relatively suffered from the problem, if a relative suffered from a heart problem and retired early due to the problem.

The above short background indicates the amount of research that has been done on this topic. Many reviews have already been done on various aspects of the topic and in various contexts in the country. This review aims to systematically evaluate the recent research on the medical factors affecting the quality of life among cardiac patients. The scope of this review is limited to medical factors and quality of life. The term cardiac patients is used to represent a wider range of cardiovascular diseases.

The paper is organised as follows. The next section, Methodology, describes the methods used to identify and screen papers related to the topic based on certain inclusion and exclusion criteria. The target is to review 25 papers. These 25 papers are critically evaluated in the Results section. The findings from the results section are synthesised and interpreted in the Discussion section. The results and discussion sections lead to some conclusions, which are presented in the Conclusion section. The findings of this review may lead to some recommendations for research and practice, listed in the Recommendations section. Finally, some limitations of this review are mentioned in the final section.

Methodology

Google Scholar was searched using the review topic as the search term. The papers identified were screened using the inclusion and exclusion criteria listed in Table 1 to select a targeted 25 papers.

Inclusion criteria	Exclusion criteria	Remarks
Full texts	Abstracts	Abstracts were considered if they contained useful information.
Papers in English	Other languages	Even the best translation tools do not provide precise information.
Only those published during 2015-2024.	Papers of earlier years.	This is to reflect the recent trend. However, some classical papers cited in a paper may be referenced without counting them as selected papers.
Only research papers, reviews and reports	Dissertations	They are guided research and, hence, not independent reports.
	Books, book sections	If full texts are available, they may be considered.
	Editorials, opinions and comments.	These evaluate other papers and are not included.
	Inadequate reference details	There are citation difficulties with such papers.

Besides the textual descriptions in the Results section, a spreadsheet was prepared containing reference details, aim, method, any theory or framework, findings, limitations mentioned in the paper or identified by the reviewer, and the following quality parameters.

Citations per year

The number of citations is available for most papers in Google Scholar. However, the years of their publications are different. To compare the quality of papers based on the number of citations the total number of citations was divided by the number of years from publication to 2024. Thus, if a paper was published in 2020, the division factor is 5, for 2021 the division factor is 4 etc. The average number of citations per year was estimated as a quality measure in this manner.

Adequacy of evidence assessment

Whether the evidence presented is adequate to reach the stated conclusion was qualitatively assessed using 1 (lowest) to 5 (highest) levels of adequacy.

Risk of Bias (RoB)

The National Toxicology Program's Office of Health Assessment and Translation (NTP OHAT) risk of bias (RoB) tool was used. This tool assesses RoB based on the criteria to select study participants, confounding, measurement of exposure and outcomes, follow-up of study participants, adequacy of the reporting of outcomes, and pre-specification of study analysis/study protocol. RoB was rated as 1 (lowest) to 5 (highest).

GRADE

Certainty of evidence was evaluated by the Grading of Recommendations Assessment, Development and Evaluation (GRADE) framework. This depends on whether there was an adequate sample size and whether adequate validity and reliability tests were done. This was assessed as 1(lowest) to 5 (highest).

CCAT

Crowe Critical Appraisal Tool (CCAT; version 1.4) was used as a quality index of papers. CCAT consists of preliminaries, introduction, design, sampling, data collection, ethical matters, results, and discussion as the assessment items. The range of scores is 1 (lowest quality) to 5 (highest quality).

Overall quality

Overall quality= Citations per year + Evidence strength- RoB+ GRADE+ CCAT.

Synthesis of literature

The data collected in the spreadsheet were used for some quantitative synthesis across the papers to discover general trends. The detailed discussions were based on these and the topics reviewed. Similar findings across different papers were pooled together and differentiated from contradictory findings to achieve the desired level of synthesis. In the results section, each paper is described in detail, cross-referring to earlier concepts or frameworks if relevant.

The results section critically analyses the 25 papers selected below.

Results

In a survey of 246 Saudi heart failure patients by Alharbi, et al. (2022), the quality of their life was affected by moderate levels of general health, physical, emotional functioning and mental health and high levels of social functioning and body pain. The survey questionnaire did not contain any specific medical factor. The limitations mentioned by the authors were the self-report bias inherent in cross-sectional surveys, selection and interviewer biases in responses and non-inclusion of some items in the questionnaire. Additionally, the selection of participants from a single hospital may affect the generalisability of the findings across the country despite the claim by the authors that the sample was representative of the Saudi population.

In a systematic review, Baert, et al. (2018) observed that 25 out of 29 papers dealing with characteristics of heart failure, clinical characteristics, comorbidities, medications and heart failure symptoms as components of congestive heart failure. These factors accounted for 47-64% of the citations. The authors identified New York Heart Association categorisations, depression, brain natriuretic peptide (BNP), left ventricular ejection fraction (LVEF), frequency of daily medication, hospitalisation rate and psychological problems as significant predictors in the reviewed papers. The limitations mentioned by the authors were the high heterogeneity of variables, focusing only on the important variables and the methodological limitations, and the absence of some analytical results in some papers.

In a scoping review of 21 papers, the most common comorbidities associated with low quality of life among chronic heart failure patients reported were diabetes, behavioural disorders, anaemia or iron deficiency and respiratory diseases. The limitations of this review include no peer review of methods in the papers, limiting to one search engine, the inclusion of only English papers, not doing a meta-analysis due to high levels of heterogeneity among the methods used in the papers and non-alignment of most studies with the objectives of the review (Comín-Colet, et al., 2020).

