Effectiveness of a Bioenergy Economy-Based Psycho-education Package on Improvement of Vegetative Function, Forgiveness, and Quality of Life of Patients with Coronary Heart Disease: A Randomized Clinical Trial

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Quantitative Study

Abstract

Background: Many treatments make the life of coronary heart patients longer, but they require more psychosocial and spiritual support for a meaningful life. The aim of the present study was to determine the effect of a bioenergy economy (BBE)-based psycho-education package on improvement of vegetative function, forgiveness, and quality of life (QOL) of patients with coronary heart disease (CHD).

Methods: In this clinical trial, using convenient sampling, 40 patients were selected from among patients referring to Bohlool Hospital in Gonabad, Iran, and were randomly assigned to the 2 case and control groups. First, the vegetative function checklist, Forgiveness Likelihood Scale, and World Health Organization Quality of Life (WHOQOL)-BREF questionnaire were completed for all the participants. Then, the case group received 8 sessions of group training for 180 minutes. After the training and the 1-month follow-up, both groups completed the questionnaires again. Finally, all data were analyzed using repeated measures analysis of variance (ANOVA) in SPSS software.

Results: The results showed a significant difference in heart rate, forgiveness, and QOL and its physical and psychological dimensions between the case group and control group after training (P < 0.05). The post hoc test showed that heart rate decreased significantly in the posttest compared to the pretest and forgiveness, and QOL and its physical and psychological dimensions increased significantly (P < 0.05). However, heart rate increased significantly in the follow-up compared to the posttest and forgiveness, and QOL and its physical and psychological dimensions decreased significantly (P < 0.05).

Conclusion: It can be concluded that group education based on BEE as a complementary care system was effective on heart rate, forgiveness, and QOL and its physical and psychological dimensions.

Keywords: Bioenergy Economy, Forgiveness, Quality of Life, Coronary Disease

Introduction

Cardiovascular diseases (CVDs) including coronary heart diseases (CHDs) are highly common in the world and one of the leading causes of mortality (Baxendale, 1992). In addition to high blood pressure, high blood cholesterol, diabetes, obesity, lack of exercise, and genetic factors, psychological factors, such as stressors, low social support, and negative emotions such as anxiety, depression, and hostility, are also causes of the increased risk of CHD (Fritzsche, Monsalve, Zanjani, Goli, Chen, & Dobos, 2020). Numerous studies have reported the high comorbidity of CHD and psychological distress (Russ, Stamatakis, Hamer, Starr, Kivimaki, & Batty, 2012; Stewart, Davidson, Meade, Hirth, & Makrides, 2000), anxiety disorders, (Cohen, Edmondson, Kronish, 2015; Caldirola, Schruers, Nardi, Berardis, Fornaro, & Perna, 2016), and depression (Cohen et al., 2015; Seligman & Nemeroff, 2015; Williams, 2012; Ren, Yang, Browning, Thomas, & Liu, 2015). From a psychocardiological point of view, psychological factors play an important role in the progression of CHD, and lifestyle changes such as a healthy diet, stress reduction, and increased physical activity help reduce the risk of CHD by up to 80% (Fritzsche et al., 2020). The heart is one of the most important and sensitive parts of the human body; damage to the heart muscle has an adverse effect on mental state, and failure to pay attention to stresses and psychological reactions of patients causes the development heart disease its resulting complications (Brosschot et al., 1994). Therefore, unfavorable psychological condition and ineffective coping style of patients can affect the vegetative function of patients such as high blood pressure, heart rate, and respiration rate and affect their physical status by increasing the burden on the cardiovascular system (Tavakolizadeh, Pahlavan, Basirimoghadam, & Kianmehr, 2018).

According to the World Health Organization (WHO), the quality of life (QOL) of individuals depends on their perceptions of their position in life. According to this definition, the QOL is a purely personal matter and has different meanings for people (Unruh & Hutchinson, 2011). Dimensions of QOL include the dimension of health, which is defined as a state of physical, mental, social, and spiritual well-being, and not only the absence of disease or disability, but also not limited to it (Mooney & Timmins, 2007). Health-related QOL is a reflection of the effects of the disease and its treatment according to the views and experiences of patients (Zuccarini, Johnson, Dalgleish, & Makinen, 2013). Studies show that heart disease has a negative effect on QOL and most patients have an adverse physical, activity, psychological, and socioeconomic status (Rahnavard, Zolfaghari, Kazemnejad, & Hatamipour, 2006; Dunderdale, Thompson, Miles, Beer, & Furze, 2005; Cepeda-Valery, Cheong, Lee, & Yan, 2011; Johansson, Brostrom, Dahlstrom, & Alehagen, 2008). Low QOL is associated with worsened disease, shorter survival time, increased number of hospitalization days, and reduced function of heart patients (Havik et al., 2007). In recent years, the spiritual dimension has been increasingly considered in health literature as 1 of the 4 dimensions of health and its importance has been revealed in health (Fallahi Khoshknab & Mazaheri, 2008). The important role of spiritual care in the cardiovascular system has been considered in some literature (Valente, Quitério, Vanderlei, 2014).

