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# Assessment of health-related quality of life in patients with heart failure: a cross-sectional study in Saudi Arabia

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## Abstract

**Background:** As a precarious clinical condition and a public health problem, heart failure (HF) is associated with a significant burden of morbidity, mortality, and health care costs. As almost all of the published research has been conducted in Western countries, there is a need for culturally relevant studies in Saudi Arabia. This is the first study to investigate health-related quality of life (HRQoL) and its associated factors among Saudi patients with HF in the Qassim region.

**Methods:** A cross-sectional study was conducted at the only tertiary care hospital in the Qassim region of Saudi Arabia during the period from November 2020 to July 2021. The participants were interviewed face-to-face by trained interviewers using the standard validated 36-item Short-Form Health Survey (SF-36) questionnaire for HRQoL assessment. The data were analyzed using STATA version 16.

**Results:** The participants included 246 HF patients whose mean (SD) age was 56.7 (10.9) years. A majority of the respondents (80%,  $n = 197$ ) were male, and 49% ( $n = 121$ ) had an education level of less than secondary school. The median scores were high for the domains of social functioning (100 points) and bodily pain (75 points) and low for role-physical functioning (25 points). In general, the median scores for the physical and mental component summaries were 58.1 and 63.7, respectively. Patients with an education level less than secondary school were more likely to have a low physical component summary score (aOR 3.00, 95% CI 1.46–6.17), while female patients were more likely to have a low mental component summary score (aOR 2.67, 95% CI 1.38–5.16).

**Conclusions:** Health-related quality of life was found to be moderate among these HF patients. Periodic HRQoL assessment is recommended for HF patients to minimize their physical and psychological concerns, particularly for patients with low education levels and female patients.

**Keywords:** Health-related quality of life, HRQoL, SF-36 health survey, Saudi Arabia, Heart failure

## Introduction

Heart failure (HF) is a public health problem with implications for health-related quality of life (HRQoL) [1]. In Saudi Arabia, the increased prevalence of HF over the past decade has imposed an economic burden on the health care system and on society [2]. According to the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO), heart disease

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is the leading cause of death among the Saudi population [3, 4]; WHO data published in 2019 reported 3365.5 disability-adjusted life years (DALYs) per 100,000 population due to ischemic heart disease [5]. The probability of dying from cardiovascular disease, cancer, diabetes, or chronic respiratory disease in Saudi Arabia between the ages of 30 and 70 years is 20.9% [6].

A national multicenter survey in Saudi Arabia found that the mean age of patients with acute heart failure (AHF) and chronic heart failure (CHF) was 57–60 years [7], which is 10 years younger than that in developed countries such as Japan [8], the USA [9, 10], and European countries [11]. The explanation for this early occurrence of heart failure among the Saudi population is multifactorial and includes a high prevalence of diabetes mellitus and hypertension, which are major risk factors for coronary artery disease and HF [7, 12]. A further contributory factor is the upsurge of obesity in Saudi Arabia due to the country's socioeconomic transition and adoption of a high-calorie Western diet [13]; other factors include a high prevalence of smoking [14].

HF has a significant impact on patients' HRQoL, as the progressive loss of physical autonomy and the subsequent psychological distress due to impairment of social interaction impose lifelong limitations on daily activities [15]. Studies of impaired HRQoL as a marker of HF report an association with sex, age, marital status, social support, left ventricular ejection fraction (LVEF), duration of HF, psychosocial status, and comorbidities [15–21]. In studies of HRQoL among HF patients in Brazil [19], the United States [22, 23], Europe [24], and Canada [25], the vast majority of the patients assigned greater importance to their quality of life than to survival. To our knowledge, only one such study has been conducted in the Kingdom of Saudi Arabia (in the country's eastern region), which found low physical and mental component summary scores and an overall low quality of life [26]. Therefore, this is the first study in the central region of the KSA that aimed to investigate HRQoL among Saudi HF patients and to identify factors associated with poor HRQoL in these individuals. We hypothesized that HF patients would have a lower physical and mental quality of life.

## Subjects and methods

### Study design and setting

The cross-sectional study of HF patients was conducted at King Fahad Specialist Hospital (KFSH) in the Qassim region between November 2020 and July 2021. KFSH is the region's largest hospital, with more than 430 beds, and is also the region's only tertiary care center. KFSH specializes in care for cardiac and oncology patients referred by primary care physicians and other hospitals in the region for assessment and admission [27]. The

hospital is located in Buraidah, the capital of the Qassim region [28], which is one of the 13 administrative regions and is located in the center of Saudi Arabia, with a population of approximately 1.4 million. Approximately half of the population is aged less than 24 years, and one-fifth of the population has a university education or higher [29]; the average family income in this region ranked third compared to other regions [30]. It has an area of approximately 70,000 square kilometers, which represents 3.1% of the total area of Saudi Arabia. Moreover, agriculture is the primary source of the economy, contributing 17% of the GDP of the region. Qassim is also known as the "food basket" of Saudi Arabia. Approximately 60% of jobs are provided by the public sector, while the remaining 40% of jobs are provided by the private sector in the form of industries [31].

