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Experiences of what influences physical activity adherence in Iranian patients with heart failure: A qualitative study

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Abstract:

BACKGROUND: Heart failure (HF) is becoming one of the important health care problems around the world. Physical activity as the foundation of the cardiac rehabilitation program is poorly adhered to by patients with HF. This study aimed to understand the experiences of patients with HF in terms of adherence to physical activity.

MATERIALS AND METHODS: This study was conducted using conventional qualitative content analysis. Data were collected by semistructured telephone interviews with 25 patients with HF through open-ended questions. Data were collected from patients with HF in Birjand and Mashhad hospitals and heart departments from December 2021 to March 2022. Data were analyzed using Max-QDA10 and data analysis was continuous, comparative, and simultaneous with data collection.

RESULTS: After data analysis, three main categories were identified: (1) patient-related barriers and facilitators, (2) support system-related barriers and facilitators, and (3) environmental barriers and facilitators. These categories were subdivided into two main themes: (1) threatening disease and (2) challenging disease.

CONCLUSION: The results showed that beyond patient-related, support system-related, and environmental categories, perceiving the disease as a challenge or a threat is crucial in the activity of patients with HF. Nurses and other health care providers can train problem-solving behaviors to patients with HF to improve their physical and mental well-being. It is suggested that theoretical-behavioral approaches can be used in future clinical trials to improve adherence to physical activity.

Keywords:

Coping behavior, heart failure, patient adherence, physical activity, qualitative research

Introduction

Heart failure (HF) prevalence is increasing due to the aging of the population, the concomitant increase in the prevalence of obesity, hypertension, and diabetes, as well as the improvement in survival after early cardiac events, such as acute coronary syndrome.^[1] HF is one of the major health care problems affecting approximately 26 million people around the world.^[2] In Iran, HF is a common cause

of hospital admission, affecting about 3,700 out of every 100,000 people.^[3] Annual HF mortality rate in Iran is 32%.^[4] The control and treatment of cardiovascular disease (CVD) consumes a huge part of the medical budget of developing countries.^[5] Physical activity is at the foundation of the HF rehabilitation program, which is currently widely recommended in combination with pharmacotherapy for patients with HF. The benefits of physical activity in HF (improving physical activity tolerance and quality-of-life and reducing

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frequent admissions) have been widely approved.^[6] Adherence to physical activity is poor among patients with HF, with 40–91% of the patients not engaging in regular exercise.^[7-9] Treatment nonadherence remains a major problem for health care systems.^[10-13] It is critical to identify the reasons why individuals do not adhere to physical activity. Albert (2015) *et al.* and Warehime (2020) *et al.*^[8,14] investigated the factors affecting adherence to physical activity in patients with heart through qualitative approach. They reported results based on cultural and social experiences of patients. Based on their results, patients' understanding of physical activity has different aspects. Some of the influencing factors included social support, perceptions, emotions, and knowledge. Evidence supports the relationship between socioeconomic conditions and health outcomes for older adults.^[15] In addition, based on the observations, there is a significant difference between the adherence to the treatment regime in Iranian patients compared with other countries according to the characteristics of the health system based on factors such as social support and the care and follow-up system. For example, in Iran, nursing case management is limited to hospitals, and home visits for treatment or follow-up are not common. Therefore, the findings of some studies in other countries cannot be generalized to the Iranian population. Addressing adherence to physical activity in the cultural, social, and economic context of Iranian society and using a qualitative study to show experiences of the patients with HF can be effective in designing clinical trials based on their actual needs. No similar qualitative study examined the factors affecting the adherence to physical activity in patients with HF in Iran.

Materials and Methods

Study design and setting

This study was conducted using conventional qualitative content analysis that aimed to understand the experiences of patients with HF in terms of adherence to physical activity.

Study participants and sampling: After acquisition of the introduction letter, telephone interviews with semistructured and open-ended questions were conducted with 14 male and 11 female patients aged 64 (± 7) years old with HF. Interview was performed with 25 patients with HF from the cardiovascular hospitals in Mashhad and Birjand at east of Iran from December 2021 to March 2022. Inclusion criteria were patients diagnosed with HF for at least 8 months, aged at least 18 years old, with no history of admission in the last two months, with stable clinical condition, and ability to communicate. Exclusion criterion was cognitive impairment that prevented interviewing.