Gallagher, et al. (2019) aimed to investigate the acceptability and feasibility of implementing validated HR-QoL instruments in heart failure clinics and to examine the impact of patient characteristics on HR-QoL. A survey of 152 UK heart failure patients was conducted. Although the NYHA class correlated significantly with HR-QoL scores, there was high variability in HR-QoL within each NYHA class, highlighting its limitation as the sole assessment of HR-QoL. Demographic variables showed a majority of patients having comorbidities, LVEF, NYHA II and III categories, arterial problems and metabolic problems. The main limitations are the use of an urban convenience sample from a single clinic and a possible confounding effect due to a particular order followed in the three rating methods, besides a low sample size, all of which can affect the validity and generalisability of the findings.

To examine the clinical factors associated with the QoL of HF patients, Comín-Colet, et al. (2016) used a survey of 1037 multicentre consecutive outpatients with systolic heart failure. A specific questionnaire (Kansas City Cardiomyopathy Questionnaire) and a generic questionnaire (EuroQoL-5D) were used. Most patients with poor quality of life had a worse prognosis and increased severity of heart failure. Mobility was more limited, and rates of pain/discomfort and anxiety/depression were higher in the study patients than in the general population and patients with other chronic conditions. The independent predictors were being older, female, having worse functional class, having a higher Charlson comorbidity index, and having recent hospitalisation for heart failure were independent predictors of worse health-related quality of life.

Ravera, et al. (2021) aimed to evaluate quality of life (QoL) metrics obtained from two commonly used questionnaires in clinical research: the Kansas City Cardiomyopathy Questionnaire (KCCQ) and the EuroQoL 5 dimensions (EQ-5D). The authors also aimed to assess and compare their prognostic significance in men and women suffering from heart failure with reduced ejection fraction (HFrEF). Using data from the BIOlogy Study to TAilored Treatment in Chronic Heart Failure (BIOSTAT-CHF) and looked at KCCQ and EQ-5D scores at the start of the study and after 9 months in a cohort of 1,276 men and 373 women experiencing new or worsening HFrEF symptoms. These individuals were receiving inadequate treatment, anticipating a future increase in guideline-recommended medical therapies. It was observed that women had significantly poorer baseline QoL compared to men, as measured by both the KCCQ overall score (KCCQ-OS: 44 vs. 53, $P < 0.001$) and the EQ-5D utility score (0.62 vs. 0.73, $P < 0.001$). However, QoL improvements at follow-up were comparable for both genders. All QoL summary measures were significantly linked to all-cause mortality, with KCCQ-OS exhibiting the strongest correlation with mortality over a year compared to EQ-5D (C-statistic of 0.650 for KCCQ-OS versus 0.633 and 0.599 for the EQ-5D utility score and visual analogue scale, respectively). QoL was associated with all outcomes assessed in both men and women (all P values for interaction with sex >0.2). There was a higher prevalence of NYHA class II and III patients in both sexes. The study's limitations include its post hoc analysis design, the predominance of Caucasian patients in BIOSTAT-CHF affecting the applicability of our findings to other ethnic groups, and the inclusion of only those patients who completed both KCCQ and EQ-5D questionnaires at baseline, which may have introduced selection bias by focusing on a subset of individuals with less severe HF initially. Additionally, we concentrated on HFrEF while many women have heart failure with preserved left ventricular ejection fraction and compared only one generic and one heart failure-specific QoL questionnaire.

To assess the quality of life of Saudi patients with heart failure, a survey of 103 Saudi HF patients was conducted by AbuRuz, et al. (2015). Data were collected using the Short Form-36 and the Medical Outcomes Study-Social Support Survey. Along with a lower QoL, left ventricular ejection fraction was the strongest predictor of both physical and mental summaries. High body pain and physical and mental health problems were reported by the patients. Although no limitation was mentioned by the authors, the low sample size of 103 may affect the validity of findings despite the efforts of the authors to justify it based on a lower level of precision, error tolerance and effect size.

To evaluate the connection between health-related quality of life (HRQL) and heart failure (HF), Johansson, et al. (2021) conducted a survey of 23,291 HF patients from 40 countries across eight global regions as part of the G-CHF study (Global Congestive Heart Failure). The authors utilised the Kansas City Cardiomyopathy Questionnaire–12 (KCCQ-12) to measure HRQL. Standardised summary scores from the KCCQ-12, adjusted for age, sex, and HF severity indicators, were compared across different regions (with scores ranging from 0 to 100, where higher scores reflect better HRQL). To analyse the relationship between KCCQ-12 summary scores and the combined outcomes of all-cause mortality, HF hospitalisations, and their components, the authors performed multivariable Cox regression, controlling for 15 variables over a median follow-up period of 1.6 years. Findings revealed that 40% of participants experienced New York Heart Association class III or IV symptoms, while 46% had a left ventricular ejection fraction of 40% or higher. HRQL scores varied by region, being lowest in Africa and highest in Western Europe. A decrease in the KCCQ-12 summary score was linked to an increased risk of all outcomes; specifically, for each 10-point drop in scores, the adjusted hazard ratio (HR) was 1.18. Although this correlation was evident across all regions, it was less pronounced in South Asia, South America, and Africa. The weakest correlation was noted in South Asia, while the strongest was observed in Eastern Europe. Lower HRQL scores were predictors of mortality in patients with both New York Heart Association class I or II and III or IV symptoms. A significant number of patients presented with hypertension, coronary artery disease, diabetes, and atrial fibrillation or flutter. Potential limitations of the study include the possibility that the samples may not accurately represent their respective regions and the fact that cultural differences among countries were not considered.

