Original Article

Physical Resilience and its Related Factors in Iranian Older Adults with Ischemic Heart Disease: A Cross-Sectional Study

Mohsen Taghadosi, Zohreh Sadat, Hosna Ranjbar-Kashi

Trauma Nursing Research Center, Kashan University of Medical Sciences, Kashan, Iran

ORCID:

Mohsen Taghadosi: 0000-0001-9782-0862

Zohreh Sadat: 0000-0002-8408-0786

Hosna Ranjbar-Kashi: 0000-0002-5164-9622

Background: Many biological and cultural factors are involved in the physical resilience of older adults, but these factors are not fully known and the results of studies are contradictory in this field. Objectives: The present study was conducted to determine the level of physical resilience and its associated factors in Iranian older adults with ischemic heart disease (IHD). Methods: A cross-sectional study was conducted on 350 older adults with IHD admitted to Shahid Beheshti Hospital in Kashan, Iran, in 2018. Sampling was done consecutively. Eligible older adults completed a demographic form and the Resnick physical resilience questionnaire in the presence of the researcher. Data were analyzed using Pearson's correlation coefficient, t-test, analysis of variance, and multivariate regression. **Results:** A majority of the participants were female (50.6%) and mostly resided in urban areas (67.4%). The overall mean score of physical resilience was 9.57 ± 3.00 out of 15. Women, those with an unmarried child at home, those who were literate and lived in urban areas, those without comorbidities, and those who did not receive financial support from family members had significantly higher resilience scores (P < 0.05). Multiple linear regression analysis showed that younger age (P < 0.001), better cognitive function (P = 0.006), and employment (P = 0.01)significantly predicted physical resilience. Conclusion: The average score of the participants was above 50% of the score of the physical resilience questionnaire. Our findings encourage authorities to develop comprehensive care plans including community education and more diverse care for patients with noncommunicable diseases, to increase resilience in older adults with IHD.

Keywords: Iran, Ischemic heart disease, Older adults, Physical, Resilience

INTRODUCTION

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Cardiovascular diseases (CVDs) are a global problem and the leading cause of hospital admission in elderly people impose a significant financial burden on the health-care system.^[1,2] Pain, nausea, vomiting, shortness of breath, fatigue, and weakness are the most common physical symptoms in patients with CVD and interfere with their daily activities. In addition to the direct and indirect costs of diagnosis, treatment, and care, reduced income and feelings of inefficiency can affect how older adults cope with their disease.^[3]

Humans are multidimensional beings with interactive biopsychosocial dimensions, and all these dimensions

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are affected by the disease. Resilience is also an important factor that influences how people respond to the disease.^[4] Over the past decade, resilience has attracted the attention of many researchers.^[4] It is defined as a positive adaptation to adverse circumstances^[4,5] and determines how psychological and physical balance is established in the face of disease and other hazardous conditions.

Address for correspondence: Ms. Hosna Ranjbar-Kashi, Trauma Nursing Research Center, Kashan University of Medical Sciences, Kashan, Iran. E-mail: phsa.ranjbar@gmail.com

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Psychological resilience is defined as the ability to successfully withstand threatening and difficult situations. Physical resilience is the ability to restore or optimize functions in the face of unfortunate events associated with age or disease.^[5] According to Fontes and Neri, resilience is not passive resistance to injury or threatening conditions. Rather, resilient people are able to actively participate, organize their environment, and maintain their biological and psychological equilibrium in the face of hazardous conditions.^[6] Osofsky et al. have also defined resilience as the ability to achieve, maintain, or regain some degree of physical and emotional health after an illness or devastating loss.^[7] Sparkling presented a conceptual framework where resilience is a process and results from the relationship between adversity, protective factors (family and social relationships), and positive outcomes.^[8]

