Survey of the Impact of Myocardial Infarction on Patients' Quality of Life: A Single-Centre Cross-Sectional Study

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A B S T R A C T

Background: A heart attack is one of the most common cardiovascular diseases, affecting different dimensions of the patients' quality of life due to the disease's disabling and limiting nature. Therefore, this study aimed to examine the impact of myocardial infarction on patients' quality of life referring to the Shahid Madani Medical & Training Hospital, in East Azerbaijan Province in 2017, in Iran.

Methods: This was a cross-sectional study. A total of 220 patients with a heart attack were selected in this study. Sampling was conducted using the systematic random method. Data were collected using the Minnesota Living with Heart Failure Questionnaire (MLHFQ). Descriptive statistics (frequency, mean) and statistical analyses (Mann-Whitney test, Spearman correlation, and Generalized Linear Models Regression) were performed at a significance level of P-value < 0.05 using SPSS$_{22}$.

Results: In this study, the mean score of the total effect of a heart attack on the patients' quality of life was 30.09 ± 17.73. The mean score of the effect of a heart attack on the patient's quality of life in the physical, emotional, and general subscales was 34.85 ± 24.24, 26.63 ± 27.73, and 27.51 ± 17.83, respectively. There was a statistically significant association between education status (P-value = 0.006), income status (P- value = 0.000), and the mean score of the effect of a heart attack on the patient's quality of life; also a positive and significant correlation was found between age (CC = 0.135, P-value = 0.046), the number of hospitalization (CC = 0.187, P-value = 0.006) and the mean score of the effect of a heart attack on the patient's quality of life.

Conclusion: A heart attack has a considerable impact on the patients' quality of life, particularly on the physical dimension. Hence, health professionals should pay more attention to these vulnerable groups and offer rehabilitation services suitable to these groups to reduce the impact of the disease.

Key words: Quality of life, Heart attack, Heart failure, Myocardial infarction, Minnesota questionnaire

Citation

Introduction

Non-communicable diseases (NCDs) are the main leading cause of death in the world in the current century (1-4). Every year these diseases kill 40 million people worldwide, representing 70 % of all deaths globally (5). NCDs include 16 million premature deaths annually (6).

Four main types of Non-communicable diseases are cardiovascular diseases, cancer, chronic respiratory diseases, and diabetics, respectively (7). The leading causes of NCDs deaths are related to cardiovascular diseases, an estimated 17.7 million death every year, representing 31 % of all death worldwide (8).On September 22, 2016, WHO adjusted a plan to prevent the global killer, with the aim to beat back the global threat of cardiovascular disease, including heart attacks (9).

More than three quarters (80 %) of the premature death arising from NCDs occur in low- and middle-income countries (8). NCDs are estimated to account for 82 % of all deaths in Iran, and \cardiovascular diseases accounted for 43 % premature mortality from NCDs in Iran (10). In addition to mortality, these diseases have led to 7 million Years Lived with Disability (YLDs) (11).

Cardiovascular diseases (CVD) are the leading cause of death, complications, disabilities, and limitation, along with high health costs in Iran. According to the World Health Organization in Iran, NCDs are estimated to account for 76 % of deaths, cardiovascular disease-account for 46 % of this figure (12).

According to the WHO, CVD will be the first cause of disability among disabling diseases by 2020. One of the most common CVD is heart attacks (13). Heart attack due to its disabling and limiting nature has negative effects on different dimensions (physical, psychological and social) of the patients' quality of life and encountering patients with many problems in the economic status and physical constraints (14). The burden of CVD is growing in high-income countries and low- and middle-income countries (LMICs) because of aging populations, but the burden is greater in LMICs owing to much larger population size and widespread exposure to increasing levels of risk factors such as unhealthy lifestyle, diabetes, raised blood pressure and hyperlipidemia (15).

17.9 million people die each year from CVD, an estimated 31 % of all deaths worldwide. More than 75 % of CVD deaths occur in LMICs. 85 % of all CVD deaths are owing to heart attacks and strokes (16).

MI is the main component of the burden of cardiovascular disease (17). There are 32.4 million MI and strokes worldwide every year (18). MI is a term used for an event of a heart attack which is due to the formation of plaques in the interior walls of the arteries resulting in reduced blood flow to a heart and injuring heart muscles because of the lack of oxygen supply. MI occurs when blood stops flowing properly to a part of a heart, and a heart muscle is injured because of the lack of oxygen supply. And one of the coronary arteries which supply blood to a heart develops a blockage due to an unstable buildup of plaques, white blood cells, cholesterol, and fat (19, 20).