Butler, et al. (2020) aimed to correlate the changes in the Kansas City Cardiomyopathy Questionnaire (KCCQ) with the Patient Global Assessment (PGA) in patients suffering from heart failure with reduced ejection fraction while also establishing the minimum clinical intervention required. This study involved 459 participants from the ongoing FAIR-HF trial. We evaluated both the KCCQ and PGA at 4 and 24 weeks post-enrolment, employing an anchor-based method to determine the minimum clinically important difference (MCID) at these time points. The PGA served as the clinical anchor to calibrate changes in the KCCQ scores. For each category of PGA change, the authors calculated the mean differences in various KCCQ domain scores along with 95% confidence intervals (CIs). The findings indicated a reasonable correlation between PGA and alterations in overall summary scores (OSS), clinical summary scores (CSS), and physical limitation scores (PLS) from the baseline to week 4. The KCCQ OSS, CSS, and PLS MCID for "little improvement" at week 4 were 3.6 and 4.7 points, respectively. At week 24, the OSS, CSS, and PLS MCID for the same level of improvement were 4.3, 4.5, and 4.0 points, respectively. Consequently, the MCID threshold for the KCCQ score was largely consistent and numerically lower than the previously established 5-point change criterion for clinical outcome prediction, remaining stable between 4 and 24 weeks. This implies that even changes smaller than the conventional 5-point improvements in KCCQ may hold clinical significance. These findings can facilitate the clinical interpretation of patient-reported outcomes and assist in selecting better endpoints for future research initiatives. Baseline data showed a high incidence of NYHA class III, ischemic aetiology, hypertension and some metabolic problems among the sampled patients. Limited generalisability due to the samples being limited to HFrEF (reduced ejection fraction) Caucasian patients with iron deficiency, low correlation values, the possibility of placebo effect in the 4-week study, PGA questionnaire not being exclusive to HF assessment and the possibility of patients with HF and preserved ejection fraction reporting different results later were mentioned by the authors.

To investigate the relationships between health-related quality of life (HRQOL), functional status, and cardiac event-free survival in heart failure (HF) patients, an observational study was conducted by Wu, et al. (2016) with 313 HF patients from various care centres across the USA, utilising a secondary analysis of registry data. HRQOL was evaluated using the Minnesota Living with Heart Failure Questionnaire (MLHFQ), while functional status was assessed with the Duke Activity Status Index (DASI). Information on cardiac event-free survival was obtained through patient interviews, hospital records, and death certificate analysis. Multiple linear and Cox regression analyses were performed to explore the connections among HRQOL, functional status, and cardiac event-free survival while adjusting for demographic and clinical variables. The average HRQOL score was 32.3 ± 20.6, indicating poor HRQOL, and the mean DASI score was 16.2 ± 12.9, reflecting poor functional status. Patients with lower HRQOL and reduced functional status experienced significantly worse cardiac event-free survival. There was also a significant correlation between better functional status and improved HRQOL ($p < .001$). However, HRQOL was not a significant predictor of cardiac event-free survival once functional status was included in the analysis ($p = .54$), suggesting that functional status acted as a mediator in the relationship between HRQOL and outcomes. Additionally, the baseline data indicated a high prevalence of prior heart attacks, hypertension, and comorbidities. Limitations included the subjective nature of the DASI, the cross-sectional assessment of HRQOL and functional status, which hindered the ability to determine causal relationships, a restriction to only English-speaking participants, and a younger average age within the sample, which may affect the findings' generalisability.

Barham, et al. (2019) conducted a study involving 275 Palestinian patients diagnosed with coronary heart disease (CHD) to examine the relationships between cardiac self-efficacy (CSE) and quality of life (QoL), as well as to identify factors influencing their QoL. To assess cardiac self-efficacy, the authors employed three different measures: the 5-item Perceived Efficacy in Patient-Physician Interaction scale (PEPPI-5), the 6-item Self-Efficacy for Managing Chronic Diseases scale (SEMCD-6), and Sullivan's 13-item Cardiac Self-Efficacy Scale (SCSES). For evaluating health-related quality of life (HRQoL), they used the 5-item version of the EuroQoL 5 Dimensions questionnaire (EQ-5D-5L) along with the Euroqol Visual Analogue Scale (EQ VAS). The authors performed multiple binary logistic regression analyses to assess the impact of demographic, medical, and self-efficacy factors on QoL scores. The findings indicated moderate positive correlations between QoL and scores on PEPPI-5, SEMCD-6, and SCSES. The regression analysis revealed that only higher scores on PEPPI-5 and SCSES were significantly related to improved QoL. Conversely, patients taking a greater number of medications were found to have lower QoL. The baseline data showed a high prevalence of overweight and obesity, as well as chronic health issues among the participants. The limitations were those related to cross-sectional research, preventing definitive causal inferences between the various scales and their factors, and it may not apply to the entire Palestinian population, as data was exclusively gathered from the Nablus area.