One of the important components of spiritual health is forgiveness. Forgiveness is a moral virtue performed in response to the fault of others. The concept of forgiveness is defined as a process of voluntary renunciation of anger and hatred of a harmful act in which the affected person exhibits a warm and kind behavior to the wrongdoer (Zuccarini et al., 2013). Given the presence of negative emotions such as anger and hostility in patients with CHD and the potential for increased risk of CHD

with these emotions, especially anger, forgiveness can play a cardiovascular protective role against anger (May, Sanchez-Gonzalez, Hawkins, Batchelor, & Fincham, 2014). Forgiveness, especially the type known for trait forgiveness, can be associated with lower blood pressure and improved heart rate (Friedberg, Suchday, & Shelov, 2007; Toussaint, Owen, & Cheadle, 2012). Walker (2012) considers forgiveness to be a basic way of eliminating preoccupations, and believes that QOL can be positively changed through different educational methods. Research shows that forgiveness helps control anger and aggression (Ghamari Givi, Mohebbi, & Sadeghi, 2014; Asgari, Alizadeh, & Kazemi, 2016; Malekzadeh, Ezazi Bojnourdi, Shahandeh, Vatankhah, & Bahadori Jahromi, 2017), manage depression (Shirinkar, Namdari, Jamilian, & Abedi, 2016), and reduce stress, and reduce stress-related physical performance in patients, including heart patients (Puggina, 2016).

Given the high prevalence of CHD, the need for its prevention and treatment, and its comorbidity with psychiatric disorders such as stress, anxiety, and depression, patients with CHD have psychological and spiritual needs during treatment. For this reason, researchers recommend the use of psychological treatment as a complementary treatment to pharmaceutical treatment (Dickens et al., 2013). Currently, various psychological interventions are used to treat cardiovascular patients. One of the integrative care models that has been shown to be effective in treating many mental health problems, such as pain control, anxiety, and depression in migraine patients (Derakhshan, Manshaei, Afshar, & Goli, 2016), anxiety (Keyvanipour, Goli, Bigdeli, Boroumand, Rafienia, & Sabahi, 2019), and depressive symptoms and stress (Shore, 2004), is bioenergy economy (BEE) intervention.

This integrative model of care was founded by Farzad Goli, psychosomatic medicine specialist, in 2010 based on biosemiotic medicine (Goli, Rafieian, & Atarodi, 2016; Goli, 2016a). Since 2011, Goli has been leading a postgraduate course and a faculty on BEE and psychosomatic health at the Energy Medicine University in California, USA (http://www.energymedicineuniversity.org/faculty/goli.html). Presently, BEE is practiced in Iran, Turkey, the United States, and Germany by trained therapists and trainers. BEE is also a part of the curriculum of the postdoctoral program on psychosomatic medicine and psychotherapy, which has been held by Isfahan Universities of Medical Sciences, Mashhad Universities of Medical Sciences, and Danesh-e Tandorosti Institute under the supervision of the department of psychosomatic medicine and psychotherapy of the Albert Ludwig University of Freiburg, Freiburg, Germany (https://www.uniklinik-freiburg.de/asialinkvn009/current-projects/daad-projects.html).

BEE is an integrative, evolutionary, body-centered approach to care. Releasing blockages, reprocessing energy information flows, resonating biofield, and opening the whole body to being are the main strategies of this metadiagnostic approach. The main goal of BEE is sustainable development of happiness. This care system tries to integrate matter-energy-information-consciousness process through the 4 levels of body economy, narrative economy, relation economy, and intention economy (Goli, 2016b).[38]

The main goal of BEE is to coordinate the energy-information stream through the physical, symbolic, and reflective worlds of signs. The higher order of energy-information processing leads to higher body resonance level and body awareness, and unconditioning salutogenesis. This holistic approach focuses on intra/iner-transpersonal integrity of energy investment by fostering body tensegrity, narrative coherence, interpersonal synergy, and boundarylessness experience (Goli, 2016b). The BEE program, with this bio-psycho-socio-spiritual approach, seems to be suited

to the numerous therapeutic needs of patients with CHD. Literature review showed that no study has been performed on the effect of BEE-based training, either individually or in groups or in person or electronically, on vegetative function, forgiveness, and QOL in patients with CHD. This study was conducted to determine the effect of a BBE-based psycho-education package on the improvement of vegetative function, forgiveness, and QOL of patients with CHD.