Several factors such as age,^[9] gender,^[10] religion,^[11] financial status,^[12] living with others, social support, and social performance^[13] have been shown to be associated with resilience. Two studies in Switzerland and Ecuador, that examined individuals aged 17-103 years, found that several factors were associated with resilience.^[14,15] A study in Germany also showed that older age was associated with increased resilience in patients with heart failure,^[13] whereas a study in the United States reported that resilience decreased after age 75.^[16] However, a study in England found no significant association between age and resilience.^[17] In a study in Pakistan, Malik (2015) investigated the predictors of resilience in outpatients with heart disease and found that resilience was higher in men than in women.^[10] However, Connor and Davidson reported that women were more resilient.^[17] A study of African-American women with diabetes also reported that more than half of the patients had high levels of resilience.[11] de Lemos et al. in Brazil also examined the level of resilience in patients with ischemic heart disease (IHD) and reported that 81% of these patients were highly resilient.^[18] Some studies have also identified spirituality and favorable financial conditions as factors that strengthen resilience.[12,19] Resilience improves quality of life,^[10] enhances community responsiveness and social participation,^[20] and also has positive effects on health behaviors and chronic disease management.[18]

Although some studies have examined resilience in various groups of patients, less attention has been paid to physical resilience in older adults with IHD. In addition, most resilience studies have used generic scales such as the Connor-Davidson Resilience Scale. This scale focuses mainly on psychological resilience and is not specific to older adults.^[21]

Objectives

Given the conflicting reports on the level of resilience and the associated factors in different societies, and the lack of studies on physical resilience in patients with IHD, this study aimed to determine the level of physical resilience and its associated factors in older adults with IHD referred to Shahid Beheshti Hospital in Kashan, Iran.

Methods

Study design and participants

This cross-sectional study was conducted from August to November 2019 on 350 older adults with IHD admitted to the cardiac, emergency, and rehabilitation departments of Shahid Beheshti Hospital in Kashan, Iran. We calculated the sample size using formula 1 and according to data reported in an earlier study, where the mean resilience in older adults was 89.90 ± 9.50 .^[22] Then, considering a confidence level of 95%, a δ of 9.50, and a measurement precision of 1.9 (i.e. $d = 0.2 \delta$ =0.2 × 9.5), 350 subjects were estimated to be needed for the study.

$$n = (z_{1-\frac{\alpha}{2}})^2 * \delta / d^2$$

Formula 1

Participants were recruited consecutively from those with inclusion criteria. Inclusion criteria were the age of 60 years and older, a medical diagnosis of IHD; no visual, hearing, and speech disorders (reported by patients); a score of 22 or higher on the mini-mental state examination (MMSE) questionnaire, and willingness to participate in the study. A decision to withdraw and an incomplete response to the questionnaire were considered exclusion criteria.

Through a daily review of the files of older adults with IHD admitted to the aforementioned departments, the first researcher identified those with the inclusion criteria and invited them to participate in the study.

Data collection instruments

Data were collected using a demographic questionnaire, the physical resilience scale (PRS), and the MMSE.

The demographic questionnaire consisted of items on the participants' age, sex, monthly income, place of residence, smoking, time since diagnosis of IHD (according to the patient's file), having an unmarried child at home, receiving support and care from others, education level of the person and his/her spouse, occupation of the person and his/her spouse, and concomitant disorders and their duration. The PRS was developed by Resnick et al.[22] and consists of 15 items that measure resilience associated with recovery after acute physical events such as fractures, muscle strains, pneumonia, and stroke, as well as recovery after exacerbations of chronic disorders, such as inflammatory arthritis or chronic obstructive pulmonary disease. All items are scored as "agree = 1" and "disagree = 0." The overall score ranges from 0to 15, with higher scores indicating greater resilience. The Cronbach's alpha of the PRS was reported as 0.90.^[22] We translated the PRS from English into Persian and assessed its content validity both quantitatively and qualitatively. In the qualitative content validity assessment, 10 experts in the field of nursing education confirmed the grammar and wording of the PRS items. In the quantitative content validity assessment, the content validity ratio (CVR) and content validity index (CVI) were calculated. To this end, 10 experts in nursing education were asked to rate the essentiality of the items (on a three-point scale as "Essential," "Useful but not essential," or "Unessential.") All items showed CVR and CVI above 0.8. For reliability assessment, twenty older adults completed the PRS twice with a 2-week interval, and the reliability correlation coefficient was calculated to be 0.92.