Joyce, et al. (2016) compared the relative impacts of heart failure (HF) compared to various medical and non-medical factors on reduced quality of life (QOL) among different subtypes defined by left ventricular ejection fraction (LVEF) categories—reduced, improved, and preserved—using a survey of 726 UK patients with ambulatory HF before their scheduled clinical visits. Participants filled out a one-page questionnaire that measured their QOL and assessed how HF, compared to other factors, contributed to their QOL challenges. Visual analogue scales were used to evaluate overall QOL, respiratory issues, and energy levels. The results were analysed across the three subtypes: reduced (57%), preserved (16%), and improved (LVEF ≥50%) (19%). Approximately half of the respondents reported that their QOL was primarily restricted by HF, 19% indicated that both HF and medical issues were equally limiting, 18% stated that medical problems were more significant, and 15% attributed limitations to non-medical factors. Those with improved LVEF exhibited the highest overall QOL scores and reported less breathing difficulty compared to those with preserved EF. Factors associated with HF-related decreased QOL included previous cardiac surgery, worse functional status according to the New York Heart Association classification, the use of renin-angiotensin-aldosterone antagonists, diuretics, lower body mass index, lower LVEF, and the absence of arthritis or a cancer history. The generalisability of these results is limited due to the study being conducted at a single centre, primarily involving male patients, the unavailability of certain parameters for patient phenotyping, and the focus solely on clinical metrics related to HF.

To assess the impact of comorbidities on the quality of life for breast cancer survivors, Fu, et al. (2015) surveyed 134 women from the U.S. The evaluation of comorbidities relied on self-reports, which were substantiated through medical record checks and the Charlson Comorbidity Index (CCI), both before surgery and 12 months post-surgery. Quality of life was measured using the Short-Form Health Survey (SF-36 v2). Data analysis utilised descriptive statistics, chi-square tests, t-tests, Fisher's exact test, and correlation methods. A total of 28 comorbidities were identified. Among the respondents, 73.8% reported having at least one comorbidity, 54.7% had between two and four, and only 7.4% had five to eight. There was no significant change in comorbidities at the 12-month mark after surgery. The number of comorbidities reported by patients and the weighted categorisation of comorbidities according to the CCI showed a similar negative correlation with overall quality of life scores, as well as in specific domains such as general health, physical functioning, bodily pain, and vitality. Specifically, hypertension, arthritis, and diabetes were linked to a diminished quality of life across several areas for breast cancer survivors. The study's limitations, which included a predominantly white sample, a small number of participants, and a lack of data on pre-surgery comorbidities, could potentially impact the generalisability and reliability of the results.

A structured review by von Haehling, et al. (2021) showed that no consistent results have been obtained from the limited data on the effect of treatments for heart failure co-morbidities like sleep-disordered breathing, diabetes mellitus, chronic kidney disease and depression in improving exercise capacity and quality of life. Each topic has been described with a tabulated list of references and a meta-analysis of a few papers. It is not clear why the meta-analysis was not done for all the papers under each topic. The authors have not mentioned the total number of papers selected for the review.

In a randomised controlled trial, Dieli-Conwright, et al. (2018) investigated the impact of a 16-week combined aerobic and resistance exercise program on patient-reported outcomes, physical fitness, and bone health among ethnically diverse, physically inactive, overweight, or obese breast cancer survivors. The study included 100 breast cancer patients who were within six months of completing their adjuvant treatment. The authors evaluated their physical fitness, bone mineral density, serum levels of bone biomarkers, and quality of life at baseline, after the intervention, and three months later for those in the exercise group. Participants were assigned to either the exercise program or usual care using concealed randomisation. The exercise regimen involved moderate to vigorous (65-85% of maximum heart rate) aerobic and resistance training, conducted three times a week for 16 weeks. The authors analysed the differences in mean changes for outcomes using mixed-model repeated measure analysis. At the end of the intervention, the exercise group showed greater improvements compared to the usual care group in quality of life, fatigue, depression, estimated VO2max, muscular strength, osteocalcin, and bone-specific alkaline phosphatase (BSAP). At the three-month follow-up, all patient-reported outcomes and physical fitness measures in the exercise group remained significantly enhanced compared to baseline. Thus, it was concluded that a 16-week clinically supervised exercise program, combining aerobic and resistance training, significantly bolstered the quality of life and physical fitness in ethnically diverse, overweight or obese breast cancer survivors, while also addressing metabolic syndrome.

Despite the significant effects of cardiovascular disease on the quality of life, morbidity, and mortality among older adults, individuals aged 75 and above are rarely included in most major cardiovascular studies. Most trials have excluded older adults with complex health conditions, substantial physical or cognitive impairments, frailty, or those living in nursing homes or assisted living facilities. Consequently, current guidelines lack evidence-based recommendations tailored for the typical older patients encountered in everyday clinical settings. This scientific statement seeks to summarise existing guideline recommendations relevant to older adults, pinpoint crucial knowledge gaps that hinder informed evidence-based decision-making and propose future research to address these gaps. To achieve these goals, Rich, et al. (2016) undertook a thorough review of current guidelines from the American College of Cardiology/American Heart Association and the American Stroke Association to identify relevant content and recommendations specifically aimed at older patients. The findings revealed a widespread deficiency in evidence to inform clinical decisions for older patients with cardiovascular disease, along with a lack of data regarding the effects of diagnostic and treatment interventions on essential outcomes for older individuals, like quality of life, physical functioning, and independence. Therefore, there is a pressing need for numerous large-scale population studies and clinical trials that include a diverse range of older patients representative of those seen in clinical practice, while also focusing on relevant outcomes that matter most to older patients in their design.