Methods

This study was a randomized controlled clinical trial. The statistical population included all men and women with CHD living in Gonabad, Iran, and referred to Bohlool Hospital in Gonabad during 6 months in 2019-2020. Using convenient sampling and based on the inclusion and exclusion criteria, 40 patients with CHD were selected and randomly assigned to a case and control group (n = 20 each). The study inclusion criteria included CHD diagnosis by a cardiologist in the hospital record, history of myocardial infarction (MI), a history of hospitalization, severity of the disease in terms of moderate risk stratification, drug use, patient instability, willingness to participate, lack of chronic diseases and debilitating complications (such as thyroid, kidney, and liver diseases), physical ability to attend and follow the process (not too old), Iranian nationality, age of 20 to 65 years, and social, economic, and religious homogeneity. The study exclusion criteria included absence from more than 3 training sessions, patient's migration or patient's death during the study period, and withdrawal from the study.

The data were collected using the Forgiveness Likelihood Scale, the World Health Organization Quality of Life (WHOQOL)-BREF, and the vegetative function checklist.

The vegetative function checklist was used to record the vegetative functions of patients such as heart rate, blood pressure, and respiratory rate using a standard monitoring device (Sadat Company, Iran). The reliability of the questionnaire was determined using equivalent reliability method. For this purpose, before monitoring the patients in each field, the accuracy of the blood pressure measuring device was checked using a mercury pressure gauge made in Germany, and the respiratory rate and heart rate were checked using a watch.

The Forgiveness Likelihood Scale (Rye, Loiacono, Folck, Olszewski, Heim, & Madia, 2001) consists of 15 items and 2 subscales for assessing the forgiveness rate toward the offender. The items are scored based on a 5-point Likert scale ranging from 1 (Strongly disagree) to 5 (Strongly agree). Higher scores on this scale indicate higher forgiveness. The validity of the entire scale and its 2 subscales [Absence of Negative (AN) and Presence of Positive (PP) subscales] has been reported to be appropriate; the Cronbach's Alpha for the 2 subscales is, respectively, 0.86 and 0.85, and that of the whole scale is 0.87. The correlation of this scale with the Enright Forgiveness Inventory was reported as high (Rye et al., 2001). The reliability of this scale was determined as 0.96 using Cronbach's alpha coefficient (Zandipur & Yadgari, 2008). In the present study, the reliability of the entire scale was assessed using Cronbach's alpha and was calculated at 0.83.

The WHOQOL-BREF Short Form was used to measure the QOL. The questionnaire contains 26 questions and the first 2 questions measure the overall QOL. However, in the present study, the mean score of all statements was considered as overall score of QOL. In the WHOQOL-BREF, the 4 domains of physical health (7 questions), psychological health (6 questions), social relationships (3 questions), and environmental health (8 questions) are measured through 24 questions. In each of the 4 domains, the responder scores between 4 and 20 points; 4 indicates the worst and 20 indicates the

best QOL (Van Biljon, Nel, & Roos, 2015). The Cronbach's alpha coefficient of the healthy population in the 4 domains of physical health, psychological health, social relationships, and environmental health was 0.70, 0.73, 0.55, and 0.84, respectively. In addition, the test-retest reliability coefficient of the WHOQOL-BREF was reported as 0.70 after 2 weeks. In general, the validity and reliability of this questionnaire is estimated to be appropriate (Soltani Shal & Aghamohammadian Sharbaf, 2013).

After obtaining a letter of introduction from Gonabad University of Medical Sciences and presenting it to officials of Bohlool Hospital, the researcher made the necessary arrangements to perform the sampling process. After selecting the participants, and obtaining informed consent from the participants and explaining the objectives and method to them, the patients were randomly assigned to the 2 groups of case and control. The case and control groups first underwent pretest using measuring instruments. The case group (n = 20) was then trained using an audio BEE-based psycho-education package in 8 weekly 180-minute sessions. The package was based on the BEE program (Goli, 2016c) the topics of which are listed in table 1.

Each podcast includes lessons, exercises, lesson summaries, and weekly assignments. The podcast was played for the group in each session in the hospital, and patients were asked to perform the same exercises performed in each session along with the presentation twice a week. It is worth noting that all the patients of the case group joined a telegram group, and were presented with the exercise file (in more detail) as a separate file after each session. This file consisted of a 30-40-minute audio recording. They were also asked to report on the implementation of the assignments and their number in a form and submit it on the next session. The structure of the first session differed from that of the following sessions, and included introductions, and familiarization with and preparation for the course. Then, 90 minutes of listening to the podcast and performing the exercises began under the supervision of a trained facilitator.