The MMSE was developed by Folstein in 1975 to screen for cognitive impairments. This scale includes 20 items for assessing cognitive functions such as orientation, immediate memory, attention, delayed recall, and language. The overall score of the MMSE ranges from 0 to 30, with higher scores indicating better cognitive performance. Seyedian *et al.* evaluated the psychometric properties of the Persian MMSE, and its Cronbach's alpha was reported to be 0.81.^[23]

The participants in this study were referred to the cardiac, emergency, and cardiac rehabilitation departments of Beheshti Hospital in Kashan, Iran, and were selected through convenience sampling. The questionnaires were completed as self-report and the researcher was also available for assistance if needed. The researcher provided the participants with the study questionnaires and instructed them how to complete them in a private and quiet environment. The researcher was available to provide assistance to participants as they completed the questionnaire if needed. For low-illiterate participants, the researcher read the questionnaire items and possible responses to the participants and recorded their answers on the related questionnaire.

Data analysis

The data were analyzed using the SPSS software v. 16.0 (SPSS Inc., Chicago, IL, USA). The normality of quantitative variables was assessed using the Kolmogorov–Smirnov test. Descriptive statistics (frequency, percentage, mean and standard deviation) were used to describe and classify the demographic data. Pearson correlation coefficient, independent samples *t*-test, and analysis of variance were used to compare the mean scores of PRS between subgroups of participants. Multivariate regression analysis was performed to identify the variables associated with physical resilience. For this purpose, the backward model was conducted with the removal criterion of P < 0.20. Then, all the remaining variables with P < 0.20 were re-entered into the model and analyzed using the forward method. P < 0.05 was considered statistically significant in all tests.

Ethical considerations

Permission to conduct the present study was obtained from the Research Ethics Committee and the Vice-Chancellor for Research at Kashan University of Medical Sciences (ethics code: IR.KAUMS.NUHEPM. REC.1396.12). The researchers also sought necessary permissions from the authorities of Shahid Beheshti Hospital in Kashan, Iran. All participants received clear explanations about the aims and methods of the study and the confidentiality of the data. In addition, they were assured that participation in the study would carry no cost or risk. They were also free to participate or withdraw from the study at any time and signed a written informed consent form before participation. We also observed all the rights of the participants in accordance with the Helsinki Declaration of the Ethical Standards of Medical Research Involving Human Subjects.

RESULTS

A total of 350 older adults with IHD participated in this study. A majority of the participants were females (50.6%), most of them resided in urban areas (67.4%), did not smoke (75.1%), and 31.7% of them had suffered from heart disease for 5-10 years [Table 1]. The overall mean score of physical resilience was 9.57 ± 3.00 . Women, those with an unmarried child at home, those who were literate and lived in urban areas, those without comorbidities, and those who did not receive financial support from family members had significantly higher mean resilience scores [P < 0.05; Table 2]. Physical resilience scores showed an inverse correlation with age [r = -0.328 and P < 0.001; Table 3]. Multiple linear regression analysis showed that younger age (P = 0.001), better cognitive function (P = 0.006), and employment (P = 0.01)significantly predicted the physical resilience. The R^2 was 0.46 [adjusted $R^2 = 0.466$; Table 4].

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Table 1: Characteristics of the older adults with ischemic heart disease				
Sex				
Male	173 (49.4)			
Female	177 (50.6)			
Having an unmarried child at home				
Yes	134 (38.3)			
No	216 (61.7)			
Place of residence				
City	236 (67.4)			
Village	114 (32.6)			
Smoking				
Yes	87 (24.9)			
No	263 (75.1)			
Level of education of the person				
Literate	214 (61.1)			
Illiterate	136 (38.9)			
Level of education of the spouse				
Literate	218 (32.3)			
Illiterate	132 (37.7)			
Job of the person				
Employed	106 (30.3)			
Unemployed	244 (69.7)			
Job of the spouse				
Employed	108 (30.9)			
Unemployed	242 (69.1)			
Concomitant disorders				
Yes	261 (74.6)			
No	89 (25.4)			
Receiving support and care from others				
Yes	110 (31.4)			
No	240 (68.6)			
Duration of the concomitant disorder (years)				
<5	104 (29.7)			
5-10	111 (31.7)			
>10	47 (13.4)			
Time passed since the diagnosis of IHD (months)				
<1	23 (6.6)			
1-12	117 (33.4)			
>12	210 (60)			
Monthly income (tomans)				
<1 million Tomans	123 (35.1)			
1-2 million tomans	165 (47.1)			
>2 million tomans	62 (17.7)			
Age, mean \pm SD	68.8 ± 7			
Physical resilience score, mean±SD	9.57 ± 3			