Patients visiting cardiology clinics often exhibit a high occurrence of obstructive sleep apnoea (OSA) and central sleep apnoea linked to Cheyne-Stokes Respiration (CSA-CSR). Evidence from smaller studies indicates that treating OSA with continuous positive airway pressure (CPAP) enhances patient-reported outcomes like sleepiness, quality of life, and mood. However, findings from larger randomised controlled trials do not currently demonstrate that positive pressure therapies lower cardiovascular mortality rates. The results from two significant randomised controlled trials published in 2015 and 2016 question the effectiveness of these pressure therapies in achieving clinical outcomes, although one trial did highlight the positive impact of CPAP on quality of life, mood, and absenteeism from work. The review by Drager, et al. (2017) aimed to provide a framework for understanding recent research findings, key clinical insights, and recommendations for future investigations in sleep and cardiovascular health. These suggested investigations should consider individual risk factors, employ both existing and innovative multi-modal therapies that enhance adherence, and conduct trials with adequate power to focus on specific endpoints and enable subgroup analyses.

The Heart Failure Society of America (Fang, et al., 2015) recommended a new definition for Stage D heart failure as, "the presence of progressive and/or persistent severe signs and symptoms of heart failure despite optimised medical, surgical, and device therapy." In addition to considering indications, contraindications, clinical status, and comorbidities, treatment selection for stage D patients involves incorporating the patient's wishes for survival versus quality of life, and palliative and hospice care should be integrated into care plans. More research is needed to determine optimal strategies for patient selection and medical decision-making, with the ultimate goal of improving clinical and patient-centred outcomes in patients with stage D heart failure.

A cluster randomised controlled trial was conducted by Coventry, et al. (2015) to test the effectiveness of an integrated collaborative care model for people with depression and long-term physical conditions. The health conditions of the sample of 387 patients included diabetes, heart disease or both. The selected patients had depressive symptoms (≥10 on the patient health questionnaire (PHQ-9)) for at least two weeks. The mean age was 58.5 (SD 11.7). Participants reported a mean of 6.2 (SD 3.0) for long-term conditions other than diabetes or heart disease; 240 (62%) were men; 360 (90%) completed the trial. Collaborative care included patient preference for behavioural activation, cognitive restructuring, graded exposure, and/or lifestyle advice, management of drug treatment, and prevention of relapse. Up to eight sessions of psychological treatment were delivered by specially trained psychological well-being practitioners employed by Improving Access to Psychological Therapy services in the English National Health Service; integration of care was enhanced by two treatment sessions delivered jointly with the practice nurse. Usual care was standard clinical practice provided by general practitioners and practice nurses. Quality of life was one of the outcomes measured. The collaborative care consisted of 19 randomised general practices and there were 20 practices in usual care. Three practices withdrew from the trial before patients were recruited. Out of 387, 191 patients were recruited from practices allocated to collaborative care, and 196 from practices allocated to usual care. There were no significant differences between groups in quality of life or disease-specific quality of life. The randomisation system ensured the absence of bias and anonymity of the participants to the research group. The authors also used appropriate methods to ensure an adequate sample size (n=387) for a satisfactory comparison and effect sizes. At four months, 106 (62.4%) participants assigned to collaborative care and 161 (89.4%) assigned to usual care were followed up. At six months 64 (37.6%) participants assigned to collaborative care and 19 (10.6%) assigned to usual care were followed up. The limitations of this study included the inability to recruit and assess the participants before randomisation, which might have led to disclosure of their allotment to interventions to staff or other participants. The participants were followed up only for four months, which prevented the assessment of long-term effects. Despite the use of self-reported questionnaires and masking of research staff to allocation, all outcome data were collected face to face at follow-up, and researchers might have been made aware of treatment allocations, leading to assessment bias. The authors collected only self-reported data on the use of antidepressants. They did not collect objective measures of physical functioning and were thus unable to assess the impact of collaborative care on both physical and mental health. Notifying general practitioners in advance to screen only for depression might have reduced the effectiveness of intervention on depression.

To determine if continuous positive airway pressure (CPAP) treatment reduces the risk of major cardiovascular events, a randomised controlled trial was carried out by McEvoy, et al. (2016). The study assessed primary outcomes and secondary outcomes, including quality of life. In the CPAP group (n=1359) compared to the usual care group (n=1358), participants used CPAP for an average of 3.3 hours per night, and the mean apnoea–hypopnea index dropped from 29.0 events per hour at baseline to 3.7 events per hour during follow-up. After an average follow-up period of 3.7 years, primary endpoint events were reported in 229 individuals from the CPAP group (17.0%) and in 207 from the usual care group (15.4%) (hazard ratio for CPAP, 1.10; 95% confidence interval, 0.91 to 1.32; P=0.34). No significant impact on individual or composite cardiovascular events was found. However, CPAP significantly enhanced the participants' quality of life and mood. A noted limitation of this study was that in several countries participating in the trial, the diagnosis and management of sleep apnoea were not well established in the healthcare system at the time the trial commenced. Although the overall adherence to CPAP therapy exceeded the estimates used in our power calculations, it may still not have been sufficient to achieve the anticipated effects on cardiovascular outcomes. For logistical reasons and to ensure efficient participant recruitment and data consistency across various sites, a simplified screening device (ApneaLink) was employed, utilising oximetry and nasal pressure recordings with automated signal analysis, rather than the conventional polysomnographic method, which involves manual scoring of analyses from overnight hospital stays.