Table 1. Summary of sessions

Session	Topic	Subject	Exercise
1	Relaxation	Work-burden/mind-body coordination, stress response/release	Abdominal breathing/gradual relaxation/body purification
2	Tensegrity	Somatic memory, armor/integrity-safety	Vibration/tensegrity exercises
3	Body awareness	Body sense, salutogenesis	Body awareness (superficial, deep, balanced and visceral senses)
4	Attention work	Attention skewness/conscious direction of attention, danger brain-communication brain/gratitude	Attention/gratitude exercises, Bioenergy work
5	Narrative work	Narrative skewness (resentment/blame/greed/melancholia), non-life/self-care bias, time and narration (memory reconstruction)/narration and body tune	Body caress, lack of interpretation, pragmatic speech, body awareness
6	Relation work	Relation-nature/selves/avoidance of rejection/limit and love/In-field and synergy/relational body	Positive no/sharing, biofield work
7	Liberation from non-life (forgiveness: inter/intrapersonal)	Death instinct?!/Repetition fate/stabilized anger/why we do not forgive/value bias/body bias	Biofield work/ refining resentments (forgiveness with guided imagination), body purification
8	Path of love (forgiveness: transpersonal)	Transpersonal dimension/openness to whole/unconditioned health providing/kindness: mature defense/submission/intentional force	Wholeheardeness, love meditation (transpersonal forgiveness)

Subsequent weekly sessions began with 30 minutes of feedback on weekly exercises and physical, mental, and communication changes, as well as answers to the participants' questions. Then, the first part of the podcast (lesson) was presented for 45 minutes, and after a 30-minute rest and break, the second part of the podcast (presenting the exercises) was presented for 45 minutes, and finally, the session ended with 30 minutes of feedback on exercises, answering questions, and presenting assignments. No specific intervention was performed in the control group, although both groups (case and control) received routine cardiovascular medications and routine care. Then, the vegetative function checklist, Forgiveness Likelihood Scale, and WHOQOL-BREF (posttest) were completed for both groups. At the 1-month follow-up, both groups underwent the second posttest using the measurement instruments to ensure the effectiveness of the training package.

All pretest and posttest data were analyzed using repeated measures analysis of variance (ANOVA) in SPSS software (version 26; IBM Corp., Armonk, NY, USA). Data analysis was performed at a significance level of 5% and statistical power of 80%.

Results

Of all the study population, 75% (30) were men and 25% (10) were women, and 10% (4) were single and 90% (36) were married. In terms of academic status, 45% (18) a pre-diploma degree, 37.5% (15) had diploma, 2.5% (1) had associate's degree, 12.5% (5) had a bachelor's degree, and 2.5% (1) had higher education. Moreover, 37.5% (15) were self-employed, 10% (4) had a government job, 27.5% (11) were retired, 22.5% (9) were housewives, and 2.5% (1) were unemployed. The mean age of the subjects was 51.65 years, their mean weight was 72.97 kg, and their mean height was 168.27 cm.

Table 2 shows the mean scores of vegetative functions (in the 3 categories of heart rate, hypertension (systolic/diastolic), and respiration rate), forgiveness, and QOL and its physical, psychological, social relations, and environmental health dimensions in the case and control groups.

To assess the significance of the differences in the scores of forgiveness and QOL, repeated measures ANOVA was used, the results of which are presented in table 3.

Table 2. Mean and standard deviations of scores of vegetative functions, forgiveness, and quality of life and its components in the experimental and control groups

