Article

# The effect of a web-based self-management training program on the quality of life of patients undergoing heart valve replacement: An experimental study

Zahra Hasani[1], Saeideh Mazloomzadeh[2*], Shiva Khaleghparast[3], Saeid Hoseini[4], Hamed Taghiloo[1]

[1]Department of Operating Room and Anesthesiolog, School of Nursing and Midwifery, Zanjan University of Medical Sciences, Zanjan, Iran
[2]Professor of Epidemiology. Rajaie Cardiovascular Medical and Research Center, Iran University of Medical Sciences, Tehran, Iran
[3]PhD in Nursing, Associate Professor, Cardiovascular Nursing Research Center. Rajaie Cardiovascular Medical and Research Center,Iran University of Medical Sciences, Tehran, Iran
[4]Professor of Cardiovascular Surgery,Heart Valve Disease Research Center, Rajaie Cardiovascular Medical and Research Center, Iran University of Medical Sciences, Tehran, Iran

## Article Info

**Article history:**
**Received**: 12 Sep 2023
**Accepted**: 6 Feb 2024

**Keywords:**
Self-management, Quality of life, Heart valve replacement, Virtual training

***Corresponding author:**
MD,PhD. Professor of Epidemiology. Rajaie Cardiovascular Medical and Research Center, Iran University of Medical Sciences, Tehran, Iran.

***Email***: smazloomzadeh@rhc.ac.ir

## Abstract

***Background:*** The available literature shows the positive effect of self-management programs on the quality of life of patients with chronic diseases; however, this effect has not been investigated in patients undergoing heart valve replacement surgery.
***Objectives:*** The present study aimed to determine the effect of a web-based self-management training program on the quality of life of patients undergoing heart valve replacement.
***Methods:*** This research was an experimental study with a control group, which was conducted on 80 patients undergoing heart valve replacement surgery at Shahid Rajaei Cardiovascular Educational, Research and Therapeutic Institute in Tehran, Iran. Participants were divided into experimental and control groups by the block randomization method. The control group received the routine care. The experimental group received the web-based self-management training program in 5-7 people groups. The educational content of the sessions included medication management, emotional management, role management, decision-making and problem-solving skills, use of resources, communication with caregivers, and an activity program. The questionnaires included the demographic information form and the 12-Item Short Form Quality of Life Questionnaire (SF-12). Data were analyzed using the independent sample t-test, paired t-test, and analysis of covariance (ANCOVA) in SPSS 18 software.
***Results:*** The mean score of quality of life after the intervention showed a significant difference between the control and experimental groups (P=0.014). Comparison of the mean score of the quality of life of patients undergoing heart valve replacement in the experimental group before and after the intervention showed a statistically significant difference (P<0.001).
***Conclusion:*** According to the results of this study, it seems that self-management programs can improve the quality of life of patients undergoing heart valve replacement.



**Implications of this paper in nursing and midwifery preventive care:**
- Considering that patients undergoing heart valve replacement need special precautions and the continuation of their care process is performed at home, it is possible to train self-management programs to patients and encourage them to implement self-management programs in hospitals and surgical clinics.
- Since nurses are considered key components of health and treatment, it is possible to train students about self-management programs and emphasize the role of nurses in providing self-management programs to patients undergoing valve replacement.

## Introduction

Heart valve disease is one of the diseases related to the heart, which is of great importance due to its chronic, complex, and progressive nature [1]. Moderate to severe heart valve diseases affect 2.5% of the adult population of the United States of America, increasing to 13.2% with age over 75 years [2,3].

The treatment of heart valve disorders is carried out by two methods: Pharmaceutical and non-pharmacological [4]. Pharmacological therapies include used inotropes and diuretics, and non-pharmacological therapies include heart valve repair and heart valve replacement [5]; 10-30% of all cardiac disorders are related to heart valve surgeries, constituting 23.8% of heart surgeries in Iran [4-6]. Due to the nature of this type of surgery and the limited facilities in health centers, many cases of recovery, treatment, and care measures are performed at home by the patient and his/her family [7]; for this reason, heart valve disease is one of the main causes of loss of physical function, quality of life, and longevity [8]. Improving and maintaining the quality of life

in patients with chronic diseases is very important [4].

Quality of life means the harmony or lack of harmony between the real-life conditions and the hopes and expectations of a person, which is unique for each person and is affected by different aspects of a person's life [4,9]. According to Heer et al., due to the invasive nature of chest surgeries, the quality of life decreases in the first few months after the surgery [10]. Also, according to Azami et al.'s study, the quality of life of cardiovascular patients is relatively low, so appropriate planning is necessary to improve the quality of life of these patients [11]. One of the ways to improve the quality of life and self-care is to perform self-management interventions [12].

