Research Paper
Health-related Quality of Life of Elderly Men and Women After a Heart Attack

Farideh Bastani[1] , Ghasem Ehsani[1], Parvaneh Samady Kia[1*] , Hamid Haghani[2]

1. Department of Community Health and Geriatric Nursing, School of Nursing and Midwifery, Iran University of Medical Sciences, Tehran, Iran.
2. Department of Biostatistics, School of Public Health, Iran University of Medical Sciences, Tehran, Iran.

ABSTRACT

Background: The most common aging change is increased arteriosclerosis, which can prone the elderly to heart attacks. Physiological and psychological changes deteriorate the health-related quality of life (QoL) of the survivors of heart attacks. However, gender differences may affect the health-related QoL of the survivors. The present study aimed to compare the health-related QoL of elderly men and women after a heart attack in selected educational-therapeutic centers of Iran University of Medical Sciences in 2020.

Methods: This was a cross-sectional study with descriptive comparative design conducted on 196 elderly patients (98 men and 98 women in each group) who were referred to the heart clinics of selected educational-therapeutic centers of Iran University of Medical Sciences in Tehran, Iran in 2020. The subjects were selected through continuous sampling. Data were collected by abbreviated mental test (AMT) and MacNew Heart Disease health-related QoL (HRQoL) questionnaire and analyzed by Chi-square test, independent t-test, analysis of variance, Pearson correlation coefficient, and multiple linear regression using SPSS software, version 26. The significance level was set at P≤0.05.

Results: The Mean±SD age of elderly women and men was 72.59±7.87 and 69.6±8.24 years, respectively. The Mean±SD health-related QoL of the elderly women was 3.89±0.58 and that of elderly men was 4.16±0.82. The results of the independent t-test showed that the scores of health-related QoL and its dimensions were significantly higher in men than in women (P<0.001). The results of the Pearson correlation coefficient revealed a negative and significant correlation between age and health-related QoL in elderly men (r=-0.253, P=0.012). The results of simultaneous multiple linear regression revealed that 26.8% of the changes in men's health-related QoL were explained by their individual characteristics.

Conclusion: Considering the lower health-related QoL of women compared to men after a heart attack, more support for women after a heart attack seems necessary. Further research is also recommended to find out the causes of this difference.

* Corresponding Author:
Parvaneh Samady Kia
Address: *Department of Community Health and Geriatric Nursing, School of Nursing and Midwifery, Iran University of Medical Sciences, Tehran, Iran.*
Tel: *+98 021-43651206*
E-mail: *parvanekia@yahoo.com*

Highlights

• Physiological and psychological changes, reduce the health-related quality of life (QoL) of the elderly after a heart attack.

• The health-related QoL of elderly women was significantly lower than that of elderly men in all dimensions.

• The lowest average health-related QoL in both groups was related to the emotional functioning dimension and the highest average was related to the dimension of physical functioning.

• As the age of elderly men increased, their health-related QoL decreased significantly after a heart attack.

Plain Language Summary

The world's elderly population is increasing. Cardiovascular conditions are more prevalent in older adults and could lead to a heart attack. Physiological and psychological changes, reduce the health-related quality of life (QoL) of the elderly after a heart attack. The aim of this study was the comparison of health-related quality of life among elderly men and women after a heart attack. The results showed that elderly men have a better QoL than elderly women after a heart attack. In addition, with increasing age, the men's health-related quality of life decreased.

1. Introduction

The world's population is rapidly aging so that the elderly currently make up a large percentage of the world's population. Based on the latest report of the World Health Organization (WHO), the world's population over 60 will increase from approximately 12% to 22% between 2015 and 2050 (WHO, 2018). According to the general population and housing census in Iran, the elderly population is increasing so that the elderly over 60 years of age constituted about 6.6% of the country's population in 1996, but this figure increased to 9.3% in 2016 (Statistical Center of Iran, 2016). Due to the improvement in health and life expectancy in recent years, the number of people reaching old age is increasing, which leads to an increase in diseases, such as cardiovascular disorders (CVD) in this period of life (Gilasi et al., 2015).

CVDs are the main cause of death in the world (Mohan et al., 2017) and the second cause of death in Iran (Rafiee Alhossaini et al., 2016). CVDs cause 17.9 million deaths each year in the world (an estimated 32% of all deaths worldwide) so that 85% of all these deaths are due to heart attack and stroke (WHO, 2023).