Variable	Group	N	Mean			SD		
			Pretest	Posttest	Follow-up	Pretest	Posttest	Follow-up
Heart rate	Experimental	20	77.10	69.70	76.75	9.64	6.02	7.40
	Control	20	71.70	72.85	74.95	9.18	7.66	6.76
Systolic hypertension	Experimental	20	123.75	118.7	124.50	15.29	14.22	15.75
	Control	20	125.25	111.30	123.40	13.62	35.06	9.58
diastole	Experimental	20	75.0	75.25	81.40	18.85	11.18	7.41
	Control	20	79.75	80.50	79.15	8.19	5.95	5.69
Breath rate	Experimental	20	25.20	24.55	25.00	1.93	1.88	1.75
	Control	20	23.60	23.40	23.40	2.35	2.28	2.52
Forgiveness	Experimental	20	41.25	53.35	44.30	7.70	4.66	5.82
	Control	20	45.95	46.55	45.00	7.66	5.34	3.73
Quality of life	Experimental	20	79.60	95.10	79.90	11.77	8.86	7.96
	Control	20	82.05	83.15	77.25	11.70	9.50	8.00
Physical health	Experimental	20	23.10	28.15	25.05	4.57	3.12	3.23
	Control	20	24.50	25.45	23.65	3.56	3.83	4.49
Psychological health	Experimental	20	19.90	23.75	19.95	3.62	3.42	3.23
	Control	20	19.85	19.55	19.20	3.90	2.72	4.49
Social relationships	Experimental	20	10.60	12.15	9.95	2.39	1.22	2.01
	Control	20	10.25	10.55	9.50	2.33	1.82	1.54
Environment health	Experimental	20	27.30	30.80	25.45	3.84	4.16	3.86
	Control	20	27.50	27.55	24.35	4.90	3.78	5.75

Table 3. Results of repeated measures analysis of variance for pretest, posttest, and follow-up

Variable	Effects	Source	Sum of Squares	df	Mean Square	F	P	Eta Squared
Heart rate	Within subjects	Time	443.32	2	221.66	7.51	0.001	0.166
		Time * group	389.22	2	194.61	6.60	0.002	0.148
	Between-subjects	Intercept	655049.63	1	655049.63	5036.74	0.000	0.993
		Group	61.63	1	61.63	0.474	0.495	0.012
Systolic hypertension	Within subjects	Time	2263.12	1.29	1764.07	3.78	0.048	0.091
		Time * group	423.950	1.283	330.463	0.71	0.438	0.018
	Between-subjects	Intercept	1761521.01	1	1761521.01	3544.50	0.000	0.989
		Group	165.67	1	165.67	0.33	0.567	0.009
Diastolic hypertension	Within subjects	Time	192.23	1.54	124.61	0.98	0.363	0.025
		Time * group	351.67	1.54	227.93	1.78	0.183	0.045
	Between-subjects	Intercept	739627.01	1	739627.01	5492.51	0.000	0.993
		Group	200.20	1	200.20	1.48	0.230	0.038
Breathing number	Within subjects	Time	3.62	2	1.81	2.50	0.089	0.062
		Time * group	1.35	2	0.67	0.93	0.398	0.024
	Between-subjects	Intercept	70228.41	1	70228.41	5732.73	0.000	0.993
		Group	63.07	1	63.07	5.15	0.029	0.119
Forgiveness	Within subjects	Time	926.87	2	463.43	15.29	0.000	0.287
		Time * group	681.67	2	340.83	11.24	0.000	0.228
	Between-subjects	Intercept	254656.53	1	254656.53	5369.32	0.000	0.993
		Group	6.53	1	6.53	0.138	0.713	0.004
Quality of life	Within subjects	Time	2368.82	1	2368.82	51.49	0.000	0.575
		Time * group	936.15	1	936.15	20.35	0.000	0.349
	Between-subjects	Intercept	823529.01	1	823529.01	5065.48	0.000	0.993
		Group	492.07	1	492.07	3.03	0.090	0.074
Physical health	Within subjects	Time	204.07	2	102.03	10.65	0.000	0.22
		Time * group	87.80	2	43.90	4.58	0.013	108
	Between-subjects	Intercept	74900.03	1	74900.03	2978.24	0.000	0.98
		Group	24.30	1	24.30	0.97	0.332	0.025
Psychological health	Within subjects	Time	406.22	2	203.11	20.559	0.000	0.351
		Time * group	89.62	2	44.81	4.536	0.014	0.107
	Between-subjects	Intercept	57860.21	1	57860.21	3004.83	0.000	0.988
		Group	106.41	1	106.41	5.526	0.024	0.127
Social relationships	Within subjects	Time	53.15	1.60	33.11	9.779	0.001	0.205
		Time * group	9.65	1.60	6.01	1.776	0.184	0.045
	Between-subjects	Intercept	13230.00	1	13230.00	2290.73	0.000	0.984
		group	19.20	1	19.20	3.324	0.076	0.080
Environment health	Within subjects	Time	369.02	2	184.51	9.010	0.000	0.192
		Time * group	60.72	2	30.35	1.483	0.234	0.038
	Between-subjects	Intercept	88509.01	1	88509.01	4856.23	0.000	0.992
		group	57.41	1	57.41	3.15	0.084	0.077

It should be noted that the use of this test required several initial assumptions, including normal distribution of scores, homogeneity of variances, and homogeneity of covariance matrices. For the scores of forgiveness and QOL in both groups, Kolmogorov–Smirnov (K-S) test confirmed the assumed normality (P > 0.05) and Levene's test confirmed the assumed homogeneity of variances (P > 0.05). For the assumption of homogeneity of the covariance matrix, Mauchly's test was used; the value obtained for forgiveness (P = 0.098) indicates that the test (P > 0.05) was insignificant and the assumed sphericity had not been violated. To examine the hypothesis related to forgiveness, the information related to assumed sphericity was used. However, the result of this test for

QOL (P = 0.002) showed that the assumed sphericity had been violated, and thus, the alternative Greenhouse-Geisser test was used for QOL.