Data collection tool and technique

The duration of the interviews varied from 30 to 45 min. Interviews were conducted by telephone at the request of participants. Some interview questions are given in Table 1. Interviews were recorded and transcribed word by word. Data were converted into semantic units, repeatedly reviewed and then coded to reveal the thoughts, ideas, and meanings. In this regard, events and topics that were indicative of the phenomenon were named or coded.

Data analysis

Data were analyzed using conventional content analysis. Data analysis was simultaneous with data collection.

Data were analyzed using Max-QDA10 and according to the following stages: (1) writing the interview immediately after each interview, (2) reading the interview text for a general understanding, (3) determining the units of meaning and primary codes, (4) classifying similar primary codes into more comprehensive categories, and (5) determining the content of the data.^[16]

Rigor: Four criteria were considered for data trustworthiness: credibility, dependability, transferability, and Confirmability.^[17]

The researcher with long-term involvement and sufficient interaction with participants. Collecting reliable information and confirming the information by the participants tried to increase the credibility of the research.

To increase the dependability of the data, step-by-step repetition of data collection and analysis and the use of surveys by supervisors, consultants, and experts were carried out.

To increase the confirmability of the data, the approval of the university faculty and their additional comments were used.

Transferability was done by trying to provide a rich description of the research report to evaluate and applicability of the research in other fields.

Table 1: Some questions of interview

Describe your normal day since the time you wake up to the time you go to sleep.

Remember a day when you were satisfied with your physical activity during the day. What made you active that day and why?

How active are you daily?

What makes you exercise more?

What prevents you from exercising (barriers)?

What information have you been given about being active as a person with heart failure?

What do others think about your exercise (for example, partner, family, etc.)?

Ethical consideration

This project was approved at ethics committee. The time of the interviews were chosen according to the participants' convenience. Participants were informed about the purpose of study and the use of the tape recorder and the confidentiality of information.

Results

After data analysis, three main categories were identified: (1) patient-related barriers and facilitators, (2) support system-related barriers and facilitators, and (3) environmental barriers and facilitators. These categories were subdivided into two main themes: (1) threatening disease and (2) challenging disease. The demographic information of the participants is given in Table 2. The sub-categories and a summary of the results are given in Table 3.

Threatening disease or Challenging disease: Hidden themes (challenge and threat) that emerged in this qualitative analysis were part of Roy adaptation model, which were confirmed by the study results.

Individuals' cognitive perception can identify and interpret environmental stimuli as challenges or threats. Individuals consciously or unconsciously use cognitive perception to assess, interpret, explain, and show behavioral responses to their experiences. When a person sees a stimulus as a threat, the stimulus causes stress, and the person uses emotional responses to relieve stress, such as changing situations, denial and/or avoidance, which in the case of treatment regimen may lead to treatment nonadherence. When a person interprets a stimulus as a challenge or conflict, it triggers behavioral responses and the person uses the problem-solving process that in the case of a treatment regimen may lead to treatment regimen adherence.^[11]

Regarding patient-related barriers and facilitators Individuals who perceive the disease as a threat, will exhibit emotional responses such as fear, bad mood, dependence, retirement, maladaptation, and finally reduced activity and inactivity. In contrast, individuals who perceive illness as a challenge use the problem-solving process to seek solutions to their problems, as well as adaptation methods such as finding alternative strategies, having fun with physical activity, etc.

Regarding support system-related barriers and facilitators, a patient may see isolation as a reason for inactivity, while another may see it as an opportunity to take responsibilities and activities. Some mentioned family members as a reason for inactivity, while others mentioned fun with grandchildren as an incentive for

Table 2: Background details on participants

Variables	Frequency (%)
Mean duration of heart failure	5 (±2) (year)
Age (year)	64 (±7) (year)
Gender	14 males/11 females
Diabetes	73.1%
Hypertension	46%
Asthma	3%
Arthritis	11%
Hyperlipidemia	11%
Fatty Liver	3%
Psychological Diseases	3%

Table 3: Summary of the results and categories

Theme	Main categories	Sub-categories
Challenging Disease	Patient-related barriers and facilitators	Behavioral problems
		Disease in turbulence
Threatening Disease	Support system-related barriers and facilitators	understand and interact with the disease
		Effects of family and communication
		Interaction between the treatment system and heart failure
	Environmental barriers and facilitators	Environmental factors as barriers
		Environmental factors as motives

activity. Those patients, who can cope with the disease challenge, seek solutions to HF problems or perform the activity by trial and error. They seek instructions and solutions from their physician or the health care system. Patients who perceive the disease as a threat select emotional responses such as bad mood and avoidance of activity, which worsen the disease.