Self-management is defined as the ability of individuals to reduce or manage symptoms, treat physical, mental, and psychological consequences, change lifestyle, and ultimately lead a favorable life with a chronic disease [13]. It seems that in patients with long-term problems, such as heart valve disorders, self-management is the best way to convince these patients to make behavioral changes and drug treatment over a long period [9,14]. On the other hand, the positive effect of self-management programs on improving the quality of life of patients with chronic diseases, including kidney patients undergoing hemodialysis treatment, patients with sickle cell disease, and patients with cancer, has been shown [15-17]. The self-management program for chronic diseases is actually a group training program designed and implemented based on the self-care needs of patients with chronic diseases and their families and organized and provided by nurses [18].

Various methods are available for patient training; however, for proper training, it is important to pay attention to the patients' educational needs, conditions, and facilities [19]. Virtual training is one of the effective educational methods [20]. Virtual health training is aimed at implementing training programs, creating motivation to follow the self-care pattern, and helping monitor the symptoms regularly; some of the important features of virtual training are easy access, flexibility, removal of costly traffic, and referability [21].

Nowadays, much attention is paid to supportive and educational treatments to improve the quality of life of patients, and more emphasis is placed on accepting treatment and self-care [22]. Meanwhile, various educational and self-management methods have been used to improve the quality of life and contradictory results have been obtained. The results of Rad et al.'s study showed that self-management program training was not effective on the self-efficacy of elderly patients with acute coronary syndrome [23], but in Baljani et al.'s study, self-management interventions made cardiovascular patients comply with the drug regimen [24].

Considering that there are different results in examining the effect of self-management training in patients with chronic diseases, and on the other hand, there was no study showing the effect of virtual self-management training on the quality of life of patients undergoing heart valve replacement, the present study was conducted to determine the effect of a web-based self-management training program on the quality of life of patients undergoing heart valve replacement.

## Methods

This experimental study was conducted with a pretest-posttest design to determine the effect of a web-based self-management training program on the quality of life of patients undergoing heart valve replacement. The study population included all patients undergoing heart valve replacement surgery admitted to Shahid Rajaei Cardiovascular Educational, Research, and Therapeutic Institute in Tehran, Iran. According to Tung et al.'s study [12] and based on the sample size formula, 40 people were allocated to each group ($\alpha$=0.05, $\beta$=0.2, $\mu_1$=13, mean score of quality of life in the intervention group, $\mu_2$= 17.31, mean score of quality of life in the control group, $SD_1$= 8.79 $SD_{2=10.36}$).

Inclusion criteria included 1) the ability to understand and speak Persian language, 2) literacy at the level of reading and writing, 3) the ability to access the Internet, 4) the use of warfarin anticoagulant medicine, and 5) being over 18 years old. Non-inclusion criteria for the study included 1) the patient or his/her family members being the treatment team members, 2) the patient's simultaneous participation in another study, 3) having a confirmed chronic debilitating disease affecting the study process and its results

(such as rheumatoid arthritis, cancer, and renal failure), 4) a history of mental illness, and 5) a history of myocardial infarction (MI) in the last three months. Eighty patients were included in the study from September to December 2020 using the convenience method. Then, the samples were divided into experimental and control groups by the block randomization method with size 4. The patient was excluded from the study if he/she died during the study or returned to the operating room for heart valve replacement surgery. The data collection tool consisted of a demographic information form and a 12-Item Short Form Quality of Life Questionnaire (SF-12).

The demographic information form included information related to age, gender, educational level, height, weight, body mass index (BMI), marital status, ethnicity, religion, occupation, family income, number of family members, and health insurance status.

The SF-12 consists of 12 questions, which is a shortened form of the 36-Item Quality of Life Questionnaire (SF-36) used in various studies. This questionnaire has 8 domains, including physical functioning, role limitations due to physical health, bodily pain, general health perception, social functioning, role limitations due to emotional problems, vitality, and mental health [25].

The questionnaire is scored through the number in front of each option. Questions 4, 5, 6, and 7 are answered through yes/no (yes= 1 and no =2), and the rest of the questions are scored on a 5-point Likert scale. Questions 1, 8, 10, and 11 are scored in reverse. For example, a score of 5 in phrase number one becomes 1, and a score of 1 in the same question becomes a score of 5. A high score indicates a higher quality of life (a score of 37-48 denotes a good status, a score of 25-36 denotes a moderate status, and a score of 12-14 denotes a poor condition).

To calculate the two general subscales of mental health and physical health, physical health was obtained from the sum of the subscales of general health perception, physical functioning, physical health, and bodily pain. Mental health was obtained from the sum of the subscales of role limitations due to emotional problems, social functioning, vitality, and mental health. The total score was calculated from the sum of all the questions [26]. For the first time, Ware et al. (1996) determined the validity and reliability of the SF-12 and Cronbach's alpha was calculated as 0.89 for the physical dimension and 0.76 for the psychological dimension, showing good reliability of the questionnaire [27]. Also, Montazeri et al. investigated the validity and reliability of the SF-12 in Iran, with a validity of 0.73 for the physical dimension and 0.72 for the psychological dimension. They also used the test-retest method to evaluate the reliability [25]. In the present study, the reliability of the questionnaire was evaluated using the internal consistency method. Cronbach's alpha coefficient was calculated for the psychological (0.73) and physical (0.77) dimensions.