In table 3, the results of repeated measures ANOVA for vegetative function, forgiveness, and QOL and its dimensions are summarized. Based on the results presented in table 3, there is a significant difference in heart rate per minute (P = 0.002) in the 3 stages of the test between the case and control groups; heart rate decreased significantly in the case group compared to the control group (P < 0.05). However, the other vegetative indices, such as systolic and diastolic blood pressure and respiratory rate per minute, did not significantly differ between the groups (P > 0.05). In table 3, the mutual effect of forgiveness and group shows a significant difference between the groups in terms of forgiveness scores in the 3 stages of the study. In other words, the forgiveness score significantly differed between the two groups (P = 0.001). Considering the mutual effect of QOL and group, it is clear that there is a significant difference between the groups in terms of QOL scores in the 3 study stages. In other words, the overall QOL was significantly different in the two groups (P< 0.001). There was a significant difference between the groups in terms of the scores of physical health (P = 0.013) and psychological health (P = 0.014) in the 3 stages of testing (Table 3), indicating that the scores of these dimensions increased significantly in the case group compared to the control (P < 0.05). However, no significant difference (P > 0.05) was observed in the other 2 dimensions of QOL (social relations and environmental health).

The results of the Bonferroni test presented in tables 4 and 5 show the pairwise comparison of the vegetative indices, forgiveness rate, and the QOL and its dimensions in the 3 study stages in the case and control groups.

Table 4. Pairwise comparisons of pretest, post-test, and follow-up scores of vegetative functions and forgiveness

Variable	(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	P-value
Heart rate	Pretest	Posttest	3.25	1.28	0.045
		Follow-up	-1.32	1.36	1.000
	Posttest	Pretest	3.25	1.28	0.045
		Follow-up	-4.57*	0.97	0.000
	Follow-up	Pretest	-1.32	1.36	1.000
		Posttest	4.57*	0.97	0.000
Systolic hypertension	Pretest	Posttest	9.47	4.33	0.105
		Follow-up	0.55	1.99	1.000
	Posttest	Pretest	-9.47	4.33	0.105
		Follow-up	-8.92	4.71	0.197
	Follow-up	Pretest	-0.55	1.99	1.000
		Posttest	8.92	4.71	0.197
Diastolic hypertension	Pretest	Posttest	-0.50	2.64	1.000
		Follow-up	-2.90	2.41	0.708
	Posttest	Pretest	0.50	2.64	1.000
		Follow-up	-2.40	1.41	0.294
	Follow-up	Pretest	2.90	2.41	0.708
		Posttest	2.40	1.41	0.294
Breathing number	Pretest	Posttest	0.42*	0.17	0.050
		Follow-up	0.20	0.18	0.837
	Posttest	Pretest	-0.42*	0.17	0.050
		Follow-up	-0.22	0.22	0.913
	Follow-up	Pretest	-0.20	0.18	0.837
		Posttest	0.22	0.22	0.913
Forgiveness	Pretest	Posttest	-6.350*	1.352	0.000
		Follow-up	-1.050	1.312	1.000
	Posttest	Pretest	6.350*	1.352	0.000
		Follow-up	5.300*	0.999	0.000
	Follow-up	Pretest	1.050	1.312	1.000
		Posttest	-5.300*	0.999	0.000

Based on estimated marginal means
*The mean difference is significant at 0.05 level.
b. Adjustment for multiple comparisons: Bonferroni test

Table 5. Pairwise comparisons of pretest, posttest, and follow-up scores of quality of life and its components