The incidence of CVD in women is typically lower than in men, but women have higher mortality and poorer prognosis after acute CVD (Gao et al., 2019). Coronary artery disease (CAD) is more common in women between the ages of 60 and 80 and the first manifestation of CVD in women occurs ten years later than in men and mainly after menopause; therefore, the mortality rate is higher in women than in men (Lekha Adik Pathak, 2017).

Gender differences, including physical, physiological, and psychological dissimilarities may affect the dimensions of general health and quality of life (QoL) in men and women. In this regard, a limited number of studies have been conducted on the elderly population. In a study conducted by Fink et al., the prevalence of hypochondriasis and health anxiety was reported to be higher in women than in men (Fink, et al., 2005), but in another study, no significant difference was observed between women and men in this regard (Looper, & Kirmayer, 2001). The incidence, prevalence, and type of response to disease, especially CVDs, are highly gender-dependent. In other words, the gender differences that are manifested in sex hormones can play a fundamental role in the occurrence of CVDs and be a determining factor in the pathophysiology and exacerbation of the disease, as well as the type of response of men and women to the stress caused by this disease and ways to deal with it (Armeni & Lambrinoudaki, 2017).

The results of a study with the aim of evaluating the QoL of patients aged 32-79 after their first acute heart attack showed that the patients' QoL decreased in all dimensions, but this decrease was more prominent in women (Beyranvand et al., 2011).

In another study aimed at evaluating gender differences in the perception of QoL and cardiovascular risks in a community sample in the northern region of Portugal, the results showed that women consumed less alcohol and exercised less; however, they had more history of psychiatric diseases, anxiety, and depression and had a higher body mass index than men (Prata et al., 2016). The mortality rate caused by heart disease in elderly women in the US is surprisingly higher than in men, but in middle age and before menopause, the mortality rate of women is less than that of men (Kittnar, 2020). In general, compared to men, women usually show lower sympathetic activity and pulmonary artery pressure and more parasympathetic activity. In contrast, men have higher plasma norepinephrine and these electrophysiological differences in the heart partially explain the mechanism of occurrence and reaction to heart diseases to some extent. Also, cardiomyocytes or heart cells in women have more potential for oxidative stress, which the origin of the sex hormones is involved in it. All these cases reflect the importance of studies on gender differences in this area, which can directly or indirectly affect the Health-related Quality of Life (HRQoL) of both men and women (Armeni and Lambrinoudaki, 2017).

Women report significantly lower QoL and they are at higher risk for mortality from CVDs. Therefore, among the cardiovascular risk factors, gender should be more considered in prevention strategies and gender differences in QoL predictors require further investigations (Prata et al., 2016). Thus, considering the studies related to gender differences in the area of health and disease, there is no doubt that the reaction of elderly women and men to CVD is different and it may affect their HRQoL in different ways. Therefore, healthcare providers, including nurses, need accurate knowledge and information about HRQoL and its related components to provide high-quality care to older residents with CVD. Accordingly, this study was conducted with the aim of comparing the HRQoL of elderly men and women after a heart attack in selected educational-therapeutic centers affiliated with the Iran University of Medical Sciences (IUMS) in 2020.

2. Materials and Methods

It was a cross-sectional study with a descriptive comparative design. The research setting was the Cardiovascular Outpatient Clinics of the selected educational-therapeutic centers in Tehran, Iran (hospitals with high referrals, including Hazrat Rasool, Firouzgar, Firouzabadi, and Haft-e Tir). The statistical population consisted of all elderly men and women who survived a heart attack and were referred to the cardiovascular

outpatient clinics of the mentioned hospitals. Considering the confidence level of 95% and the test power of 80% and with the assumption that the difference in the HRQoL in elderly men and women who survived a heart attack referring to these centers in 2020 is at least 1.5 points, the required sample size was determined to be 98 people in each of the male and female groups. The inclusion criteria were having a medical record in the center, confirmation of heart attack by a physician and available in the summary of the medical record, at least two weeks passed from discharge (after hospitalization of the elderly due to heart attack), having a stable physical condition to complete the questionnaires, ability to establish communication, no specific mental illness according to the medical record, and scoring at least seven out of ten based on the abbreviated mental test (AMT). The subjects were excluded from the study if they scored less than seven in AMT. Eligible subjects were selected through continuous sampling so that every day the researcher personally went to one of the four cardiovascular clinics of the aforementioned centers and selected elderly men and women who met the inclusion criteria and were willing to participate in the research. Data was collected over a 3-month period in 2020 during the coronavirus pandemic. Three questionnaires were used to collect data in this study:

Demographic information form: Including age, gender, marital status, education level, employment status, smoking, time after a heart attack, use of assistive devices, such as (hearing aids, crutches/cane, glasses, dentures, and walkers), mobility and social activities (such as going to the mosque, going to cultural centers, family relations, etc.), satisfaction with life, having family or social support, and feeling healthy (what number do you give yourself from zero to ten).