### Questionnaire

To assess HRQoL, we used the RAND 36-Item Health Survey 1.0 Questionnaire in Arabic version [32] of the 36-item Short Form (SF-36) Health Survey [33], which is a validated, self-report questionnaire. The instrument comprises 36 items with two composite measures of physical and mental components that encompass the following eight domains [33, 34]: physical functioning (PF), role limitations due to physical functioning (RP), bodily pain (BP), general health perceptions (GH), vitality (VT), social functioning (SF), role limitations due to emotional health (RE), and general mental health (MH). Each item is scored from 0 to 100, representing the worst to best quality of life. The physical component summary (PCS) score is calculated as the aggregate of four domains: PF (10 items), RP (four items), BP (two items), and GH (five items). The mental component summary (MCS) score is calculated as the aggregate of RE (three items), VT (four items), SF (two items), and MH (five items). Additionally, one unscaled item compares the respondent's current health status with that in the past year [33]. In their assessment of the psychometric properties of the SF-36, Brazier et al. [35] reported satisfactory to excellent reliability coefficients of Cronbach's  $\alpha$ , which were  $>0.75$  for all scales except the SF domain ( $\alpha=0.73$ ). Additionally, a strong correlation with the Nottingham Health Profile confirmed the instrument's construct validity. Coons et al. [32] translated the instrument into Arabic and reported satisfactory psychometric results (highest  $\alpha=0.94$  for the PF domain; lowest  $\alpha=0.71$  for the general health domain).

Participants were classified into four groups depending on their HRQoL scores: scores from 0 to  $<25$  points, scores from 25 to  $<50$  points, scores from 50 to 74.9 points, and scores from 75 to 100 points. When the results were analyzed, none of the participants had a

score less than 25, and thus, we classified the participants into 3 groups. The patients with scores of 0 to < 50 points were categorized as having low HRQoL, those with scores of 50–74.9 points were considered to have moderate HRQoL, and those with scores of 75–100 points were considered to have high HRQoL [26, 35, 36].

#### Data collection

Patients diagnosed with HF were selected following admission to KFSH and during scheduled visits for assessment. Patients with cancer or major psychotic disorders were excluded from the study. The study's purpose and objectives were explained to eligible patients, and those who consented to participate were interviewed face-to-face by trained interviewers using the standard validated SF-36 questionnaire for HRQoL assessment. The study was approved by the Regional Qassim Ethics Committee (reference number 675170) and conformed to the ethics guidelines of the Declaration of Helsinki. Written informed consent was obtained from all participants in the study.

#### Sample size estimation

The sample size was computed using OpenEpi statistical software based on a previously reported correlation coefficient (0.2) among patients with HF [26], assuming adequate power (80%) and an alpha of 0.05. The minimum required sample size was 194 patients. In total, we recruited 246 patients diagnosed with HF, with an inclusion rate of 93%.

#### Statistical analysis

The data were analyzed using STATA version 17 and are presented as frequencies with percentages for categorical data and medians with interquartile ranges (IQRs) for continuous variables. The Shapiro–Wilk test was used to assess the normality of the distribution of continuous variables that were not normally distributed; therefore, the Mann–Whitney U test and Kruskal–Wallis test were used to compare 2 groups or more, respectively. Multiple logistic regression analysis was used to detect for an association between sociodemographic characteristics and low quality of life in the physical and mental component summaries [37], and adjusted odds ratios (aORs) and 95% confidence intervals (95% CIs) were reported. A  $p$  value  $\leq 0.05$  was considered statistically significant.

#### Results

The mean age of the participants was 56.7 (10.9) years; the majority (80%,  $n = 197$ ) were male, and almost half of the participants (49%,  $n = 121$ ) had less than a secondary school education. Ninety-nine (40.2%) participants had low scores for the physical component summary, and 72 (29.3%) had low scores for the mental component summary of the HRQoL assessment (details in Table 1). The median scores for the physical and mental component summaries were 58.1 and 63.7, respectively.