A proactive strategy of early diagnosis and treatment of cardiovascular diseases is essential to maximise duration and quality of life. This was recommended as a part of a coordinated approach to the diagnosis and management of Duchenne Muscular Dystrophy (DMD) by Birnkrant, et al. (2018) on behalf of the DMD Care and Considerations Working Group. The paper aimed to update the recommendations on DMD care considerations of the Group. In 2014, the DMD Care Considerations Working Group steering committee, comprising experts from a wide range of disciplines, identified 11 topics to be included in this update. Part 2 contains the latest care considerations for respiratory, cardiac, bone health and osteoporosis, and orthopaedic and surgical management. Using an extensive search strategy, the authors selected 545 papers and categorised them on four criteria. The authors observed that large-scale, randomised controlled trials (RCTs) are rare in this field. Hence, the guidance was developed using a method that queries a group of experts on the appropriateness and necessity of specific assessments and interventions, using clinical scenarios. This methodology was designed to produce an essential toolkit for DMD care. Out of these, only assessments and interventions that have been deemed both appropriate and necessary were recommended.

Garcia, et al. (2024) aimed to review the novel and unique aspects of cardiovascular health in women and sex differences as they relate to clinical practice in the prevention, diagnosis, and treatment of CVD. The authors identified diabetes, hypertension, dyslipidaemia, obesity, pre-term delivery, hypersensitive pregnancy disorders, gestation-related obesity and diabetes, autoimmune diseases like Rheumatoid Arthritis and Systemic Lupus Erythematosus, stroke, peripheral arterial diseases, abdominal aortic aneurysms, effects of radiation and chemotherapy for breast cancer and menopause-related conditions as the medical risk factors which can affect their quality of life. The number of papers was not mentioned as this was a qualitative review.

The prevalence, epidemiology, risk factors and treatments for atherosclerotic cardiovascular disease among South Asians in the USA were reviewed, and recommendations for clinical strategies to reduce disease and directions for future research on this topic were given by Volgman et al. (2018) on behalf of the American organisations related to these specialisations. The writing group members, nominated by the AHA Manuscript Oversight Committee, consisted of experts on South Asians and CVD. A general framework was provided by the committee chairs to conduct a comprehensive literature review, summarise existing evidence, indicate gaps in current knowledge, and formulate recommendations. Only English-language studies were reviewed. The manuscript was peer-reviewed before publication. The medical risk factors identified by the authors are likely to affect the quality of life of this population. These factors include type 2 diabetes, obesity, Dyslipidaemia, Lipoprotein(a), hypertension, chronic kidney density, inflammation and thrombosis, diet and genetic factors.

In the case of the Iranian CVD population, the medical risk factors that are likely to affect their quality of life are hypertension, diabetes, high LDL-C, low HDL-C, hypertriglyceridemia, hypercholesterolemia and obesity. Sarrafzadegan and Mohammmadifard (2019) arrived at this observation from an extensive qualitative review of the literature. Although no limitation was mentioned, a meta-analysis might have been more useful.

In a qualitative review of the literature, Marelli, et al. (2016) identified the neurological risk factors associated with congenital heart diseases across the lifespan. Heart failure and low cardiac output increase the risk of dementia. Atrial fibrillation, high blood pressure and hypertension are implicated in both cardiovascular and neurological problems. These medical risk factors are likely to affect patients' quality of life. Although no limitation is mentioned, a meta-analysis would have been more useful.

Discussion

This review aimed to systematically evaluate recent research on medical factors affecting the quality of life among cardiac patients. The scope of the review was expanded to include all cardiac and cardiovascular diseases. Almost all other chronic conditions have been associated with the reduced quality of life of cardiac patients.

Papers directly discussing medical factors related to quality of life were rare. Therefore, in some cases, medical conditions listed in baseline data were used. In some other cases, medical conditions discussed to explain the findings on quality of life were used. In a different set of cases, cardiac or cardiovascular problems were only one aspect of the study and medical factors affecting the quality of life of all such patients were separated and used.

Some general trends are discussed. Deficiencies in research designs were the major limitations of 11 papers. Future researchers need to think seriously about this issue. Most studies relied on self-reported data using surveys. The authors could have used large volumes of data accumulated in healthcare facilities and analysed them using big data analytics or machine learning methods. No such paper was seen. Only three papers used randomised controlled trials. Preference was for surveys and qualitative reviews.

Specific quantitative trends are shown below.

Year-wise number of papers

Year-wise number of papers is shown in Fig 1.