Due to the coincidence of the study with the coronavirus disease 2019 (COVID-19) pandemic, in order to comply with the health protocols, the questionnaires were completed by the researcher before the intervention through interviews.

The control group received routine care provided by ward nurses. In addition to receiving the care of the control group, and after the face-to-face discussion, 3 days after surgery and transfer from the intensive care unit (ICU) to the surgery unit, participants of the experimental group were invited to participate in the self-management program and attend online training sessions through the WhatsApp program. The participants were studied in 5-7 people groups. Then, training sessions with patients were organized by the researcher in two 60-minute sessions. The self-management program included 3 areas, namely drug management, role management, and emotional management, and 5 main skills, namely problem-solving, decision-making, use of resources, activity plan, and formation of caregiver-patient therapeutic relationship (12). Before the start of the first session, an educational booklet was provided to the patients based on the self-management plan. The educational content of the sessions was based on the booklet and included self-care after surgery at home and prevention of complications, recommendations related to lifestyle and diet, drug and food interactions with drugs related to the period after heart valve replacement, control of mental and emotional pressures, and recognition of the main factors. The first session started with the introduction of the goals and explanation of the activity plan, and communication was established

with the participants, which were respectively related to the fourth skill, i.e., the activity plan, and the fifth skill, i.e., the formation of a caregiver-patient therapeutic relationship in the self-management program. Then, training was provided to patients based on the 3 main parts of the self-management program in the form of drug management, role management, and emotional management training. Also, in the training session on the first day, the opportunity to get to know the peer patients was provided, and the patients were able to express their experiences regarding the topics raised in the session, providing an opportunity to identify the patients' educational needs and to be aware of and correct the incorrect information. The second training session was held 2-3 days after the first session. In this session, the challenges that the patients might face were raised and the patients discussed how to deal with the challenges according to the materials presented in the first session. After the group discussion and the exchange of experiences and the method of correct handling of the situations raised, in order to strengthen problem-solving skills, decision-making by presenting scenarios of possible problems and problem-solving methods were specified by the researcher, which were problem-solving and decision-making in connection with the first and second skills of the self-management program.

At the end of the second session, the patients' questions and doubts about the booklet presented before the first training session were answered. In the continuation of the research program, based on the patients' conditions, a follow-up program was proposed, based on which a 10-20-minute call was made once a week based on the patient's needs. The phone call content was to strengthen the training and verbal encouragement and ask about the patient's condition. Phone calls were made for 8 weeks, and at the end of the 8th week, the SF-12 was completed by the researcher in both experimental and control groups.

Then, all the data were analyzed using SPSS version 18 software. The results were reported as standard deviation and mean for quantitative data and as number (percentage) for qualitative data. The normality of the distribution of quantitative variables was evaluated using the Kolmogorov-Smirnov test and considering the skewness and kurtosis indices. The independent t-test and the paired t-test were used to compare the mean of quantitative variables in the two experimental and control groups or each group before and after the intervention, respectively, and the chi-square test was used to compare the frequency distribution of qualitative variables in both groups. Also, analysis of covariance (ANCOVA) was used to investigate the effect of the self-management program on the quality of life of patients. The significance level in the tests was considered 0.05.