The median scores and IQRs for the eight domains assessed by the SF-36 are displayed in Table 2. Overall, the median scores were  $\geq 50$  for all domains except the role of physical functioning domain, with a median of 25 points for quality of life. Findings for the physical component summary indicated that the participants had a

**Table 1** Sociodemographic characteristics of the participants according to the PCS and MCS

Characteristics	Total	Physical component summary (PCS)			Mental component summary (MCS)		
		< 50	50–74	> 75	< 50	50–74	$\geq 75$
n (%)	246	99 (40.2)	89 (36.2)	58 (23.6)	72 (29.3)	90 (36.6)	84 (34.2)
Age, mean (SD)	56.7 (10.9)	59.4 (10.3)	54.2 (10.4)	55.9 (11.7)	57.2 (10.8)	57.1 (11.9)	55.9 (9.8)
Sex, n (%)							
Male	197	74 (37.6)	73 (37.1)	50 (25.4)	49 (24.9)	71 (36)	77 (39.1)
Female	49	25 (51)	16 (32.7)	8 (16.3)	23 (46.9)	19 (38.8)	7 (14.3)
Education level, n (%)							
$\geq$ University	62	15 (24.2)	28 (45.2)	19 (30.7)	20 (32.3)	20 (32.3)	22 (35.4)
Secondary school	63	21 (33.3)	22 (34.9)	20 (31.8)	18 (28.6)	23 (36.5)	22 (34.9)
< Secondary school	121	63 (52.1)	39 (32.2)	19 (15.7)	34 (28.1)	47 (38.8)	40 (33.1)

**Table 2** The median scores and IQRs of the participants for the SF-36 quality of life domains

Subscale	Median	IQR
General health	62.5	25
Physical functioning	55	55
Role physical functioning	25	100
Role emotional functioning	66.7	100
Social functioning	100	25
Body pain	75	50
Vitality	50	25
Mental health	66	32

**Table 3** Sociodemographic characteristics associated with the physical and mental component summaries

Characteristics	Median (IQR)	p Value
<i>Physical component summary</i>		
Age	> 56 years	50 (32.8)
	≤ 56 years	56.3 (30)
Sex	Male	56.3 (33.8)
	Female	49.4 (21.3)
Education level	≥ University	57.8 (28.8)
	Secondary school	61.3 (31.3)
	< Secondary school	48.8 (33.1)
<i>Mental component summary</i>		
Age	> 56 years	62.5 (31.2)
	≤ 56 years	67.1 (32.8)
Sex	Male	68.3 (31.7)
	Female	50.8 (23.8)
Education level	≥ University	68 (32.9)
	Secondary school	65 (35.5)
	< Secondary school	62.5 (31.8)

<sup>a</sup> Mann–Whitney *U* test, <sup>b</sup>Kruskal–Wallis test, \**p* value ≤ 0.05

median of 55 points for the physical functioning domain, 25 points for the role of physical functioning domain, and 75 points for the bodily pain domain. Participants reported a median score of 62.5 for their general health.

The mental component summary results indicated that the quality of social functioning domain had a median score of 100 points. Additionally, patients reported a median score of 66 points for the mental health domain, 66.7 points for the emotional role domain and 50 points for the vitality domain.

Table 3 shows that male sex, being aged 56 years or younger and having a higher educational level were shown to be significantly associated with a higher median score on the physical component summary ( $p=0.024$ ,  $p=0.004$ , and  $p<0.001$ , respectively). Male subjects showed significantly higher median mental component summary scores ( $p<0.001$ ) than females.

Multiple logistic regression showed that the patients with less than a secondary school education were more likely to have a low physical component summary score (aOR 3.00, 95% CI 1.46–6.17,  $p=0.003$ ), while female patients were more likely to have a low mental component summary score (aOR 2.67, 95% CI 1.38–5.16,  $p=0.004$ ) (Table 4).

## Discussion

As heart failure is a multifactorial clinical syndrome, interpreting quality of life among HF patients is a complex task [38]. Most previous studies have characterized HRQoL as subjective because of the self-reported nature of the data, which are based on patients' own perceptions of their condition [39–41]. However, Alla et al. [42] and Scott et al. [43] eventually agreed on a multidimensional account that encompasses the physical, psychological, and social dimensions of HRQoL, all of which are

**Table 4** Multivariable analysis of the factors associated with poor quality of life (physical and mental quality of life)

Characteristics	Physical component summary			Mental component summary		
	aOR	95% CI	p Value	aOR	95% CI	p Value
<i>Age, years</i>						
> 56 years	1.71	0.96–3.02	0.066	1.94	0.70–2.38	0.407
≤ 56 years	Reference			Reference		
<i>Sex</i>						
Female	1.81	0.92–3.55	0.082	2.67	1.38–5.16	0.004*
Male	Reference			Reference		
<i>Education level</i>						
< Secondary school	3.00	1.46–6.17	0.003*	0.79	0.38–1.62	0.518
Secondary school	1.81	0.81–4.06	0.151	1.02	0.46–2.26	0.954
≥ University	Reference			Reference		