In terms of environmental barriers and facilitators, it is clear that environmental conditions have a significant effect on activity, but they can be overcome. For example, one goes to the yard, another to the garden and a third walks around the house in the absence of a suitable environment, the Covid-19 pandemic and bad weather. Figure 1 shows a scheme of the relationship between these factors.

Patient-related barriers and facilitators

1. Behavioral factors

1.1. Having Fun with physical activity: Individuals who had fun with physical activity were more active in daily life. "I am always watching TV at home." (Participant No. 25) "I do a lot of pruning in the garden. I am more active now. I get tired but it is entertaining. I am more energized when I am there." (Participant No. 21)

1.2. Dependence: Individuals who remain active while having HF-related problems are independent in dealing with these problems and live a more active life. "I cannot do some personal tasks. I cannot bend my head too much. I need someone to help me with some work." (Participant No. 25) "I

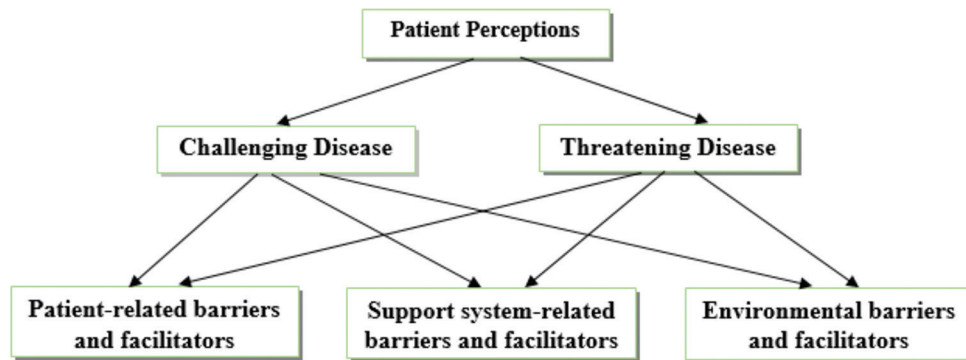


Figure 1: Relationship between patient perceptions and barriers and facilitators of physical activity adherence

live alone. I do my personal tasks I don't like to be dependent on my children." (Participant No. 20)

1.3. Fear: It was reported as a reason for inactivity: "When I walk a lot, I sometimes feel short of breath. My legs start to feel numb. I may fall. I have to find a place to sit. For this reason, I fear to go somewhere alone. I need someone to help me." (Participant No. 16)

2. Disease-related factors: Individuals who describe a pleasant experience with activity reported greater physical activity, whereas those with Negative experience reported less physical activity. **2. 1. Negative experience of physical activity:** "I can't go shopping because I can't walk long distances. I often have to sit down because I can't walk all the way to the store." (Participant No. 2)

2. 2. Positive experience of physical activity: "I feel better when I exercise." (Participant No. 16)

3. Knowledge and belief: Knowledge and belief about the disease was considered as a factor affecting activity. "I believe our family has a genetic predisposition to cardiovascular disease and hyperlipidemia. My mum passed away because of cardiovascular disease and hyperlipidemia. She was also active. I do not believe that physical activity will have an effect on the disease." (Participant No. 23)

4. Psychological problems: Psychological problems affected physical activity.

"If my mood and my physical condition is good, I will go for a walk." (Participant No. 9)

"I do not have time to go out. My mood is bad. My physician advised me to see a psychologist. He even implied that I was depressed." (Participant No. 11)

5. Adaptation: Individuals who perceive their disease as a challenge use adaptation methods such as finding alternative strategies, having fun with physical activity, etc.

"I do not go out. I have no reason to leave the house. I just walk inside the house for a while." (Participant No. 25) "I do not do much work. I get tired quickly. I pray while I am seated. I do things slowly." (Participant No. 1)

6. Maladaptation: "Before cardiovascular disease, I was more active than I am now that I take these heart medications. My body got weaker, and now I cannot walk as well as I used to." (Participant No. 16)

Support system-related barriers and facilitators:

1. Family and communication factors

1.1. Family: Although the presence of family and children improved mood in some cases, it both directly and indirectly hindered the activities of these individuals.