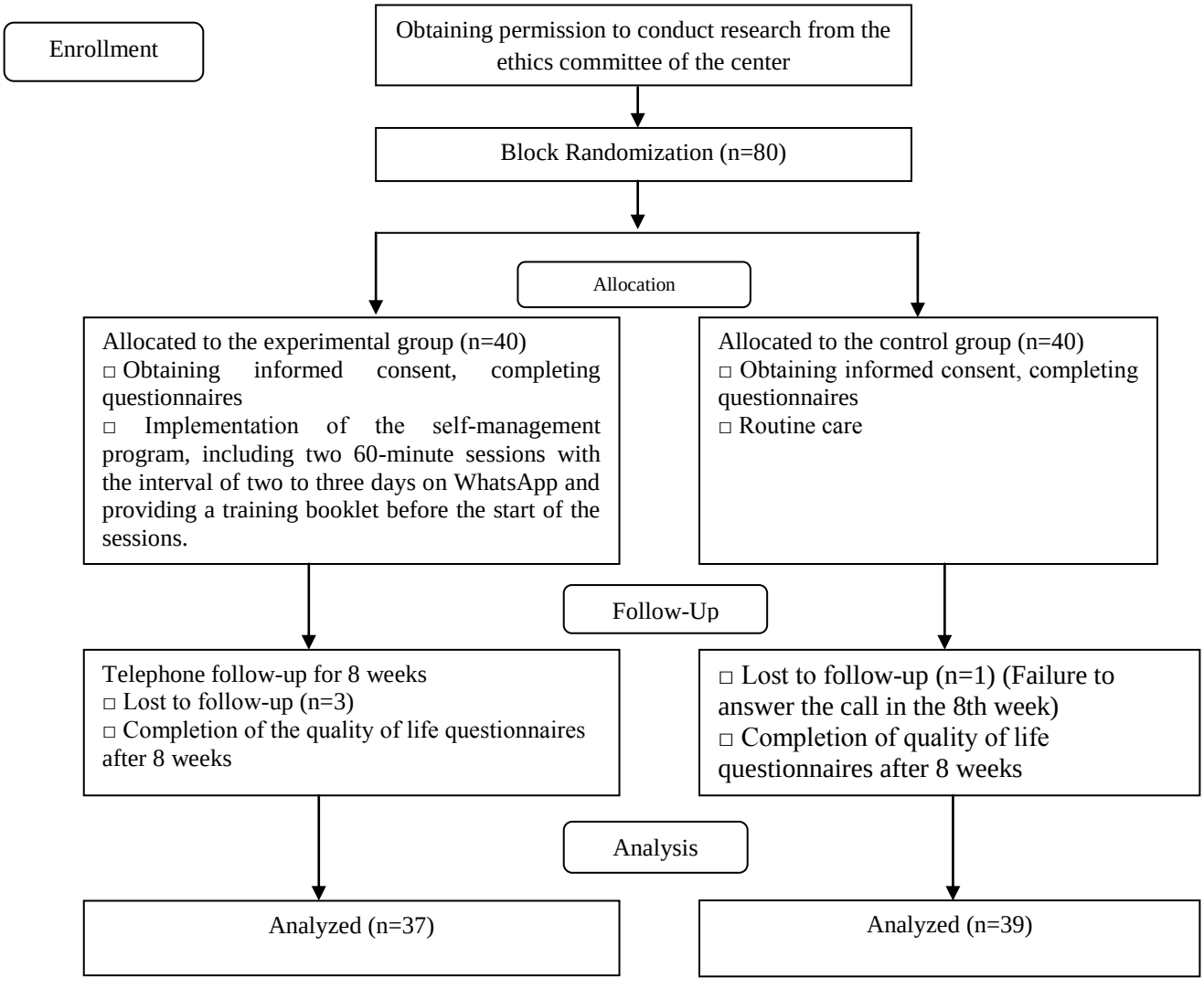


***Figure 1: The CONSORT flow diagram of the progress***

## Results

During the 8-week follow-up in the intervention group, 2 people refused to continue the telephone follow-up and were excluded from the study. In the control group, at the end, one person was not inclined to complete the questionnaire and was excluded from the study.

The majority of participants in this study were female (51.25%; N=41), married (80%; N=52), and under diploma (41.25%; N=33). The mean age of the participants was 44.98 (10.70) years in the control group and 45.75 (9.55) years in the experimental group.

In the current study, the chi-square test showed no statistically significant difference between the control and experimental groups in the frequency distribution of gender, family income, place of residence, occupation, a history of heart disease in the family, a history of cigarette, hookah, alcohol, and drug use, and a history of various diseases ($P>0.05$). However, the results demonstrated that the frequency distribution of educational level ($P=0.010$) and marital status ($P=0.044$) were significantly different between the control and experimental groups (Table 1).

*Table 1: Frequency distribution of demographic variables in the control and experimental groups*

| Variable | Group | Control Group | | Experimental Group | | Chi-square Test | | |
|---|---|---|---|---|---|---|---|---|
| | | N* | % | N | % | $\chi^2$ | Df** | P |
| **Gender** | Female | 21 | 52.5 | 20 | 50.0 | 0.05 | 1 | 0.823 |
| | Male | 19 | 47.5 | 20 | 50.0 | | | |
| **Educational level** | Under diploma | 13 | 32.5 | 20 | 50.0 | 9.31 | 2 | 0.010 |
| | Diploma | 6 | 15.0 | 12 | 30.0 | | | |
| | University | 21 | 52.5 | 8 | 20.0 | | | |
| **Marital status** | Single | 7 | 17.5 | 5 | 12.5 | 6.26 | 2 | 0.044 |
| | Married | 21 | 52.0 | 31 | 77.5 | | | |
| | Divorced/widow | 12 | 30.0 | 4 | 10.0 | | | |
| **Religion** | Islam | 38 | 95.0 | 38 | 95.0 | 0.00 | 1 | 1.000 |
| | Other | 2 | 5.0 | 2 | 5.0 | | | |
| **Ethnicity** | Persian | 12 | 30.0 | 18 | 45.0 | 3.73 | 3 | 0.293 |
| | Turk | 9 | 22.5 | 10 | 25.0 | | | |
| | Kurd | 8 | 20.0 | 3 | 7.5 | | | |
| | Other | 11 | 27.5 | 9 | 22.5 | | | |
| **Family income** | Enough | 17 | 42.5 | 13 | 32.5 | 1.38 | 2 | 0.502 |
| | Almost enough | 19 | 47.5 | 20 | 50.0 | | | |
| | Not enough | 4 | 10.0 | 7 | 17.5 | | | |
| **Insurance** | Yes | 35 | 87.5 | 40 | 100.0 | 5.33 | 1 | 0.055 |
| | No | 5 | 12.5 | 0 | 0.000 | | | |
| **Residency** | Urban | 30 | 75.5 | 31 | 77.5 | 0.07 | 1 | 0.793 |
| | Rural | 10 | 25.0 | 9 | 22.5 | | | |
| **Occupation** | Housekeeper | 13 | 32.5 | 18 | 45.0 | 1.96 | 3 | 0.579 |
| | Employee/ worker | 14 | 35.0 | 12 | 30.5 | | | |
| | Freelance | 7 | 17.5 | 7 | 17.5 | | | |
| | Other | 6 | 15.0 | 3 | 7.5 | | | |
| **A history of heart disease in Family** | I do not know | 5 | 12.5 | 0 | 0.0 | 5.36 | 2 | 0.099 |
| | Yes | 12 | 30.0 | 13 | 32.5 | | | |
| | No | 23 | 57.5 | 27 | 67.5 | | | |
| **A history of smoking, Hookah, alcohol, drugs** | Yes | 19 | 47.5 | 26 | 65.0 | 2.49 | 1 | 0.115 |
| | No | 21 | 52.5 | 14 | 35.0 | | | |
| **A history of various diseases** | Yes | 27 | 67.5 | 21 | 52.5 | 1.88 | 1 | 0.171 |
| | No | 13 | 32.5 | 19 | 47.5 | | | |