IHD: Ischemic heart disease, SD: Standard deviation

DISCUSSION

The older adults in the present study possessed a mean score of 9.57 out of 15. This score was above 50% of the score of the physical resilience questionnaire. A systematic review found that people with physical diseases had lower resilience than healthy ones.^[24]

the older adult's characteristics				
Variables	Physical resilience	P ^a		
	score, mean ± SD			
Sex				
Male	$9.33~\pm~2.9$	0.036		
Female	9.90 ± 2.9			
Having an unmarried child at home				
Yes	10.03 ± 3.08	0.027		
No	9.29 ± 2.92			
Place of residence				
City	9.28 ± 3.04	0.024		
Village	9.05 ± 2.84			
Smoking				
Yes	9.20 ± 3.14	0.192		
No	9.69 ± 2.95			
Level of education of the person				
Literate	9.73 ± 2.76	0.205		
Illiterate	9.31 ± 3.33			
Level of education of the spouse				
Literate	9.91 ± 2.83	0.005		
Illiterate	9.00 ± 3.19			
Job of the person				
Employed	9.15 ± 2.77	0.084		
Unemployed	9.75 ± 3.08			
Job of the spouse				
Employed	9.76 ± 2.85	0.413		
Unemployed	9.48 ± 3.06			
Concomitant disorders				
Yes	9.35 ± 3.09	0.019		
No	10.21 ± 2.63			
Receiving support and care from others				
Yes	8.77 ± 3.23	0.001		
No	9.93 ± 2.81			
Duration of the concomitant				
disorder (year)				
<5	9.04 ± 3.22	0.17		
>5	9.58 ± 3.00			
Time passed since the diagnosis of				
IHD (months)				
<1	8.58 ± 3.88	0.232		
1-12	9.46 ± 2.76			
>12	$9/73 \pm 3/01$			

Table 2: The mean physical resilience score according to

^aAll data analyzed by Chi-square test. IHD: Ischemic heart disease, SD: Standard deviation

Physical resilience is a relatively new topic, and further research is needed to develop this concept. Such studies will improve our understanding of the biological and psychosocial factors affecting resilience in older adults, and help manage acute and chronic problems and improve the rehabilitation process for this vulnerable group.^[25]

The findings showed that having an unmarried child at home was significantly associated with increased

 Table 3: The correlation between age, Mini-Mental State

 Examination score, monthly income, and the score of

 physical resilience in older adults with ischemic heart

uisease				
Variable	Correlation coefficient	Р		
Physical resilience score				
Age	-0.328	0.001		
MMSE score	0.068	0.205		
Monthly income	0.090	0.092		

MMSE: Mini-Mental State Examination

Table 4: Multiple linear regressions analysis results for predicting factors of Physical resilience in older adults with ischemic heart disease^b

with ischemic near tuisease								
Variables	В	Beta	t	Р				
Age	-0.105	-0.235	-3.682	0.001				
Sex	0.116	0.019	0.304	0.762				
Lower level education of the	0.074	0.012	0.201	0.841				
spouse								
Being employed	0.974	0.143	2.603	0.010				
Income	1.79	0.059	1.006	0.316				
Living at village	-0.096	-0.015	-0.301	0.764				
Lake of an unmarried child at	0.270	0.042	0.885	0.377				
home								
Receiving financial support by	0.042	0.007	0.110	0.912				
others								
Having a concomitant disorder	-1.975	-0.056	-1.195	0.233				
Smoking	-0.120	-0.016	-0.290	0.772				
Duration of the concomitant	0.264	0.042	0.906	0.366				
disorder								
MMSE score	-0.254	-0.189	-2.780	0.006				