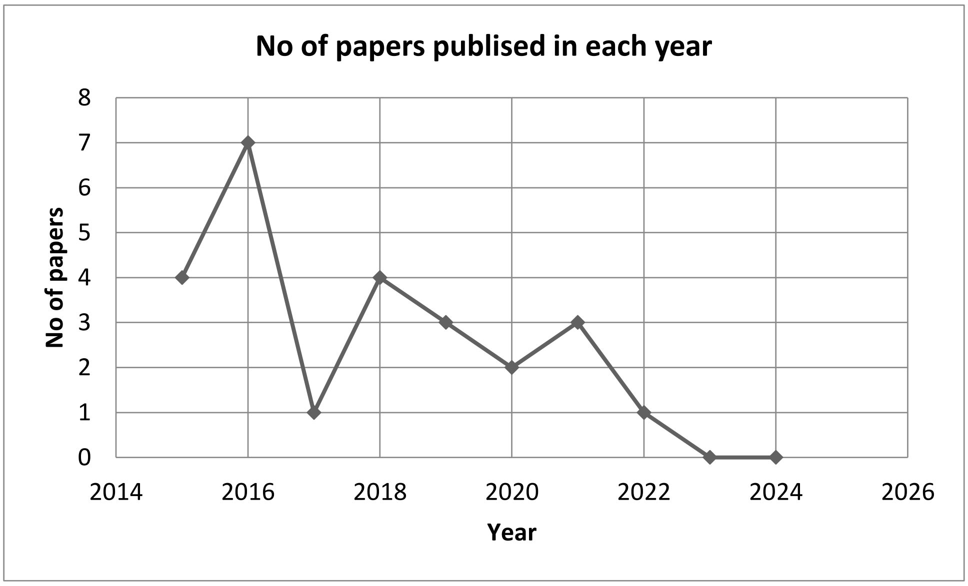

Figure 1 Year-wise number of papers.

The year-wise trend was irregular. After a substantial increase from four in 2015 to seven in 2016, it decreased sharply to one in 2017. Only 1 to 3 papers were published till 2022. No paper was available for 2023 and 2024. These trends do not mean that only these numbers of papers were published in the respective years. The fixation of a target of 25 papers and the use of a single search engine might have limited the papers to show this trend.

Research methods used

Research methods used in the reviewed papers are shown in Fig 2. Surveys with nine papers (36%) and qualitative reviews (20%) with five papers dominated the methods. There were only three papers (12%) each using RCT and systematic reviews. Secondary data was used in two (8%) papers. Three papers (12%) discussed the guidelines of associations and issues related to evidence for their updating.

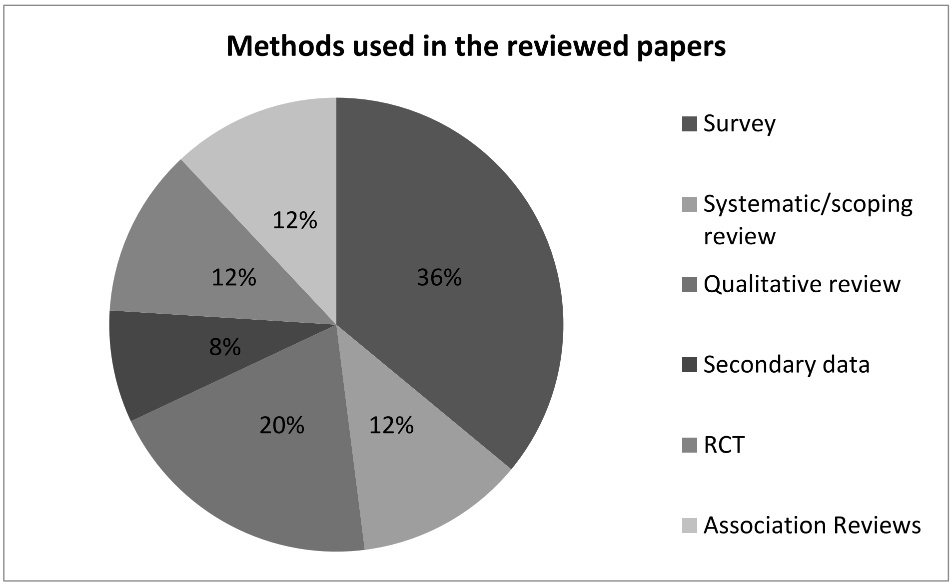

Figure 2 Research methods used in reviewed papers.

Limitations of papers

The limitations of the reviewed papers are shown in Fig 3.

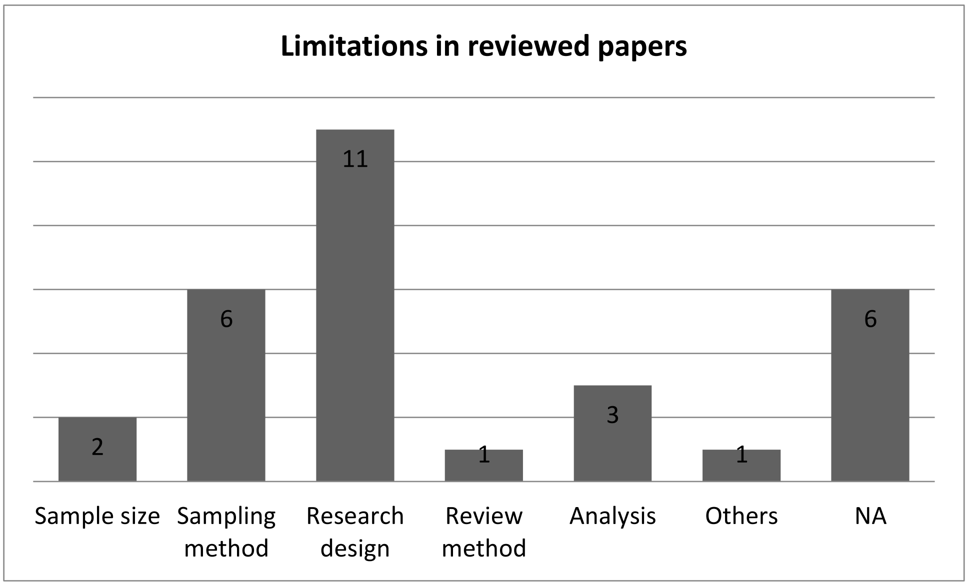

Figure 3 Limitations of reviewed papers.