Health-related quality of life (HRQoL) is a multi-dimensional concept, comprising of domains related to the physical, mental, emotional, and social functioning. It focuses on the health status impact on the quality of life, in addition to a direct measure of population health, life expectancy, and causes of death (21). HRQoL is a useful indicator of overall health because it captures information on the physical and mental health status of individuals and the impact of health status on quality of life (22, 23). HRQoL has been used to measure the effects of chronic illness, treatments, and short- and long-term disabilities by clinicians and public health officials (21). Measurement of health outcomes after MI has been focused on clinical outcomes like survival and event-free lifespan. In recent years, HRQoL is increasingly used in medical research and is considered as a complementary

measure of the medical effectiveness of intervention by physicians (24, 25). HRQoL assessment for patients undergoing cardiac treatments is recommended by key organizations, including the American Heart Association (26). So the objective of this study was to examine the impact of myocardial infarction on the patients' health-related quality of life in East Azerbaijan Province in 2017, in Iran.

Materials and Methods

Study population

This was a cross-sectional study which was conducted on patients with a heart attack in East Azerbaijan Province, in 2017. The statistical population included all patients with heart attack referring to the Shahid Madani Medical & Training Hospital in the first fourth months of 2017, in Tabriz, Iran. The number of patients with heart attack calculated 550 people according to the obtained statistics from the hospital's medical records department. 225 patients were selected based on the Morgan table, and systematic sampling method.

Inclusion criteria

Patients who have had a heart attack more than eight weeks ago and their MI disease had been diagnosed by the cardiologist, were included,

Exclusion criteria

Patients with other diseases, including mental disorders and physical disabilities in addition to a heart attack, were excluded.

Data collection tools

The Minnesota Living with Heart Failure Questionnaire (MLHFQ) was used for data collection. The MLHFQ is one of the most widely used health-related quality of life questionnaires for patients with heart failure (21), consisting of 21 items rated on six-point Likert scales, indicating various degrees of HF impact on HRQoL, from 0 (none) to 5 (very much). It provides a total score (range 0–105, from best to worst HRQoL). Besides, scores for two dimensions physical (8 items, range 0–40), emotional (5 items, range 0–25), and general

dimension with eight questions (score range from 0 to 40)(27). After obtaining the raw scores of each subscale, they were inverted into a standard score from 0 to 100.

The formula used for the calculation of the scores was as follows:

(Obtained score in subscale - the possible lowest of subscale/the difference between the possible highest and lowest of subscale) $\times$ 100

In the present study, the score of < 24, 24 < X > 45 and > 45 on the MLHFQ represented a good QoL, moderate QoL, and a poor QoL, respectively (28).

The validity of the Persian version of the questionnaire with the content validity method and also the reliability of the questionnaire with the Test-retest method and Pearson correlation coefficient r = 0.8 has already been confirmed in the study by Sadeghi et al (29).

Statistical analysis

Data were analyzed using SPSS$_{22}$. Descriptive statistics (mean and Standard Deviation (SD), frequency and percent) were used to examine the socio-demographic variables and the effect of a heart attack on the quality of life. In order to a more straightforward comparison between various dimensions of the questionnaire and comparison with other studies, the mean scores were reported from 100 for all dimensions. K-S (Kolmogorov-Smirnov) test was applied to the assessment of the normality of data. Considering the result of the K-S test and the nonnormality of data, the Kruskal-Wallis test was used to examine the association between the mean score of a heart attack's effect on the HRQoL and demographic variables (gender, marital status, education status, employment status, and smoking status).

Moreover, the Mann-Whitney U test was used for data analysis of gender, habitation status, and the use of rehabilitation services. Spearman correlation was used to examine the association between the mean score of a heart attack's effect on the HRQoL and demographic variables (age, the number of hospitalizations, and the length of

hospital stay) were used. Generalized Linear Models Regression also was used to examine the overall effect of demographic variables on the quality of life in patients with a heart attack.

Ethical approval was obtained from the Cardiovascular Research Centre, Tabriz University of Medical Sciences (REF, No; IR.TBZMED.REC.1396.530). All participants in this study participated voluntarily and completed the informed consent form.

Results

In total, 250 people were included in this study, of whom 220 (88 %) responded. The mean age of the patients was 58.06 ± 11.85. The mean of the number of hospitalization and the length of hospital stay was 1.4 ± 0.744 and 6.7 ± 1.16 days, respectively. The mean score of the total effect of a heart attack on the patient's HRQoL was 30.09 ± 17.73. The mean score of the effect of a heart attack on the patient's HRQoL in the physical, emotional, and general subscales was 34.85 ± 24.24, 26.63 ± 27.73, and 27.51 ± 17.83, respectively.