\**p* Value ≤ 0.05

incorporated in the SF-36 health survey [33–35]. Building on that approach, the present study found higher scores across almost all of the SF-36 domains compared to previous studies in the KSA's Eastern region [26], Ethiopia [44], and Spain [18], which reported low HRQoL across all domains of the SF-36. This might be explained by methodological differences, variations in the history of comorbidities, duration of heart failure, treatment compliance, and differences in health quality. In the present study, the lowest scores were observed for the role limitations due to physical functioning domain, which is consistent with a study conducted in Spain [18] that indicated HF patients experience physical symptoms that include fatigue, dyspnea, chest pain, edema, and sleep difficulties, adversely affecting their physical ability to perform daily life activities [17, 45–50]. The present study found that the highest scores on the SF-36 were for the social functioning and bodily pain domains, which is consistent with a study in Spain [18]. These findings suggest that HF patients may try to maintain a positive psychosocial attitude despite physical limitations in their daily activities, positively impacting their HRQoL [22]. For patients in Saudi Arabia, the availability of personal attendants and family members for religious and socio-cultural reasons may also be an important contributory factor [26].

The median score for the mental component summary was higher than that for the physical component summary in the present study. However, both of these scores were higher than those reported by previous studies [18, 26] and a recent meta-analysis of 14 studies [51]. The present results also found that participants with less than a secondary school education had poor PCS scores, indicating better physical functioning among those with high education levels. This confirms earlier evidence that education level is positively correlated with knowledge and awareness of one's own physical health [52]. This might be because less educated patients may have difficulties following medical instructions and procedures, which in turn results in poor quality of life, and higher education is associated with better general health knowledge and more positive lifestyle factors [53]. An association has been demonstrated between a low educational level of HF patients and various quality of life aspects, including lower levels of physical functioning, higher anxiety, and poorer general health scores [39]. Moreover, HF patients with low education levels were found to have a 50% increased risk of hospitalization compared to highly educated patients [54]. This finding suggests an additional need for interventions in the form of medical or psychological counseling by health care practitioners to improve the functional and physical status of HF patients with low education levels.

Interestingly, male patients in the present study received higher MCS scores than female patients, indicating better mental functioning in males. This aligns with earlier evidence [55–58] that, in this context, men's psychosocial adjustment is better than that of women. This sex difference in psychosocial adjustment is attributed to the strong effect of psychosocial stressors among women due to altered functioning of the hypothalamic–pituitary–adrenal axis (HPA axis) and autonomic nervous system [59]. HRQoL assessment is crucial in heart failure management and the optimization of guideline-directed medical therapy or interventions that can improve patient HRQoL; therefore, we recommend yearly follow-up assessments of HF patients for extended periods to acquire prospective data on their progress and to identify prognostic factors for the rehabilitation process.

### Strengths and limitations

The present study is notable for its sufficiently large sample size representative of the population and its utilization of a questionnaire validated for the Arabic language, which was in the form of a face-to-face questionnaire given in the only tertiary care setting of the region. The study's limitations include its dependence on the inherent constraint of the SF36 instrument in the form of subjective reporting by the participants, which may lead to over- or underreporting. Moreover, HRQoL scores can be affected by the time since the diagnosis of heart failure. Most likely, the joy of having survived is high after the incident and will influence the reported HRQoL level. Selection bias cannot be excluded, as some patients may receive treatment for their condition in the private sector or a hospital in another region. The interviews were conducted by trained interviewers, but there is a chance that the interviewer influenced the interviews. Some sociodemographic characteristics were not included in this study, including BMI, marital status, employment status, smoking history, annual income and ejection fraction, because the SF-36 questionnaire had 36 items; therefore, we preferred to limit additional questions since we assumed that the majority of the participants would be elderly and thus less likely to cooperate for a long questionnaire. Additionally, the length of HF and illness were not addressed in the current study, which might have made the cohort significantly heterogeneous; thus, a further prospective study is recommended.

### Conclusion

Health-related quality of life was found to be acceptable among these HF patients. Periodic HRQoL assessment is recommended for HF patients to minimize their physical and psychological concerns, particularly for patients with low education levels and female patients.

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### Author contributions

MA and FA conceived and designed the survey. AT, AA, YA, YA and FA performed the investigation. OW and RK analyzed the data. RK and OW wrote the original paper. MA and FA revised the paper. All authors read and approved the final manuscript.

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### Availability of data and materials

The dataset in this study is available from the first author upon reasonable request.

### Declarations

#### Ethical approval and consent to participate

The study was approved by the Regional Qassim Ethics Committee (Reference No. 675170) and conformed to the ethics guidelines of the Declaration of Helsinki. Written informed consent was obtained from all participants in the study.

#### Consent for publication

Not applicable.

#### Competing interests

The authors declare that they have competing interests.

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