"My children prevent me from working excessively; but if I sit, I get more tired." (Participant No. 3) "My children do all of the work. I do not even drive, which is OK with me and I left the tasks to the children." (Participant No. 7)

1.2. Communication: In some cases, communication increased activity, whereas in others it decreased activity. "When I do not have any visitors I take more walks around the house and I am more active. It is impossible for me to stay active when I have visitors because they just sit and talk." (Participant No. 7)

"There used to be a retirement home next to our house. I used to go there to plant flowers and play sports. I discussed the past with my peers. I no longer go there because of knee pain. The center address has changed and I have no car to go there." (Participant No. 24)

1.3. Isolation: Loneliness made individuals more responsible for their own affairs. On the other hand, it lowered individuals' morale, and they declared bad mood as a reason for no physical activity. "I live alone. I do my own thing." (Participant No. 20) "Fewer individuals are going to see their families. Now no one goes anywhere. I do not feel good about this; I do not have the patience to exercise." (Participant No. 25)

2. Factors related to the health care system

2.1. Health care system and training: Cases such as lack of training on strategies for controlling symptoms, activity despite symptoms, Lack of information related to the disease and treatment affected activity. *“The physician and other personnel did not provide me any information about physical activity.”* (Participant No. 18)

“As a beginner, I had short of breath while walking; I could not walk. I informed the doctor that I could not walk. He instructed me to walk for a few minutes every day and to add a few steps the next day. I gradually increased my steps in the same way, and now I am not out of breath when walking. My doctor advised me to sit and rest whenever I was experiencing shortness of breath.” (Participant No. 22)

2.2. Health care system and supportive role: Patient follow-up, insurance, and financial issues affected the activity of these patients. *“I asked my physician whether I might undergo cardiac rehabilitation. She informed me that insurance only covered rehabilitation six months after cardiovascular surgery. Now, it is quite costly and not covered by insurance.”* (Participant No. 2)

“I am not insured, the medicines are costly for me.” (Participant No. 3)

Environmental barriers and facilitators

Participants mentioned cold weather, stairs, rough environment, and a lack of a special workout setting as reasons for inactivity, whereas spring and a suitable environment around the house were mentioned as reasons for activity and walking.

“I cannot walk in crowded places where there are cars, and I move slowly, so I can hardly cross a busy street.” (Participant No. 6) *“I cannot go uphill. If the path is smooth, I have no problem. I walk slowly.”* (Participant No. 4) *“I have been walking considerably less since the Covid-19 pandemic.”* (Participant No. 9) *“I do not go for a walk. The weather is cold. I walk at home. If the weather gets warm, I may go for more walks in the spring.”* (Participant No. 7)

“My grandchildren have been visiting me more often since the Covid-19 pandemic and the closure of schools, so I became more active at home.” (Participant No. 20)

Discussion

In this study, patient-related, support system-related, and environmental barriers and facilitators and most importantly, perception of the disease as a challenge or threat affected the activity of patients with HF.

The results of several studies showed that patients' perception of the disease as a challenge increased

treatment adherence, while perception of the disease as a threat decreased treatment adherence.^[11,18,19] This results is consistent with the results of studies on relationship between cognitive perception and self-care behavior in patients with diabetes.^[12,20]

By consulting and training patients on how to use problem-solving behaviors in individual and social situations, nurses can improve the physical and mental well-being of patients with HF.^[18]

Studies show that the use of theories/models of health promotion and education has an overall positive effect on various health outcomes in patients with CVD.^[21] Seixas et al.^[22] stated in a study that patients' nonadherence to healthy lifestyle behaviors and treatment regimens constitutes a significant part of the burden associated with chronic diseases. Several studies showed that patients with HF experienced fear, social isolation, and loss of control, which could lead to psychological distress, depression, anxiety, and frustration.^[23,24] Several other studies have reported the relationship between psychological distress and poor self-care behaviors.^[25,26] Heo et al. (2021)^[27] showed that one of the possible reasons for the ineffectiveness of self-care strategies in HF was the lack of knowledge about HF symptoms and management. Lack of patient knowledge and awareness regarding HF may also increase the risk of worsening HF.^[28] Freedland (2021) showed that patients with psychosocial problems, including depression, stress, anxiety, and inadequate social support were more likely to have difficulty in self-care than other patients with HF, which can increase their risk of readmission.^[29] The transtheoretical model (TTM) from the field of psychotherapy is one of the most popular models in health education research and practice, which has been widely used in behavioral research and primary and secondary prevention. Considering the many aspects of physical activity adherence, this model can be used to educate and improve the health of these people.^[30]