Abbreviated mental test or AMTS: The AMTS was developed and validated by Hodgkinson in 1972 to rapidly assess elderly patients for possible dementia (Hodkinson, 1972). It consists of ten items and point one is given for each correct answer. In this test, a score of 0-3 indicates severe disorder, 4-7 moderate disorder, and 8 and above indicates normal cognitive function. The reliability of the Persian version of this test has been confirmed with a Cronbach's alpha of 0.99 (Bakhtiyari et al., 2014).

MacNew Heart Disease health-related quality of life (HRQoL) questionnaire: This questionnaire was specifically designed to assess the HRQoL of patients with CVD by Höfer et al. This tool assesses how coronary heart disease and its treatment affect daily activities and

physical, emotional, and social functioning and is sensitive to changes in the HRQoL following various medical interventions for the survivors of heart attack (Höfer et al., 2004). This questionnaire has 27 questions and three subscales, including emotional function, physical function, and social function. Five questions from the domain of physical function evaluate the symptoms of the disease, including chest pain, shortness of breath, fatigue, dizziness, and leg pain. The questions can be placed in one, two, or all three domains. Accordingly, the score of each person in the emotional function is obtained from 14 questions, including questions 1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 13, 15, 18, and 23; the score in the physical function is obtained from 14 questions, including the questions 1, 6, 9, 12, 14, 16, 17, 19, 20, 21, 24, 25, 26, and 27; and the score in social function is obtained from 13 questions, including the questions 2, 11, 12, 13, 15, 17, 20, 21, 22, 23, 24, 25, and 26. Questions 1 and 6 could be calculated in both physical and emotional domains and, questions 2, 13, and 23 in both emotional and social domains and, questions 17, 20, 21, 24, 25, and 26 could be calculated in both physical and social domains and, question 12 can be calculated in all three physical, emotional, and social domains. One question is also related to the sexual function area of the QoL . Accordingly, the score of each person in each dimension is obtained by calculating the mean scores obtained from the questions of the same dimension, and the final score of the HRQoL is calculated by obtaining the mean score of all the questions. Each question is scored on a 7-point Likert scale ranging from "always" to "not at all". The highest possible score in each domain is seven and the lowest score is one, indicating high HRQoL and low HRQoL , respectively. This questionnaire has an appropriate level of content validity and constructs validity. The Cronbach coefficient of this questionnaire has been reported as 0.94 (Höfer et al., 2012) The reliability of the questionnaire has been demonstrated using internal consistency and the intraclass correlation coefficients for the three domains in the Dutch, English, Farsi, German, and Spanish versions of the questionnaire (Höfer et al., 2004). Cronbach's alpha of the questionnaire in the present study was obtained as 0.89. The questionnaires were completed in person by literate seniors. If the elderly were illiterate, the questionnaires were completed by the researcher through interviews. Each interview lasted about 20 minutes (in hearing-impaired subjects and due to the COVID-19 pandemic, questions were asked loudly at a distance of 1.5 meters from the subjects with the full implementation of health protocols).

To describe the data, frequency distribution, minimum and maximum, and the Mean±SD were calculated for demographic questions and different dimensions of HRQoL . The Chi-square test, Bonferroni test, independent t-test, analysis of variance (ANOVA), Pearson's correlation coefficient, and finally, multiple linear regression analysis were used to assess the relationship between demographic data and HRQoL . All analyses were performed by SPSS software, version 26. The significance level was set at $P < 0.05$.

3. Results

The Mean±SD age of the woman was 72.59±7.87 years. According to Table 1, the results of the independent t-test showed that the HRQoL of elderly women with a family or social support was significantly higher than other elderly women (P=0.025). The Mean±SD age of the men was 69.61±8.24 years and 60% of the men were in the "young elderly" age group.