***N: number of samples,** df: Degree of freedom**

According to the independent t-test, the mean age and BMI showed no statistically significant difference between the two groups (P>0.05) (Table 2).

*Table 2: Comparison of the mean age and body mass index in the control and experimental groups*

| Variable \ Group | Control Group | | Experimental Group | | Independent Sample T-Test | | |
|---|---|---|---|---|---|---|---|
| | Mean | SD* | Mean | SD* | t | Df** | P |
| Age | 44.98 | 45.75 | 45.75 | 9.55 | -0.34 | 78 | 0.733 |
| Body mass index | 25.66 | 25.93 | 25.93 | 3.62 | -0.32 | 78 | 0.750 |

***Standard deviation; **Df: Degree of freedom**

The results showed a significant difference between the mean score of the quality of life of the two groups before the intervention (p=0.002) and after the intervention (p=0.007). Also, a significant difference was observed between the two groups in the mean score of quality of life

before and after the intervention (p<0.001). On the other hand, the results indicated a significant difference between the mean score of the quality of life of individuals before and after the intervention in both groups (p<0.001)(Table 3).

***Table 3: Comparison of the mean score of the quality of life before and after the intervention in each group***

| Group | Before the Intervention Mean (SD) | After the Intervention Mean (SD) | Difference Mean (SD) | **P-Value |
|---|---|---|---|---|
| **Control** | 27.27±3.07 | 33.60±4.87 | 6.32±5.56 | <0.001 |
| **Experimental** | 23.97±6.17 | 36.77±5.09 | 12.79±7.31 | <0.001 |
| ***P-value** | 0.002 | 0.007 | ----- | <0.001 |

***Independent sample t-test; **Paired t-test**

According to the results, the effect of the pre-test on the quality of life after the intervention was not significant (P=0.285, F=1.30) and its effect was 0.02. However, the effect of the self-management program was significant (F=0.004, P=8.99) and its effect on improving the quality of life of patients was 0.11 (Table 4).

***Table 4: Analysis of covariance of quality of life in the experimental and control groups***

| Effects | SS* | Df ** | F | P | Eta*** |
|---|---|---|---|---|---|
| **Quality of life pre-test** | 32.24 | 1 | 1.30 | 0.258 | 0.02 |
| **Effect of the self-management program** | 222.74 | 1 | 8.99 | 0.004 | 0.11 |

***SS: Sum of squares ,** Df: Degree of freedom,***Eta :Partial Eta Squared**

## Discussion

The results of the present study showed the positive effect of a web-based self-management training program on the quality of life of patients undergoing heart valve replacement.

In line with the results of the present study, it was shown in the studies conducted by Tang et al. and Abbasi et al. that patients with heart failure who underwent self-management training had a high quality of life [12,28]. In addition to patients with heart diseases, the positive effect of the educational intervention of the self-management program on the quality of life of patients with other chronic diseases has also been observed [28]. Rezaei et al. reported that the effects of face-to-face and virtual training through WhatsApp in improving the quality of life of postmenopausal women were equally increasing [29]. According to the results of this study, it seems that if the virtual training content is presented accurately and regularly, it can improve the quality of life of patients who do not have access to face-to-face training [29]. Yaoyao Li et al. investigated the effect of the self-management program on the self-management behaviors and quality of life of middle-aged stroke patients and concluded that the level of self-management behaviors and the interaction effects of the total score of quality of life and the scores of each dimension in both control and intervention groups were statistically significant [30]. In another study, Hou et al. performed a self-management program on breast cancer patients and observed an improvement in the quality of life after 1.5 months and 3 months follow-up in the intervention group [31]. In Shah Hamzeh et al.'s research, self-management and the components of drug management, information management, seizure management, and lifestyle management had a statistically significant and positive relationship with the quality of life of patients [32]. Also, the results of Khezri et al.'s study to examine the effect of the self-management empowerment model on the quality of life of the elderly with high blood pressure showed that the self-management empowerment program could improve the overall quality of life and all its dimensions help them manage their disease, and reduce their problems to some extent

[33]. Similar results were obtained in a study conducted by Kelleher et al. in 2019 to determine the effect of self-management on the quality of life of patients with breast cancer [16].