Self-care requires knowledge and skills in self-care behavior as well as adaptation to one's values.^[31] Adherence is easier for patients who have a support system.^[32] Support can help patients take care of themselves and reduce their dependence on others. However, support should not be so great that patients become passive in their care and dependent on others.^[23] Perceived emotional/informational support is associated with better self-care management.^[33]

Social isolation is associated with an increased risk of death, use of health care, loss of control, and readmission in patients with HF.^[34-36] Studies indicated that attending a rehabilitation center, being involved in family and community circles, and having a pet were helpful. Family

and friends were important in motivating the patient to participate in an activity, but when they overprotect the patient, they might become a barrier to activity.^[23]

Some studies reported a lack of insurance coverage for cardiac rehabilitation services for patients with HF as a barrier to the use of rehabilitation programs and physical activity.^[31] Some studies have pointed out the role of various barriers such as lack of knowledge about benefits of rehabilitation program, costs, socio-economic status, and lack of insurance coverage for rehabilitation program.^[37,38] Similarly, in the McCarthy study, lack of insurance coverage of cardiac rehabilitation services in HF was identified as a barrier to utilization of rehabilitation programs.^[31] Lack of social support is a barrier to self-care.^[39] Amirova *et al.* (2021)^[40] reported the local environment, equipment, facilities and resources as barriers to empowerment of patients with HF.^[40] A lack of a safe environment may prevent patients with HF from engaging in physical activity around their home.^[41] In several studies, undesired climate and cold were introduced as barriers to physical activity of patients with HF.^[42,43]

A review study (2022) showed a significant reduction in the active behavior of patients with HF during the Covid-19 pandemic. Alternative approaches, such as cardiac rehabilitation for patients with CVD can be considered to maintain a regular active lifestyle during recent pandemic and any future epidemics.^[44]

Limitations and recommendation

The present study specifically investigated the barriers and facilitators of adherence to physical activity in Iranian patients with HF. The limitations of this study were the reluctance of the participants to conduct face-to-face interviews due to the Covid-19 pandemic. It is suggested that doctors, nurses, and other members of the treatment team pay more attention to the psychological issues related to patients with HF. Also, the use of transtheoretical model and theoretical-behavioral approaches may be effective in improving the physical activity adherence in these patients.

Conclusion

The results showed that understanding the disease as a challenge or threat for activity of patients with HF is crucial. The health care system, nurses, and other health care providers can improve the physical and mental well-being of patients with HF by advising and training patients about the use of problem-solving behaviors in individual and social situations. It is suggested to pay more attention to the use of theoretical-behavioral approaches to improve adherence to physical activity in future clinical trial studies.

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Conflicts of interest

There are no conflicts of interest.

References

1. Nakanishi M, Miura H, Irie Y, Nakao K, Fujino M, Otsuka F, *et al.* Association of adherence to a 3 month cardiac rehabilitation with long-term clinical outcomes in heart failure patients. *ESC Heart Fail* 2022;9:1424-35.
2. Harwood AE, Russell S, Okwose NC, McGuire S, Jakovljevic DG, McGregor G. A systematic review of rehabilitation in chronic heart failure: Evaluating the reporting of exercise interventions. *ESC Heart Fail* 2021;8:3458-71.
3. Mohammadi F, Jahromi MS, Bijani M, Karimi S, Dehghan A. Investigating the effect of multimedia education in combination with teach-back method on quality of life and cardiac anxiety in patients with heart failure: A randomized clinical trial. *BMC Cardiovasc Disord* 2021;21:535.
4. Sarrafzadegan N, Mohammadifard N. Cardiovascular Disease in Iran in the Last 40 years: Prevalence, mortality, morbidity, challenges and strategies for cardiovascular prevention. *Arch Iran Med* 2019;22:204-10.
5. Shakibazadeh E, Sabouri M, Mohebbi B, Tol A, Yaseri M. Validity and reliability properties of the Persian version of perceived health competence scale among patients with cardiovascular diseases. *J Educ Health Promot* 2021;10:19.
6. Volterrani M, Iellamo F. Cardiac rehabilitation in patients with heart failure: New perspectives in exercise training. *Card Fail Rev* 2016;2:63-8.
7. Cewers E, Joensson A, Weinstein JM, Ben Gal T, Jaarsma T. Physical activity recommendations for patients with heart failure based on sex: A qualitative interview study. *J Rehabil Med* 2019;51:532-8.
8. Warehime S, Dinkel D, Alonso W, Pozehl B. Long-term exercise adherence in patients with heart failure: A qualitative study. *Heart Lung* 2020;49:696-701.
9. Klompstra L, Liljeroos M, Jaarsma T, Strömberg A. Experience of physical activity described by patients with heart failure who have received individualized exercise advice: A qualitative study. *J Rehabil Med* 2021;53:jrm00139. doi: 10.2340/16501977-2771.
10. Ahrari S, Moshki M, Bahrami M. The relationship between social support and adherence of dietary and fluids restrictions among hemodialysis patients in Iran. *J Caring Sci* 2014;3:11-9.
11. Heydari A, Ahrari S, Vaghee S. The relationship between self-concept and adherence to therapeutic regimens in patients with heart failure. *J Cardiovasc Nurs* 2011;26:475-80.
12. Ahrari S, Mohammadpour A, Amouzesi Z, Agha-Yousefi A. The relationship between cognitive appraisal and adherence to medical regimens in type 2 diabetic patients. *J Caring Sci* 2014;3:277-85.
13. DaSantos A, Goddard C, Ragoobirsingh D. Self-care adherence and affective disorders in Barbadian adults with type 2 diabetes. *AIMS Public Health* 2021;9:62-72.