The mean ± SD of the total score of the impact of a heart attack on the patients' HRQoL by separation of demographic variables and the association between demographic variables and the mean impact of a heart attack on patients' HRQoL are shown in Tables 1 - 4, respectively.

Results in Table 2 showed that there was a significant and positive correlation between age and physical subscale, general subscale (P-value < 0.01), the total score (P-value < 0.05), between the number of hospitalization and physical subscale (P-value < 0.05), general subscale, the total score (P-value < 0.01).

The statistical analysis is represented in Table 3. It was noticeable that the association between gender and physical subscale, between income status and physical subscale, emotional subscale, general subscale, the total score was statistically significant. Moreover, there was a significant statistical association between education status and physical subscale, general subscale, total score, between employment status and physical subscale.

The result of Generalized Linear Models regression is shown in Table 4. The variables of gender, employment status, income status, education status, and hospitalization numbers accounted for 48.85 % of the variance of HRQoL, and the effect of a heart attack on men's HRQoL was higher than in women. Furthermore, the impact of a heart attack on HRQoL in patients who had an income level more than livelihood was lower than those who had an income level less than livelihood. Also, the effect of a heart attack on illiterate patients was higher compared to those with academic education.

Table 1. Frequency (percent) of socio-demographic variables and the total score of the effect of a heart attack

Variables		Frequency (percent)	Mean ± SD	P
Gender	Female	40 (18.2)	33.83 ± 19.92	
	Male	180 (81.8)	29.48 ± 17.75	0.224
Marital status	Married	217 (98.6)	30.16 ± 18.09	
	Single	3 (1.4)	38.41 ± 28.16	0.505
Employment status	Housewife	40 (18.2)	33.83 ± 19.92	
	Employed	14 (6.4)	19.86 ± 12.34	
	Self-employed	92 (41.8)	26.48 ± 15.45	0.059
	Retired	74 (33.6)	29.28 ± 16.68	
Habitation status	Native	127 (57.7)	31.32 ± 19.68	
	Nonnative	93 (42.3)	28.83 ± 15.94	0.493
Income status	More than the living cost	117(53.2)	24.94 ± 17.54	
	Equal to living cost	58 (26.4)	34.18 ± 16.73	0.000**
	Less than living cost	45 (20.5)	39.06 ± 17.31	
Use of rehabilitation services	Yes	31 (14.1)	28.11 ± 16.32	
	No	189 (85.9)	30.62 ± 18.50	0.519
Education status	Illiterate	67 (30.5)	31.84 ± 18.68	
	Under diploma	110 (50)	28.77 ± 17.80	
	Diploma	23 (10.5)	31.71 ± 21.26	0.006**
	University education	20 (9.1)	31.61 ± 15.39	
Smoking status	Yes	73 (33.2)	32.99 ± 20.05	
	No	147 (66/8)	28.92 ± 17.11	0.678

* Correlation is significant at the 0.05 level. ** Correlation is significant at the 0.01 level.

Table 2. Correlation between age, the length of hospital stay, number of hospitalization, and the effect of a heart attack

Variables	Physical subscale	Emotional subscale	General subscale	Total score	
Age	0.217**	- 0.114	0.188**	0.135*	Correlation Coefficient
	0.001	0.092	0.005	0.046	P
The length of hospital stay	- 0.013	- 0.035	- 0.021	- 0.028	Correlation Coefficient
	0.843	0.605	0.760	0.679	P
Number of hospitalization	0.156*	0.079	0.228**	0.187**	Correlation Coefficient
	0.021	0.245	0.001	0.006	P

* Correlation is significant at the 0.05 level. ** Correlation is significant at the 0.01 level.

Table 3. Association between socioeconomic variables and the effect of a heart attack

Variables	Physical subscale	Emotional subscale	General subscale
Gender	0.017*	0.751	0.893
Marital status	0.568	0.095	0.869
Income status	0.024*	0.037*	0.000**
Education status	0.002**	0.810	0.000**
Employment status	0.006**	0.991	0.100
Smoking status	0.224	0.660	0.442
Use of rehabilitation services	0.334	0.054	0.063
Habitation status	0.370	0.685	0.529

* Correlation is significant at the 0.05 level. ** Correlation is significant at the 0.01 level.