The results of Engelen et al.'s study on the training of web-based self-management programs in cardiovascular patients were not consistent with the results of our study. The reason for the difference between our study and Engelen's research was probably that we tried to make the information available to the patients sufficient, concise, and useful, within the framework of the patients' patience, in order to preserve the patients' energy to continue the treatment process, but Engelen, by giving a lot of information, led to information overload; as a result, patients were unmotivated and minimally used the program; also considering that the follow-up of patients in Engelen's study was carried out at intervals of 6 and 12 months, this long distance of communication with patients may have decreased the motivation to use this program; however, we tried to maintain the motivation to improve the treatment process through weekly calls for 2 months [34]. Also, the results of Świątoniowska et al.'s systematic review on the training of heart failure patients showed no improvement in the quality of life of these patients, which is contrary to the results of the present study [35] .The discrepancy in the results can be due to the different methods used in the training, as well as the difference in the measurement time of the dependent variables.

On the other hand, some studies have reported results different from the present study. The results of Javanoosh et al.'s study showed that the self-management program training had no significant effect on the quality of life of the elderly with acute coronary syndrome [23], which is probably due to the illiteracy and the high age of the majority of the samples. On the contrary, in our study, the samples were literate, and due to the virtual nature of the training and the possibility of choosing the right time to transfer the training and information by the participants, individuals participated in the training with more patience and interest and a positive result was obtained. In Bashi et al.'s study, although there were small improvements due to the effect of self-management in the self-care confidence subscale and self-efficacy, its results, unlike the results of our study, showed no significant difference between the control and intervention groups. It seems that the observed difference may be due to the different methods used to conduct the study, i.e., training through the website.

In the present study, the effect of the pre-test on the quality of life after the test was not significant and its effect was 0.02 (p=0.258, F=1.3). However, the effect of the self-management program was significant and its effect on improving the quality of life was 0.11 (p=0.004, F=8.99).

Therefore, the present study showed that self-management programs had significant effects on the quality of life of patients undergoing heart valve replacement. This point should not be forgotten that the quality of life is a vital factor for patients, so the quality of life of individuals reflects the important criterion of the effectiveness of health care; therefore, the use of appropriate methods to improve the quality of life of patients with chronic diseases can create appropriate approaches to reduce the adverse symptoms of diseases.

Due to the high prevalence of COVID-19, at the time of sampling, it was not possible to hold training sessions in person due to the patients' conditions. Also, due to the suspension of all elective surgeries during the COVID-19 epidemic and the sampling limitation, individuals over 60 years of age who underwent simultaneous replacement of two or more heart valves and had emergency surgery were included in the study. These factors may have influenced the research results. Therefore, for future studies, it is suggested that the study be conducted in non-epidemic conditions of the mentioned diseases and limitations with a larger sample size, and the results of the studies be compared.

## Conclusion

The findings of the present study show that web-based self-management program training can improve the quality of life in all dimensions in patients undergoing heart valve replacement. Therefore, due to the cost-effectiveness of self-management programs, these programs can be included in the agenda of treatment systems, hoping that this method will be an effective step to improve the quality of life of patients undergoing heart valve replacement.

**Ethical Consideration**

The present study was approved by the Research Deputy of Shahid Rajaei Cardiovascular Educational, Research, and Therapeutic Institute in Tehran and the institutional ethics committee (code: IR.RHC.REC.1399.066).

**Acknowledgments**

This article has been extracted from a master's thesis in special care nursing (code of ethics: IR.RHC.REC.1399.066). We would like to thank the Research Deputy of Shahid Rajaei Cardiovascular Educational, Research, and Therapeutic Institute in Tehran, dear professors, and all the respected participants who cooperated in conducting this study.

**Conflict of interest**

The authors declared no conflict of interest.

**Funding:**

This study was conducted without financial support

**Authors' contributions:**

Z. H.: Study conception, design, and data collection process; S. M.: Supervisor, contributing to study conception, design, and Analysis, interpretation; SH. KH. P. and S. H.: Advisors, contributing to all the stages of the study; Z. H. and H. T.: Analysis, interpretation, and result reporting . All authors contributed to the drafting and revising of the article, agreed with the final version of the manuscript to be submitted to the journal, and met the criteria of authorship.