Variable	(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	P-value
Quality of Life	Pretest	Posttest	-8.30*	1.99	0.000
		Follow-up	2.250	1.97	0.779
	Posttest	Pretest	8.30*	1.99	0.000
		Follow-up	10.55*	1.20	0.000
	Follow-up	Pretest	-2.25	1.97	0.779
		Posttest	-10.55*	1.200	0.000
Physical health	Pretest	Posttest	-3.0*	0.72	0.001
		Follow-up	-0.55	0.77	1.000
	Posttest	Pretest	3.0*	0.72	0.001
		Follow-up	2.45*	0.57	0.000
	Follow-up	Pretest	0.55	0.77	1.000
		Posttest	-2.45*	0.57	0.000
Psychological health	Pretest	Posttest	-1.77*	0.69	0.041
		Follow-up	-4.47*	0.71	0.000
	Posttest	Pretest	1.77*	0.69	0.041
		Follow-up	-2.70*	0.71	0.002
	Follow-up	Pretest	4.47*	0.71	0.000
		Posttest	2.70*	0.71	0.002
Social relationships	Pretest	Posttest	-0.92	0.41	0.095
		Follow-up	0.70	0.41	0.285
	Posttest	Pretest	0.92	0.41	0.095
		Follow-up	1.62*	0.26	0.000
	Follow-up	Pretest	-0.70	0.41	0.285
		Posttest	-1.62*	0.26	0.000
Environment health	Pretest	Posttest	-1.77	0.85	0.133
		Follow-up	2.50	1.11	0.093
	Posttest	Pretest	1.77	0.85	0.133
		Follow-up	4.27*	1.05	0.001
	Follow-up	Pretest	-2.50	1.11	0.093
		Posttest	-4.27*	1.05	0.001

Based on estimated marginal means
*The mean difference is significant at 0.05 level.
b. Adjustment for multiple comparisons: Bonferroni test

As seen in table 4, the vegetative index of heart rate significantly decreased in the posttest compared to the pretest and vice versa (P = 0.045), but significantly increased in the follow-up compared to the posttest vice versa (P = 0.001). The other two vegetative indices, systolic/diastolic blood pressure and respiratory rate, did not significantly differ between the groups (P > 0.05). As can be seen in table 4, the rate of forgiveness increased significantly in the posttest compared to pretest vice versa (from posttest to pretest) (P = 0.001), while this difference from posttest to follow-up was not significant and vice versa (P = 1.00). However, the forgiveness score significantly decreased in the follow-up compared to posttest and vice versa (P < 0.001). Based on the data presented in table 5, the overall QOL score significantly increased from in the posttest compared to the pretest (and vice versa from posttest to pretest) (P = 0.001), but it significantly decreased in the follow-up compared to the posttest and vice versa (P = 0.001). Moreover, the difference in the QOL score from pretest to follow-up and vice versa was not significant (P = 0.779). The results of the Bonferroni test on the dimensions of physical health and psychological health are presented in table 5; the level of physical and psychological health has increased significantly in the posttest compared to pretest and vice versa (P < 0.05). Moreover, the increase in these two dimensions in the follow-up compared to posttest and vice versa was significant (P < 0.05).

Discussion

The aim of the present study was to determine the effect of a BBE-based psycho-education package on the improvement of vegetative functions, forgiveness, and QOL of patients with CHD. Repeated measures ANOVA and Bonferroni test showed that group education through an audio podcast reduced heart rate in the posttest compared to the pretest; however, this effect was only significant after a month of follow-up. This finding is consistent with that of similar studies (Friedberg et al., 2007; Toussaint et al., 2012; Derakhshan et al., 2016; Keyvanipour et al., 2019; Shore, 2004). However, in the present study, the effect of this intervention on the improvement of blood pressure and respiration rate was not confirmed in either the posttest or follow-up.

This educational intervention appears to have been effective on some vegetative functions of patients with CHD, including reduced heart rate. The effect of the training package on heart rate reduction may be related to reduction of emotional experiences such as anger, anxiety, and depression, and the effect of the training package techniques including relaxation, body awareness, and self-awareness on stress management. In addition, the forgiveness-related section of the training may explain the findings on the effect of forgiveness on stress reduction and its somatic symptoms (Puggina, 2016) and the relationship between the components of forgiveness and relaxation and body-awareness and its effect on stress management, and thus, reduced heart rate in cardiac patients (Valente et al., 2014). Nevertheless, the unsustainability of this effect is consistent with the results of this study regarding the unsustainable effect of education on forgiveness and QOL. In fact, reduction in the effect of BEE education on these variables reduces its direct and indirect effects on heart rate. Another assumption could be related to the psychological distress of patients due to negative social events (such as Soleimani's martyrdom, plane crash, and corona outbreak) that have been reported by many patients, which made them less likely to follow these exercises. This likelihood is increased by comparison of heart rate in the pretest, posttest, and follow-up stages between the case group and the control group and the increased heart rate in the control group compared to the case group in the follow-up phase compared to the pretest (although insignificant).