The major limitation was in the research design itself (11 papers). The method of sampling was erroneous in the case of six papers. The other six papers did not mention any limitations, and from the descriptions, it was not possible to identify any limitations. Three papers had analytical deficiencies.

Assessment of the quality of papers

Citations per year, strength of evidence, risk of bias, GRADE and CCAT were used to estimate the overall quality of the reviewed papers. The methods have been described in the Methodology section.

Citations per year

Fig 4 shows citations per year of the reviewed papers.

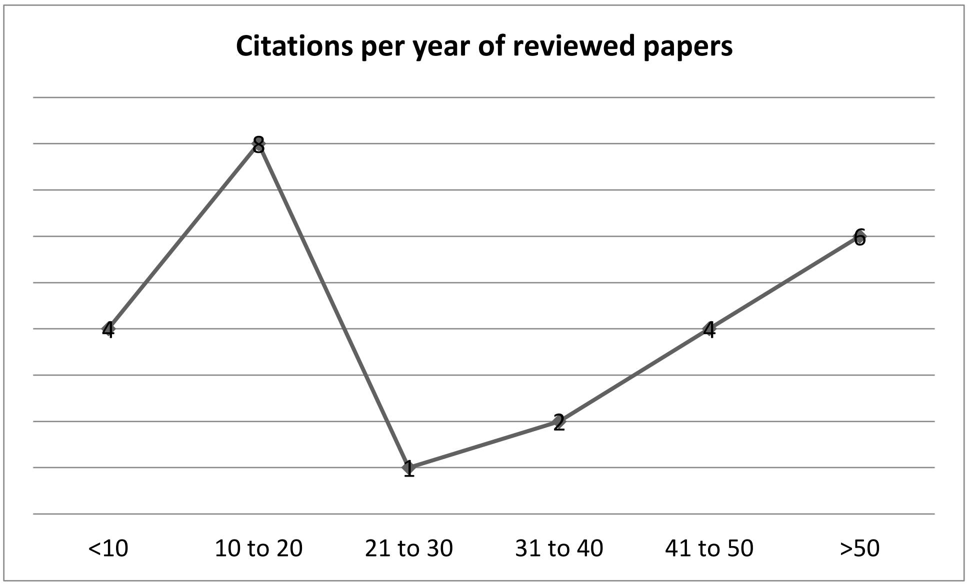

Figure 4 Citations per year of reviewed papers.

Fig 4 shows that 12 papers were cited by 30 or more other authors. Citations above 40, especially above 50, were high. Equally, another 12 papers were cited in 20 or fewer other papers. This trend shows that generally, the quality of papers had been moderate. The dependency of the number of citations on the year of publication cannot be entirely removed by estimating the average per year. For example, a paper published in the latter half of 2024 may not be cited at all. It does not mean that the quality of the paper is poor. On the other hand, a paper published in 2015 might have hundreds of citations, and the average number of citations per year will be high. This does not mean that this paper is of good quality. Since no better method was available to account for citation variations, this method was resorted to.

The risk of bias was lower than 2.5 in 20 papers. The authors used multiple ways to reduce various risks, leading to a lower risk of bias. Evidence adequacy, GRADE and CCAT ranged between 4 and 5. For evidence adequacy, values lower than 4.5 were more than those higher than 4.5. This shows a lack of evidence adequacy in many papers. In the case of GRADE and CCAT, most papers had values higher than 4.5, indicating that evidence inadequacies were overcome by other aspects of quality.

The mean value of the quality parameters is given in Table 2.

Table 2. Mean value of the quality parameters.

Citation/Yr	Evidence adequacy	Risk of bias	GRADE	CCAT	Overall quality
45.13	4.34	3.18	4.41	4.42	55.13

The above values show a generally moderate to high quality of the reviewed papers.

Conclusions

This review sought to systematically assess recent studies on the medical factors influencing the quality of life in cardiac patients, broadening its focus to encompass all cardiac and cardiovascular diseases. It was found that nearly all other chronic conditions have been linked to a diminished quality of life in these patients. However, few papers specifically addressed medical factors associated with quality of life. As a result, some studies relied on medical conditions noted in baseline data, while others referenced these conditions to elucidate findings related to quality of life. In certain instances, cardiac or cardiovascular issues were just one part of the analysis, with medical factors impacting the quality of life for all patients being analysed separately. A significant limitation identified in 11 of the studies was the deficiencies in research design, which future researchers should consider carefully. Most studies depended on self-reported data gathered through surveys. The authors could have leveraged the vast amounts of data available from healthcare facilities and analysed it using big data analytics or machine learning techniques; however, no studies utilising these methods were found. Only three of the examined papers employed randomised controlled trials, with a clear preference for surveys and qualitative reviews.

Limitations of this review

As was indicated above, relying on a single search engine, targeting the number of papers, selecting only the papers in English and problems in estimating citations per year are the limitations of this review. A meta-analysis could not be done as some papers were qualitative reviews and the abstract of one paper was used.

Scope for future research

The limitations of the papers provide scope for future research. Thus, there should be more randomised controlled trials. Research needs to be done using big data analytics and machine learning to derive useful findings from the already accumulated large volumes of data. Future research needs to be properly designed research with an adequate sample size. Limitations of papers must be always included for others to learn from errors.

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APPENDIX - PRISMA