According to Table 2, the results of ANOVA showed that men's HRQoL was different in at least one of the education levels (P=0.008). The results of the Bonferroni test showed that the HRQoL of elderly men with a diploma and university level of education was significantly higher than that of illiterate men (P=0.017). The results of the independent t-test showed that the HRQoL of elderly men with hearing aids (P=0.035) and canes (P=0.025) was significantly lower than others. The results of ANOVA illustrated that the HRQoL was different in at least one level of life satisfaction (P<0.001). There was no significant difference between the HRQoL of elderly men with low and moderate life satisfaction (P=0.065). The results of ANOVA showed that there was a significant relationship between the HRQoL and the ability to move and carry out daily life activities (P=0.017). The results of Pearson's correlation coefficient demonstrated that there was a negative and significant association between age and HRQoL (P=0.012). This means that with increasing age, the HRQoL of men decreases significantly (r=0.253).

According to Table 3, the results of the independent t-test showed a significant difference between the total average HRQoL of the men and women (P=0.008) and its different dimensions, including the emotional function (P=0.003), physical function (P=0.015), and social function (P=0.045). This means that the overall HRQoL and its dimensions are significantly better in men than in women. In addition, the dimension of psychological function received the lowest score in both groups.

Table 1. Numerical indices of the health-related quality of life of elderly women after a heart attack according to demographic characteristics

Variables			No.	Mean±SD	Test Results
Marital status*	Single (divorced and widowed)		20	3.86±0.85	df=22.45 t=-0.156 P=0.877
	Married		78	3.90±0.50	
Level of education**	Illiterate		19	4.01±0.56	F=0.535 P=0.587
	Under diploma		68	3.85±0.95	
	Diploma and university		11	3.92±0.59	
Employment status*	Unemployed and a housewife		88	3.86±0.55	t=-0.078 df=96 P=0.938
	Retired		10	3.88±0.85	
	Employed (employed in government organizations and self-employed)		0	-	
Use of assistive devices*	Hearing aids	Yes	5	3.94±0.02	t=-0.124 df=85 P=0.902
		No	93	3.86±0.56	
	Walking stick	Yes	15	3.84±0.58	t=-0.155 df=85 P=0.466
		No	83	3.93±0.53	
	Dentures	Yes	53	3.93±0.57	t=-0.732 df=85 P=0.877
		No	45	3.85±0.52	
	Glasses	Yes	64	3.80±0.62	t=1.325 df=85 P=0.189
		No	34	3.96±0.48	
	Walker	Yes	5	3.17±0.50	t=2.749 df=3.06, P=0.267
		No	93	3.92±1.10	
Smoking*	Yes		5	3.49±0.63	t=1.564 df=96 P=0.12
	No		93	3.91±0.57	
Time after the heart attack (months)**	1-6		65	3.92±0.53	F=0.374 P=0.772
	6-12		21	3.83±0.68	
	12-18		7	3.97±0.89	
	18-24		5	3.68±0.58	
Having family or social support*	Yes		89	3.92±0.55	t=-2.275 df=95 P=0.025
	No		9	3.47±0.71	
Feeling healthy*	Favorable(0-5)		82	3.63±0.72	t=-1.950 df=96 P=0.054
	Unfavorable(6-10)		16	3.94±0.54	
Life satisfaction**	Much		13	4.11±0.75	F=3.152 P=0.057
	Moderate		71	3.91±0.51	
	Low		14	3.57±0.64	

Variables		No.	Mean±SD	Test Results
Able to move and carry out daily life activities**	Much	19	4.02±0.75	F=2.498 P=0.088
	Moderate	64	3.92±0.42	
	Low	15	3.60±0.83	
Age η	Min age 60	98	72.59±7.87	r=0.173 P=0.089
	Max age 88			

* T-test; ** Analysis of variance; η Pearson's correlation coefficient.

Based on the results of the simultaneous multiple linear regression in Table 4, only life satisfaction had a significant effect on the HRQoL of elderly men (P=0.017). The HRQoL of the men with high life satisfaction was 0.706 units higher than those with low life satisfaction. The adjustment coefficient of the model was equal to 0.268, which means that 26.8% of the changes in HRQoL were explained by individual characteristics.