The findings of this study did not confirm the effect of the training package on reduction of systolic and diastolic blood pressure and respiratory rate, either in the posttest or in the follow-up phase. In interpreting this finding, we can point to the overlap and interaction of somatic symptoms of stress and symptoms of CHD. In fact, some vegetative functions of patients with CHD affected by stress respond with the effect of BEE program on body awareness relaxation, reduced stress levels, anxiety, improved mood and emotions and their management, increased forgiveness, and reduced negative emotional experiences and physical symptoms of stress, but some of these symptoms which are the result of dysfunction in the cardiovascular system are not affected.

The results of the present study also showed that the BEE-based psycho-education package increased the forgiveness scores of patients in the posttest compared to the pretest; however, this increase was not significant in the follow-up compared to posttest. This finding is consistent with the findings of similar studies in which face-to-face training has been used to influence forgiveness (Ghamari Givi et al., 2014; Asgari et al., 2016; Malekzadeh et al., 2017). It seems that BEE-based educational intervention can increase forgiveness scores of patients through training

and using intrapersonal, interpersonal, and transpersonal forgiveness as part of the training program, and possibly reduce negative emotions such as anger (Ghamari Givi et al., 2014; Asgari et al., 2016; Malekzadeh et al., 2017). However, the unsustainability of the positive status of patient forgiveness after 1 month may be due to abandonment of exercises and homework during the follow-up and/or short duration of exercises.

The results of this study showed the effect of the psycho-educational intervention on QOL. After the intervention, QOL scores increased significantly in the posttest compared to the pretest in the case group compared to the control group. This finding is consistent with the findings of similar studies in which face-to-face training has been used to influence QOL (May et al., 2014; Walker, 2012; Shiyasi & Khayatan, 2015). It seems that a BEE-based audio package used in coordination with different physical, cognitive, and communication levels and different techniques (such as relaxation, body awareness, orientation, relationship building, and forgiveness) can reduce negative emotions, cognitive barriers, and social adjustment and positively alter patients' perceptions of their QOL. However, it was found that positive effect of research intervention on QOL was only limited to the posttest stage and QOL was significantly reduced in the follow-up stage to almost that in the pretest stage. From this finding, two conclusions can be drawn. The first is the overlap and similarity of some of the forgiveness, QOL, and health constructs associated with CHD. Everything that happened in the posttest or follow-up phase for patients in one variable occurred in another variable. A health-related training program is associated with relaxing the body, regulating mood and emotions, and recognizing and forgiving all of which are important in forgiveness and QOL of heart patients. The second inference is related to psychological distress of patients in social events. Here, the assumption can be considered by looking at the findings presented in table 1 and comparing the pretest scores and tracking the patients of the 2 groups in terms of QOL.

The results of this study showed the effect of educational intervention on different dimensions of QOL; this intervention only caused a significant increase in scores of physical health and psychological health in the case group in the posttest compared to the pretest and the scores of these variables significantly reduced in the follow-up compared to posttest. The results also showed that the other 2 dimensions of QOL (social relations and environmental health) were not affected by the intervention. For interpretation of this finding based on the effect of the educational program on dimensions of QOL, we should take into consideration the content of the educational program (such as relaxation, and self-awareness and its closeness to the dimensions of physical and mental health), differences in individual characteristics and health status and its adaptation to dimensions of health and QOL, the timing of the educational intervention (time constraints for using techniques in areas outside of oneself such as relationships with others and environmental health), and limitations of self-reporting method in performing homework assignments (e.g., uncertainty about the complete and correct performance of exercises) and its effect on QOL and its dimensions. Therefore, further studies seem to be needed for a more accurate assessment of these two variables.

One of the limitations of the present study was the application of self-assessment questionnaires and the possibility of bias in them, impossibility of a longer follow-up such as 3 months or more due to the coronavirus outbreak, small sample size for the study of individual and socio-economic factors that can be effective in these interventions and lack of control over some of the confounding variables during the

intervention (the mentioned social events). Based on the limitations of the present study, it is suggested that these cases be considered in subsequent studies and that the training be conducted on a larger scale to assess individual-social factors with a longer follow-up stage. It is also recommended that future studies perform these interventions for a longer period of time to stabilize their positive effects.

Conclusion

BEE-based psycho-education had significant effects on reducing heart rate, and improving forgiveness and QOL of patients with CHD. However, these effects did not persist during the follow-up period due to pervasive social crises that prevented the program from being pursued appropriately. In order to sustain the positive effects of the intervention, more long-term exercises and methods were needed to strengthen motivation and monitor the continuation of this psychosomatic intervention.

Conflict of Interests

Authors have no conflict of interests.

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