**References**

1. Schoen FJ. Heart valve tissue engineering: quo vadis? Current opinion in Biotechnology. 2011; 22(5): 698-705. https://doi.org/10.1016/j.copbio.2011.01.004

2. d'Arcy JL, Coffey S, Loudon MA, Kennedy A, Pearson-Stuttard J, Birks J, et al. Large-scale community echocardiographic screening reveals a major burden of undiagnosed valvular heart disease in older people: the OxVALVE Population Cohort Study. European heart journal. 2016; 37(47): 3515-22. https://doi.org/10.1093/eurheartj/ehw229

3. Bani Hani A, Awamleh N, Mansour S, Toubasi AA, AlSmady M, Abbad M, et al. Valve Surgery in a Low-Volume Center in a Low-and Middle-Income Country: A Retrospective Cross-Sectional Study. International Journal of General Medicine. 2023: 4649-60. https://doi: 10.2147/IJGM.S433722

4. Rippe JM. Lifestyle strategies for risk factor reduction, prevention, and treatment of cardiovascular disease. American Journal of Lifestyle Medicine. 2019; 13(2): 204-12. https://doi.org/10.1177/1559827618812395

5. Leong DP, Joseph PG, McKee M, Anand SS, Teo KK, Schwalm J-D, et al. Reducing the global burden of cardiovascular disease, part 2: prevention and treatment of cardiovascular disease. Circulation research. 2017; 121(6): 695-710. https://doi.org/10.1161/CIRCRESAHA.117.311849

6. Amirabadi T, Nasiri A, Kazemi T, Kardan M. Educational needs of patients with heart valve replacement surgery in birjand, 2012. Journal of surgery and trauma. 2014; 2(2): 52-8. http://jsurgery.bums.ac.ir/article-1-41-en.html

7. Rief W, Shedden-Mora MC, Laferton JA, Auer C, Petrie KJ, Salzmann S, et al. Preoperative optimization of patient expectations improves long-term outcome in heart surgery patients: results of the randomized controlled PSY-HEART trial. BMC medicine. 2017; 15(1): 1-13 https://doi.org/10.1186/s12916-016-0767-3

8. Coffey S, Roberts-Thomson R, Brown A, Carapetis J, Chen M, Enriquez-Sarano M, et al. Global epidemiology of valvular heart disease. Nature Reviews Cardiology. 2021;18(12):853-64. https://doi.org/10.1038/s41569-021-00570-z

9. Riegel B, Moser DK, Buck HG, Dickson VV, Dunbar SB, Lee CS, et al. Self-care for the prevention and management of cardiovascular disease and stroke: A scientific statement for healthcare professionals from the American Heart Association. Journal of the American Heart Association. 2017; 6(9): e006997. https://doi.org/10.1161/JAHA.117.006997

10. de Heer F, Gökalp AL, Kluin J, Takkenberg JJ. Measuring what matters to the patient: health related quality of life after aortic valve and thoracic aortic surgery. General thoracic and cardiovascular surgery. 2019; 67: 37-43. https://doi.org/10.1007/s11748-017-0830-9