4. Discussion

The present study aimed to compare the HRQoL of elderly men and women after a heart attack in selected educational-therapeutic centers affiliated with IUMS. The results showed that after a heart attack, there was a significant difference between elderly men and women in terms of the overall HRQoL and dimensions of emotional, physical, and social function so that the HRQoL score and its dimensions were significantly higher in men than in women. This difference might be attributed to the fact that 60% of the men were in the "young elderly" age group and there was a significant relationship between the men's HRQoL and their age.

In addition, although the men had better HRQoL scores, the psychological functioning dimension received the lowest score in both groups. However, the results of a meta-analysis of 116 cohort studies in Australia showed that the difference between elderly women and men in the psychological domain disappeared when the analysis was adjusted for confounding factors, such as age, the presence of chronic diseases, socioeconomic status, and depression symptoms (da Rocha et al., 2014).

The results of a similar study in Tehran showed that the QoL of patients decreased in all dimensions after a heart attack, but the women's QoL showed a greater decrease (between 9 and 23%) in different subscales of the tool. Congruent with our study, the results of this study showed a decrease in the QoL with increasing age, but in both sexes. However, unlike our findings, the decrease in

physical subscales in this study was more than in mental-psychological subscales (Beyranvand et al., 2011). These differences may be related to the type of tools used in the research and the age range of the samples, because in the study by Beyranvand et al., SF- 36 was used to measure the QoL , and the age of the samples was between 32 and 79 years; while the samples of our research were all elderly. Consistent with the result of the present study, in another study conducted to assess the QoL of adult patients after a heart attack in Tehran, the QoL had a significant relationship with gender so that the QoL in most subscales was significantly lower in women than in men (Rejeh et al., 2015). Also, based on the results of a study in Luxembourg, five years after coronary angiography, women were at a lower level in terms of health, total QoL , and its physical and mental domains compared to men (Tchicaya & Lorentz, 2016). Some studies have shown that men cope with life's affairs more easily and accept life events, including heart diseases.

The present study also showed that social support in women has an inverse relationship with their HRQoL . The decrease in QoL can be related to various factors, such as unfavorable economic and social situations, the lack of benefit from social and family support, and the degree of adaptation to the disease (Tajvar et al.). Men cope with life's affairs more easily and accept life events, including heart diseases (Reiner et al., 2019, Costa et al., 2019). Our findings indicated that satisfaction with life and using hearing aids and assistive tools are associated with high and low HRQoL , respectively. Some studies have also indicated that the use of assistive devices and low satisfaction with life in the majority of patients can have a negative role in the QoL of patients with heart diseases (Reiner et al., 2019, Costa et al., 2019).

Table 2. Numerical indices of the health-related quality of life of elderly men after a heart attack according to demographic characteristics

Variables		No.	Mean±SD	Test results
Marital status*	Single (divorced and widowed)	15	4.13±0.75	t=-0.155 df=96 P=0.877
	Married	83	4.17±0.83	
Level of education**	Illiterate	15	3.77±0.71	F=5.031 P=0.008
	Under diploma	55	4.08±0.73	
	Diploma and university	28	4.53±0.93	
Employment status*	Unemployed and a housewife	18	3.86±0.92	F=2.433 P=0.093
	Retired	43	4.12±0.77	
	Employed (employed in government organizations and self-employed)	37	4.36±0.79	
Use of assistive devices*	Hearing aids — Yes	5	3.18±1.09	t=-2.148 df=76 P=0.035
	Hearing aids — No	93	4.13±0.74	
	Walking stick — Yes	15	3.66±0.66	t=-2.280 df=76 P=0.025
	Walking stick — No	83	4.18±0.76	
	Dentures — Yes	53	4.04±0.69	t=-0.639 df=76 P=0.525
	Dentures — No	45	4.16±0.85	
	Glasses — Yes	64	4.05±0.88	t=-0.738 df=76 P=0.463
	Glasses — No	34	4.18±0.5	
	Walker — Yes	5	3.97±0.4	t=-0.239 df=76 P=0.812
	Walker — No	93	4.10±0.78	
Smoking*	Yes	36	4.02±0.79	t=-1.317 df=95 P=0.191
	No	62	4.25±0.83	
Time after the heart attack (months)**	1-6	53	4.22±0.74	F=0.548 P=0.651
	6-12	25	4.18±0.95	
	12-18	8	4.09±0.26	
	18-24	12	2.89±1.1	
Having family or social support*	Yes	84	4.17±0.78	t=0.321 df=96 P=0.749
	No	14	4.10±1.03	
Feeling healthy*	Favorable(0-5)	81	4.23±0.82	t=1.658 df=96 P=0.1
	Unfavorable(6-10)	17	3.87±0.77	
Life satisfaction**	Much	23	4.69±0.91	F=10.175 P<0.001
	Moderate	59	4.11±0.7	
	Low	16	3.61±0.66	