14. Albert NM, Forney J, Slifcak E, Sorrell J. Understanding physical activity and exercise behaviors in patients with heart failure. *Heart Lung* 2015;44:2-8.
15. McMaughan DJ, Oloruntopa O, Smith ML. Socioeconomic status and access to healthcare: Interrelated drivers for healthy aging. *Front Public Health* 2020;8:231.
16. Denise Polit CB. *Essentials of Nursing Research: Appraising Evidence for Nursing Practice*. Tenth, North American edition. LWW; 2021.
17. Singh M, Thirsk L, Stahlke S, Venkatesaperual R, LoBiondo-Wood G, Haber J. *LoBiondo-Wood and Haber's Nursing Research in Canada: Methods, Critical Appraisal, and Utilization*. 5th ed. Mosby Canada; 2021.
18. Thomas CM. The influence of self-concept on adherence to recommended health regimens in adults with heart failure. *J Cardiovasc Nurs* 2007;22:405-16.
19. Chen S, Jackson T. Causal effects of challenge and threat appraisals on pain self-efficacy, pain coping, and tolerance for laboratory pain: An experimental path analysis study. *PLoS One* 2019;14:e0215087. doi: 10.1371/journal.pone.0215087.
20. Carpenter R. Appraisal of perceived threat of diabetes and the relation to adherence for adults in Appalachia. *J Health Care Poor Underserved* 2012;23:726-38.
21. Mohebbi B, Sabouri M, Tol A. Application of health education and promotion theory-based interventions on patients with cardiovascular disease: A systematic review. *J Educ Health Promot* 2021;10:236.
22. Seixas A, Connors C, Chung A, Donley T, Jean-Louis G. A pantheoretical framework to optimize adherence to healthy lifestyle behaviors and medication adherence: The use of personalized approaches to overcome barriers and optimize facilitators to achieve adherence. *JMIR Mhealth Uhealth* 2020;8:e16429. doi: 10.2196/16429.
23. Charuel E, Bernard M, Vaillant Roussel H, Cambon B, Ménini T, Lafarge E, *et al.* "I Can't Go Far": Perceptions and experiences of heart failure patients regarding physical activity: A qualitative study using semistructured face-to-face interviews. *Health Educ Behav* 2022;49:78-86.
24. Celano CM, Villegas AC, Albanese AM, Gaggin HK, Huffman JC. Depression and anxiety in heart failure: A review. *Harv Rev Psychiatry* 2018;26:175-84.
25. Hwang B, Moser DK, Dracup K. Knowledge is insufficient for self-care among heart failure patients with psychological distress. *Health Psychol* 2014;33:588-96.
26. Kessing D, Denollet J, Widdershoven J, Kupper N. Psychological determinants of heart failure self-care: Systematic review and meta-analysis. *Psychosom Med* 2016;78:412-31.
27. Heo S, Moser DK, Lennie TA, Kim J, Turrise S, Troyan PJ, *et al.* Self-care strategies and interventions needed in patients with heart failure: From patient perspectives-A qualitative study. *Eur J Cardiovasc Nurs* 2021;20:540-6.
28. Kobayashi M, Wilcke C, Girerd N. Assessment of patient knowledge, awareness, and adherence in heart failure in a real-life setting: Insights from data acquired in pharmacies. *J Clin Med* 2022;11:863.
29. Freedland KE, Skala JA, Steinmeyer BC, Carney RM, Rich MW. Effects of depression on heart failure self-care. *J Card Fail* 2021;27:522-32.