11. Azami-Aghdash S, Gharaee H, Aghaei MH, Derakhshani N. Cardiovascular Disease Patient's

Quality of Life in Tabriz City in Iran in 2018. Journal of Community Health Research. 2019. https://doi.org/10.18502/jchr.v8i4.2080
12. Tung HH, Lin CY, Chen KY, Chang CJ, Lin YP, Chou CH. Self-management intervention to improve self-care and quality of life in heart failure patients. Congestive Heart Failure. 2013; 19(4): E9-E16. https://doi.org/10.1111/chf.12014
13. Katch H, Mead H. The role of self-efficacy in cardiovascular disease self-management: a review of effective programs. Patient Intelligence. 2010: 33-44. , https://doi.org/10.2147/PI.S12624
14. Riegel B, Dunbar SB, Fitzsimons D, Freedland KE, Lee CS, Middleton S, et al. Self-care research: where are we now? Where are we going? International journal of nursing studies. 2021;116:103402.
https://doi.org/10.1016/j.ijnurstu.2019.103402
15. bajani s. the effectof self-management programs on the quality of life in patients undergoing hemodialysis. 2014. http://unmf.umsu.ac.ir/article-1-1910-fa.html [In Persian]
16. Kalhor M, Fathi M, Ghaderi B, Roshani D, Ozairi S, Rashidi K. Effect of five a model self-management on quality of life in patients with breast cancer. Avicenna Journal of Nursing and Midwifery Care. 2019; 27(4): 269-80. http://doi.org/10.30699/ajnmc.27.4.269 [In Persian]
17. Moosapour SA, Elahi N, Tahery N, Haghighizadeh MH, Ehsanpour A. Comparing the effect of self-care education and pain self-management on the nature of pain and quality of life in patients with sickle cell disease. Hayat. 2022; 27(4): 431-45. http://hayat.tums.ac.ir/article-1-4384-en.html[In Persian]
18. Veronovici NR, Lasiuk GC, Rempel GR, Norris CM. Discharge education to promote self-management following cardiovascular surgery: An integrative review. European Journal of Cardiovascular Nursing. 2014; 13(1): 22-31. https://doi.org/10.1177/1474515113504863
19. Alligood MR. Areas for further development of theory-based nursing practice. Nursing Theory: Utilization & Application 5th ed St Louis: Elsevier Mosby. 2014: 414-24.
20. Barkhordari-Sharifabad M, Saberinejad K, Nasiriani K. The effect of health literacy promotion through virtual education on the self-care behaviors in patients with heart failure: A Clinical Trial. Journal of Health Literacy. 2021; 6(1): 51-60. DOI:10.22038/JHL.2021.56956.1159[persian]
21. Najafi F, Pishkar Mofrad Z, Ayubi E, Hosseini R. The effect of self-management based discharge planning on treatment adherence in patients with heart failure. Hayat. 2021; 26(4): 455-68. http://hayat.tums.ac.ir/article-1-3552-en.html [In Persian]
22. Rice H, Say R, Betihavas V. The effect of nurse-led education on hospitalisation, readmission, quality of life and cost in adults with heart failure. A systematic review. Patient Education and Counseling. 2018; 101(3): 363-74. https://doi.org/10.1016/j.pec.2017.10.002
23. Javanvash Z, Mojdekanloo M, Rastaghi S, Rad M. The effect model-based self-management program 5A on quality of life of elderly patients with acute coronary syndrome Bojnourd Year 1395. Journal of Sabzevar University of Medical Sciences. 2018; 25(1): 75-82.
https://jsums.medsab.ac.ir/article_1032.html?lang=en [In Persian]
24. Baljani E, Rahimi Z, Heidari S, Azimpour A. The effect of self management interventions on medication adherence and life style in cardiovascular patients. Avicenna Journal of Nursing and Midwifery Care. 2012; 20(3): 58-68. http://nmj.umsha.ac.ir/article-1-1124-en.html [In Persian]
25. Montazeri A, Vahdaninia M, Mousavi SJ, Omidvari S. The Iranian version of 12-item Short Form Health Survey (SF-12): factor structure, internal consistency and construct validity. BMC public health. 2009; 9(1): 1-10. https://doi.org/10.1186/1471-2458-9-341
26. Kontodimopoulos N, Pappa E, Niakas D, Tountas Y. Validity of SF-12 summary scores in a Greek general population. Health and quality of life outcomes. 2007; 5(1): 1-9. https://doi.org/10.1186/1477-7525-5-55
27. Galenkamp H, Stronks K, Mokkink LB, Derks EM (2018) Measurement invariance of the SF-12 among different demographic groups: The HELIUS study. PLoS ONE 13(9): e0203483. https://doi.org/10.1371/journal.pone.0203483
28. Abbasi A, Ghezeljeh TN, Farahani MA. Effect of the self-management education program on the quality of life in people with chronic heart

failure: a randomized controlled trial. Electronic physician. 2018; 10(7): 7028. doi: 10.19082/7028
29. Rezaei M, Tiznobaik A, Kohan S, Tapak L, Aghababaei S. Comparison of the Effect of In-person and Virtual Group Training on the Quality of Life of Postmenopausal Women: A Randomized Controlled Clinical Trial. 2023. http://nmj.umsha.ac.ir/article-1-2512-en.html [In Persian]
30. Li Y, Zhang S, Song J, Tuo M, Sun C, Yang F. Effects of self-management intervention programs based on the health belief model and planned behavior theory on self-management behavior and quality of life in middle-aged stroke patients. Evidence-Based Complementary and Alternative Medicine. 2021; 2021. https://doi.org/10.1155/2021/8911143
31. Hou I-C, Lin H-Y, Shen S-H, Chang K-J, Tai H-C, Tsai A-J, et al. Quality of life of women after a first diagnosis of breast cancer using a self-management support mHealth app in Taiwan: randomized controlled trial. JMIR mHealth and uHealth. 2020; 8(3): e17084. DOI: 10.2196/17084
32. Shahhamzeh M, Fasihi Harandy T, Kabir K, Montazeri A, Asadi Shavaki M, Saei V. The relationship between self-management and quality of life in epileptic patients who referred to iranian epilepsy association. Journal of health and care. 2017; 19(2): 189-98. http://hcjournal.arums.ac.ir/article-1-793-fa.html [In Persian]
33. Khezri R, Ravanipour M, Motamed N, Vahedparast H. Effect of self-management empowering model on the quality of life in the elderly patients with hypertension. Iranian Journal of Ageing. 2016; 10(4): 68-79. http://salmandj.uswr.ac.ir/article-1-796-en.html [persian]
34. Engelen MM, van Dulmen S, Puijk-Hekman S, Vermeulen H, Nijhuis-van der Sanden MW, Bredie SJ, et al. Evaluation of a web-based self-management program for patients with cardiovascular disease: explorative randomized controlled trial. Journal of Medical Internet Research. 2020; 22(7): e17422. doi: 10.2196/17422
35. Świątoniowska-Lonc NA, Sławuta A, Dudek K, Jankowska K, Jankowska-Polańska BK. The impact of health education on treatment outcomes in heart failure patients. Advances in Clinical and Experimental Medicine. 2020; 29(4): 481-92. https://doi.org/10.1016/j.copbio.2011.01.004