Table 4. Generalized Linear Models regression

Variables		B	Std. Error	95 % Wald Confidence Interval Lower	Upper	P
	(Intercept)	48.856	14.9467	19.561	78.151	0.001**
Gender	Female	- 11.926	4.3235	- 20.400	- 3.453	0.006**
	Male	0ᵃ	.	.	.	.
Marital status	Married	- 6.904	9.8405	- 26.191	12.383	0.483
	Single	0ᵃ	.	.	.	.
Employment status	Employed	- 17.312	6.4080	- 29.871	- 4.752	0.007**
	Self-employed	- 16.238	3.7150	- 23.519	- 8.956	0.000**
	Retired	- 13.369	4.1396	- 21.483	- 5.256	0.001**
	Housewife	0ᵃ	.	.	.	.
Habitation status	Native	1.679	2.3767	- 2.979	6.338	0.480
	Nonnative	0ᵃ	.	.	.	.
Income status	More than the living cost	- 12.503	2.9359	- 18.257	- 6.749	0.000**
	Equal to living cost	- 2.410	3.3198	- 8.917	4.096	0.468
	Less than living cost	0ᵃ	.	.	.	.
Use of rehabilitation services	Yes	- 3.831	3.3218	- 10.342	2.679	0.249
	No	0ᵃ	.	.	.	.
Education status	Illiterate	11.834	5.4405	1.170	22.497	0.030*
	Under diploma	8.151	4.9061	- 1.465	17.767	0.097
	Diploma	6.526	5.5224	- 4.298	17.350	0.237
	University education	0ᵃ	.	.	.	.
Smoking status	Yes	- 1.902	2.6532	- 7.102	3.298	0.473
	No	0ᵃ	.	.	.	.
Age		- .130	.1263	- .377	.118	0.304
The length of hospital stay		.217	1.0845	- 1.908	2.343	0.841
Number of hospitalization		5.579	1.6308	2.382	8.775	0.001**
(Scale)		263.280ᵇ	25.1600	218.310	317.513	

** Correlation is significant at the 0.01 level. * Correlation is significant at the 0.05 level. 0ᵃ→ reference group

Discussion

In the present study, the estimated mean age of patients was 58.06 ± 11.85. The majority of patients were men (81.8 %). The total mean of the effect of a heart attack on the HRQoL was 30.09 ± 17.73, and the mean dimensions of physical (34.85 ± 24.24), emotional 26.63 ± 27.73 and general 27.51 ± 17.83. According to the results, heart attack had a moderate effect on the HRQoL in all three dimensions of physical, emotional, and general. In addition to the disabling nature of a heart attack, factors such as costs of the disease treatment, dependence on others in daily activities, as well as disruption in the occupational and social tasks have had a negative impact on patients' HRQoL.

In the study by Abdollahi et al. (30) sixty patients with heart attack were analyzed. The HRQoL in patients after a heart attack was lower compared with healthy individuals. Lea Mollon et al. (31) conducted a cross-sectional matched case-control study to compare HRQoL among survivors of myocardial infarction compared to propensity score-matched controls. MI Survivors were approximately 2.7 times more likely to report fair/poor general health compared to the control and 1.5 times more likely to report limitations to daily activities. MI Survivors were more likely to report poor physical health > 15 days in the month and poor mental health > 15 days in the month in comparison to matched controls. No difference was found in MI survivors compared to

controls in the level of emotional support, hours of recommended sleep, or life satisfaction.

The highest mean score and the most problem in patients with a heart attack were related to the physical dimension. This indicates the considerable impact of a heart attack on pain and limiting the movement and physical activity of patients. Moreover, since the mean age of patients was high (58.06 ± 11.85), it can be concluded that high age can have a negative effect on patients' function in the physical dimension and can exacerbate the impact of a heart attack on the physical dimension of patients' HRQoL. A significant association was observed between age and the mean score of the effect of a heart attack on the HRQoL in all dimensions except for the emotional dimension, which indicates the increased age is likely to decrease patients' HRQoL. A heart attack seems to have more effect on older patients' HRQoL, which is justifiable with regards to the physical and functional difficulties and limitations of the elderly. The result is in accordance with some other studies (32-35). However, the results of other studies indicated younger individuals have a lower QoL, which was not in agreement with this study (36-38). Heart attack at an early age has a negative effect on the patient's psychological and social status, including employment and social status and life expectancy. So, a heart attack affects more the physical dimension of the elderly and the emotional and functional dimension of younger individuals. In a study in Iran, patients with a heart attack had a disruption in all dimensions of the HRQoL, but the functional dimension was more disrupted in heart attack patients than other chronic diseases (39). Another study reported the highest and lowest mean of QoL was related to the social function dimension (86.1 ± 26.3) and physical dimension (57.7 ± 476) (40).