30. Mohebbi B, Tafaghodi B, Sadeghi R, Tol A, Yekanenejad MS. Factors predicting nutritional knowledge, illness perceptions, and dietary adherence among hypertensive middle-aged women: Application of transtheoretical model. *J Educ Health Promot* 2021;10:212.
31. McCarthy M, Katz SD, Schipper J, Dickson VV. "I Just Can't Do It Anymore" patterns of physical activity and cardiac rehabilitation in African Americans with Heart Failure: A mixed method study. *Healthcare (Basel)* 2015;3:973-86.
32. Khaledi GH, Mostafavi F, Eslami AA, Rooh Afza H, Mostafavi F, Akbar H. Evaluation of the effect of perceived social support on promoting self-care behaviors of heart failure patients referred to the cardiovascular research center of Isfahan. *Iran Red Crescent Med J* 2015;17:e22525. doi: 10.5812/ircmj.22525v2.
33. Cené CW, Haymore LB, Dolan-Soto D, Lin FC, Pignone M, Dewalt DA, *et al.* Self-care confidence mediates the relationship between perceived social support and self-care maintenance in adults with heart failure. *J Card Fail* 2013;19:202-10.
34. Manemann SM, Chamberlain AM, Roger VL, Griffin JM, Boyd CM, Cudjoe TKM, *et al.* Perceived social isolation and outcomes in patients with heart failure. *J Am Heart Assoc* 2018;7:e008069. doi: 10.1161/JAHA.117.008069.
35. Lockhart E, Foreman J, Mase R, Heisler M. Heart failure patients' experiences of a self-management peer support program: A qualitative study. *Heart Lung* 2014;43:292-8.
36. Heidari Gorji MA, Fatahian A, Farsavian A. The impact of perceived and objective social isolation on hospital readmission in patients with heart failure: A systematic review and meta-analysis of observational studies. *Gen Hosp Psychiatry* 2019;60:27-36.
37. Heydarpour B, Saeidi M, Soroush A, Komasi S. What is the most serious obstacle to participation in outpatient cardiac rehabilitation programs among Iranian patients? *Iran J Nurs Midwifery Res* 2019;24:158.
38. Koehler Hildebrandt AN, Hodgson JL, Dodor BA, Knight SM, Rappleyea DL. Biopsychosocial-Spiritual Factors Impacting Referral to and Participation in Cardiac Rehabilitation for African American Patients: A systematic review. *J Cardiopulm Rehabil Prev* 2016;36:320-30.
39. Allemann H, Strömberg A, Thylén I. Perceived social support in persons with heart failure living with an implantable cardioverter defibrillator: A cross-sectional explorative study. *J Cardiovasc Nurs* 2018;33:E1-8. doi: 10.1097/JCN.0000000000000523.
40. Amirova A, Lucas R, Cowie MR, Haddad M. Perceived barriers and enablers influencing physical activity in heart failure: A qualitative one-to-one interview study. *PLoS One* 2022;17:e0271743.
41. Sharma A, Colvin-Adams M, Yancy CW. Heart failure in African Americans: Disparities can be overcome. *Cleve Clin J Med* 2014;81:301-11.
42. Klompstra L, Jaarsma T, Strömberg A, van der Wal MHL. Seasonal variation in physical activity in patients with heart failure. *Heart Lung* 2019;48:381-5.
43. Shoemaker MJ, Kampfschulte A, Rustmann S, Dickinson MG. Dynamic factor analysis of seasonal variation in daily physical activity in individuals with heart failure and implanted cardiac devices. *Heart Lung* 2021;50:754-62.
44. Kirsch M, Vitiello D. The COVID-19 pandemic lowers active behavior of patients with cardiovascular diseases, healthy peoples and athletes. *Int J Environ Res Public Health* 2022;19:1108.