Adjusted R^2 =0.466. ^bAll variables other that age, income, and the scores of Physical resilience and MMSE were entered the model as categorical variables. MMSE: Mini-Mental State Examination

physical resilience in older adults. Perhaps single children who live with their older parents provide them with more support and establish a better emotional relationship with their parents. This finding is consistent with what Izadi-Avanji *et al.*^[26] reported. In a study by Wells family relationships had a positive effect on resilience in older adults.^[27] Strong family ties have also been reported to boost morale and increase resilience in older adults.^[28]

Most of the older adults surveyed in this study lived in urban areas. Older people who lived in urban areas also scored significantly higher on physical resilience than those who lived in rural areas. However, a study in China found no significant association between place of residence and resilience in older adults.^[29] Perhaps the ease of living and better access to health care contributed to the higher resilience of older adults residing in urban areas. In addition, in the past, there were few educational facilities in rural areas. This may mean that older adults living in rural areas are less likely to be literate, which in turn leads to lower resilience.

More than half of the older adults participating in the present study were literate. Although literate people had higher resilience scores, no significant correlation was found between literacy and physical resilience. Nevertheless, there was a significant relationship between spouse education and physical resilience among older adults. Some studies in Iran,^[26] the United States,^[16] and the Netherlands^[19] have reported that education may directly affect resilience.

In addition to IHD, about two-thirds of the older adults in the present study suffered from other chronic comorbidities such as diabetes mellitus and hypertension. Chronic disease was also significantly associated with reduced physical resilience in older adults. Consistent with our results, a meta-analysis showed that chronically ill patients had lower resilience scores than healthy individuals.^[24]

About one-third of older adults reported receiving financial support from their relatives. We also found that those who received financial support had lower physical resilience. This is while Luznitz cited support as a factor that improves resilience.^[13] This finding may be justified from two aspects. First, older adults who are unwell may need more support. On the other hand, the need for support may create feelings of dependency, inferiority, and burden in older people, which in turn reduces self-esteem and resilience.

In the current study, women accounted for about half of the participants. However, women scored higher on physical resilience than men. A British study also found that women were more resilient than men.^[30] However, a Brazilian study found no significant difference in resilience scores between women and men with IHD.^[18] Conversely, some studies in Iran^[26] and Pakistan^[10] have shown that older men are more resilient than women. Karimi et al. reported that men are more resilient than women due to their higher emotional intelligence, yet women are more capable of changing different life situations because of their emotions, flexibility, and willingness to learn.^[31] About one-third of the seniors in the present study were employed. Employed older adults also had higher resilience scores than unemployed ones. Although the difference between the two groups was not statistically significant, employment appears to have a positive impact on mental health and improve resilience in older adults. Izadi-Avanji et al. also investigated the resilience of Iranian community-dwelling women and reported that employed women were more resilient compared to nonemployed ones.^[26]

We found a significant inverse correlation between age and physical resilience, with resilience scores decreasing with increasing age. This finding is consistent with that of Hardy *et al.* in the United States.^[16] On the contrary, a study in Germany showed that resilience increases with age in patients with heart disorders.^[13] While a study by Connor and Davidson found no significant relationship between age and resilience.^[17] Resilience appears to be a personality trait that remains relatively stable during life and changes little with events and age.

In the present study, no significant correlation was found between the scores of cognitive functions and physical resilience. Nonetheless, it seems that cognitive functions can indirectly affect physical resilience by affecting an individual's mental state. Older adults with better cognitive functioning have also been shown to manage their physical pain better.^[32] The lack of a significant association between cognitive function and resilience in the present study can be attributed to the fact that individuals with severe cognitive impairment were not included in the study. This study was conducted on hospitalized patients. Furthermore, the majority of older adults surveyed were under the age of 65. Furthrmore, due to the use of self-administered questionnaires, patients may have experienced recall bias.

CONCLUSION

The elderly participants in this study had approximately moderate physical resilience. according to the results of this study, it is suggested that older and lonely elderly who have various diseases should be taken care of more. It is also suggested to conduct studies to increase resilience in these people. Furthermore, multicenter studies are recommended.

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Conflicts of interest

There are no conflicts of interest.

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