Variables		No.	Mean±SD	Test results
Able to move and carry out daily life activities**	Much	46	4.40±0.92	F=4.276 P=0.017
	Moderate	42	4.00±0.57	
	Low	10	3.77±0.97	
Age η	Min	60		r=0.253 P=0.012
	Max	91	98 69.61±8.24	

* T-test; ** Analysis of variance; η Pearson's correlation coefficient.

Table 3. Comparison of the health-related quality of life in elderly men and women after a heart attack

Gender HRQoL and Dimensions	Mean±SD		Independent t-test Results
	Women	Men	
Emotional function	3.68±0.61	3.99±0.81	t=3.025 , df=194, P=0.003
Physical function	4.05±0.65	4.32±0.88	t=2.450 , df=194, P=0.015
Social function	3.94±0.69	4.18±0.94	t=2.019 , df=194, P=0.045
Overall HRQoL	3.89±0.58	4.16±0.82	t=2.698 , df=194, P=0.008

Table 4. Regression coefficients in the multiple linear regression model to predict factors affecting the health-related quality of life of elderly men after a heart attack

Models		Coefficient B	Standard Coefficient	Statistics T	P	Confidence Interval	
						Lower limit	Upper limit
Constant		4.75	0.997	0.77	<0.001	2.769	6.747
Age		-0.013	0.014	-0.913	0.364	-0.04	0.015
Education	Illiterate	-0.490	0.323	-1.517	0.134	-1.134	0.115
	Under diploma	-0.279	0.202	-1.383	0.171	-0.682	0.124
	Diploma and university			Reference category			
Hearing aids	Yes	-0.533	0.461	-1.157	0.251	-1.453	0.387
	No			Reference category			
Assistive tool cane	Yes	-0.233	0.240	-0.927	0.335	-0.711	0.245
	No		Reference category			-	-
Life satisfaction	Much	0.706	0.278	2.458	0.017	0.113	1.280
	Moderate	0.331	0.226	1.467	0.147	-0.120	0.782
	Low			Reference category			
Able to move and perform daily life activities	Much	0.254	0.392	0.864	0.391	-0.332	0.839
	Moderate	0.165	0.281	0.558	0.558	-0.395	0.725
	Low			Reference category			

Considering the low HRQoL of women and men in the emotional dimension compared to other dimensions, it is suggested to increase social and family support for all patients after a heart attack. Also, because the women's HRQoL was lower in all dimensions compared to men, and considering the relationship between HRQoL and social support in women, family support and social support at macro levels can be effective in increasing the HRQoL of this group of patients. There was a significant relationship between the level of education and the HRQoL in elderly men. Therefore, increasing men's health awareness and literacy in the field of nutrition, physical activity, and self-care could be helpful.

Knowing the HRQoL of patients after a heart attack and the factors involved in it can be a guide for improving nursing measures and interventions. According to the results of this study, it is suggested that managers and healthcare workers take the necessary measures to increase the HRQoL of the elderly after a heart attack, especially in women.

5. Conclusion

Based on the results, the overall HRQoL and its emotional, physical, and social function dimensions were significantly higher in men than in women. It is necessary to make appropriate decisions and conduct educational-counseling interventions to improve the HRQoL of the elderly after a heart attack, especially in women, and to pay attention to the gender aspects of the elderly in QoL studies and to make appropriate policies in this field. It is also suggested to conduct qualitative studies on the population of elderly women after a heart attack and explore various political, social, physical-psychological, and family factors in this group.

Limitations

The physical and mental condition of the elderly while answering the questions of the questionnaire and the possibility of fatigue of the subjects could have affected the way they answer. Many variables may affect the HRQoL ; however, due to the descriptive and comparative research design, these variables were not homogenous in the two groups, which is one of the limitations of this research.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of IUMS (Code: IR.IUMS.REC.1399.240). The required permissions were obtained from the Faculty of Nursing and Midwifery of Iran University of Medical Sciences (IUMS), and the educational-therapeutic centers. The research objectives were explained to the subjects and they were assured of the confidentiality of their information. Informed consent was obtained from all the subjects.

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