The better HRQoL of patients in the emotional dimension can be attributed to the being married of most patients in this study (98.6 %). The emotional support of a spouse can have a positive effect on the emotional health of the patients, but this difference was not statistically significant (P-value = 0.505). Buchloze et al. (41) showed that HRQoL in physical and emotional dimension is higher among married patients.

Moreover, in this study, there was a significant difference between the mean score of the effect of a heart attack on patients' HRQoL and gender, so that heart attack had more impact on the men' HRQoL in comparison to the women that was not consistent with the results of some studies (37, 42, 43), but was compatible with other studies (36, 44). Riedinger et al. (45) reported, considering the fewer exercise among women compared with men, this factor led to a reduction in functional capacity and deterioration of the physical condition.

The results showed that individuals with higher education had a better HRQoL, which was in accordance with the study by Mohammadi et al. (46) In this study, no significant association was found between smoking status and the mean score of HRQoL, which is in accordance with the study of Howkes et al. (36) but was not consistent with some other studies (47-49). The reason for these inconsistent results can be attributed to differences in study design and methodology. The study design of this study and the study by Howkes et al. (50) was cross-sectional, the effect of confounding or intervening variables were not controlled. But, the study by Buchanan DM et al. and Conard MW et al. was a cohort study, and they examined only specifically the impacts of smoking status on the health status of heart failure; hence, the results of their study were significant. The association between the length of hospital stay and the score of the effect of a heart attack on the patients' HRQoL was not significant, which was consistent with the study by Simpson et al. By contrast, another study in Iran reported that high length of hospital stay had a negative effect on patients' HRQoL (51). One of the reasons for the disparity in results of studies can be attributed to the length of hospital stay.

The results showed that the effect of a heart attack on the HRQoL was lower among those who had used the rehabilitation services compared with those who were not benefited from the rehabilitation services, but this difference was not statistically significant. The reason may be

attributed to a low percentage of rehabilitation service use among patients (14.1 %), which was compatible with the study by Shabani et al. and Siavoshi et al. (52, 53).

The effect of a heart attack on the HRQoL was higher among patients with a lower economic status. That means the lower-income status would be associated with lower HRQoL. This result was in accordance with the study by Arnold et al. and Kim et al. (47, 54).

Besides, it appears that by increasing the number of hospitalization, the effect of a heart attack on the HRQoL would be higher. Abbassi et al. (55) in 2016 showed an inverse association between the number of hospitalization and the mean score of HRQoL, which was in accordance with the present study result.

The results of Generalized Linear Models regression showed that the variables of gender, employment status, income status, education status, and hospitalization numbers accounted for 48.856 % of the variance of HRQoL and the effect of a heart attack on women's HRQoL was 11,926 lower than that of men. The impact of a heart attack on HRQoL in patients who had an income level more than livelihood was 12.503 lower than those who had an income level less than livelihood. Also, the effect of a heart attack on illiterate patients was 11,834 higher than those with academic education. A heart attack had a lower impact on the HRQoL of employees, self-employed and retired patients than that of housewife patients. As the number of hospitalizations increases, the impact of a heart attack on HRQoL in patients increases by a rate of 5.579, which may be due to the severity of the illness and, consequently, the need for more hospitalization. In the study by Ha Mi Kim et al. (54) HRQoL among women with lower monthly income, lower functional capacity, and more symptoms were worse. Shiow-Li HWANG et al. (56) studied 133 patients with heart failure. They showed that the variables of age, duration of heart failure, physical symptoms, and depression had a significant impact on the quality of life,

accounting for 37.6 % of the variance of quality of life.

Conclusion

The results of this study showed that a heart attack had a negative effect on all dimensions of patients' HRQoL, and the greatest impact was related to the physical dimension of HRQoL. Moreover, the impact of heart attacks on men's HRQoL, people with lower education, and lower-income was more than others. Therefore, paying particular attention to these vulnerable groups and adopting supportive policies to reduce the impact of heart attacks on these groups is necessary. Also, planning to train the patient's family for more emotional and physical support of the patient and reducing the number and length of hospitalization is recommended. This cross-sectional study was conducted on patients who have had a cardiac attack at least eight weeks. So, to achieve better results, it is suggested that future studies be carried out using a case-control or cohort study with a control group, and also longer period, which provides the possibility of examining heart attack effect at different times after heart attack and the effects of measures rehabilitation on patients' HRQoL.

Conflict of interests

The authors declared that they have no conflict of interests.

Authors' contributions

Jalilian H and Imani A designed research; Jalilan H and Heydari S conducted research; Jalilian H analyzed data; Mir H, Javanshir E, and Mamene M collected data; and Heydari S wrote manuscript. Heydari S had primary responsibility for final content. All authors read and approved the final manuscript.

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