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The relationship between depression and nutritional status among the elderly adults with cardiovascular diseases in Northern Iran

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Abstract

Background Malnutrition and depression among the elderly people with cardiovascular diseases are important public health concerns. This study made an attempt to determine the relationship between these people's depression and their nutritional status in northern Iran.

Methods This analytical cross-sectional study was conducted on 190 elderly patients hospitalized with cardiovascular diseases in Dr. Heshmat Heart Hospital in Rasht (Iran) in the 2022–2023. The research instruments included demographic information questionnaire, mini-nutritional assessment questionnaire, and geriatric depression scale. Data were analyzed by SPSS-21 software and using Chi-Square tests and ordinal logistic regression.

Results The participants' mean age was 68.4 ± 6.5 and 50.5% of the participants were women.56.3% of the elderly participants suffered from malnutrition and 96.3% of them suffered from various degrees of depression. Additionally, there was a relationship between the participants' severity of depression and their nutritional status. Significant relationships were also observed between the participants' depression (OR = 1.28 and $p < 0.001$), marital status (OR = 1.52 and $p = 0.006$), and underlying diseases (OR = 0.814, $p = 0.035$) with nutritional status.

Conclusion Given the significant relationship depression with nutritional status in cardiovascular patients, early diagnosis and treatment of depression in these patients is essential to prevent the effects of depression on nutritional status and disease course.

Keywords Elderly, Nutrition, Depression, Cardiovascular Disease

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Background

The world's population is aging [1]. By 2030, 14.4% of the Iran population will be aged 60 years and older [2]. Over time, as people approach old age, their health declines, and the negative burden of disease increases, such as hypertension, diabetes, cancer, cardiovascular disease [3]. In this regard, cardiovascular diseases (CVD) are considered to be one of the main public health problems across the world and in Iran [4]. CVD is common among the elderly and its incidence and prevalence increase due to age. Furthermore, it is one of the factors that affect the elderly people's death and disability [5].

Good quality of life and proper nutritional status and psychological status improve the elderly people's health level and reduce their pathogenicity [6]. In the elderly, the risk of receiving an insufficient diet and malnutrition increases because of various diseases, physical disability and inability to chew, excessive drug use, social isolation, and reduced income [7]. Malnutrition increases the risk of mortality by reducing normal body functions, decreasing the bone mass, causing a disorder in the immune system, delaying recovery after surgery, and prolonging the period of hospitalization [8]. Gorji et al. reported that 12.2% of Iranian elderly over the age of 60 and 21.6% of the elderly who lived in nursing homes suffered from malnutrition [9]. CVD is one of the diseases that are strongly influenced by diet [10]. Multiple clinical studies have demonstrated that inadequate nutritional status correlates with a higher risk of mortality in patients with CVD [11, 12]. Malnutrition is common among the elderly patients with heart failure and coronary artery disease and leads to unfavorable results [13, 14].

The examination of the disease patterns in the elderly population shows that depression is one of the factors that decrease their efficiency and increase their mortality. Depression is one of the most common mental disorders of the elderly. More specifically, a quarter of people over the age of 65 suffer from depression [15]. Moreover, the symptoms of depression are related to the mortality and cardiovascular events of the patients with CVD [16]. Furthermore, studies have shown that patients with CVD are more likely to suffer from depression in comparison with the general population [17, 18]. There is a bidirectional relationship between depression and diet [19]. The elderly people who show the symptoms of depression lose their appetite and choose unhealthy foods. In addition, high psychological stress is associated with an increase in the consumption of unhealthy foods and a decrease in the consumption of healthy foods [20]. The results of the study which was carried out by Marx et al. indicated that proper diet could be used as an adjunctive treatment for mental disorders. Moreover, diet may affect depression which is caused by chronic diseases such as diabetes, metabolic syndrome, and CVD [21].

Most existing research originates from Western societies, which differ culturally and economically from developing countries. Additionally, there is a lack of research in countries like Iran, especially in regions with high populations of elderly individuals and elevated rates of CVD, despite the potential value of such studies. Therefore, in this study, the researchers made an attempt to determine the relationship between depression and nutritional status of the elderly people with CVDs who were admitted to Dr. Heshmat Heart Hospital in Rasht.

Materials and methods

Study design and participants

The current cross-sectional study was conducted on 190 elderly patients with CVDs who were admitted to Dr. Heshmat Heart Hospital in Rash (Iran) in the 2022–2023 time period. This hospital is the only specialized center for CVDs in Guilan province in the north of Iran.

The study was approved by the ethics committee of Guilan University of Medical Sciences (code IR.GUMS.REC.1401.096). The objectives of the study and confidentiality and anonymity of the information were explained to each elderly participant, and a verbal informed consent was obtained from each of them. The sample size was determined based on the following formula: $\left(n = \left(\frac{z_{1-\alpha/2} + z_{1-\beta}}{0.5 * \ln\left(\frac{1+r}{1-r}\right)}\right)^2 + 3\right)$. The correlation coefficient between depression and nutrition was 0.42 based on previous studies (6). The confidence interval was 95% and the power of the test was 90%. In order to control the effect of the other 9 demographic variables and the relevant variables, the researchers added 15 samples for each of the variables to the total number of samples. Therefore, a total of 190 elderly patients with CVDs who were hospitalized in Dr. Heshmat Heart Hospital were examined. This research employed a non-probability sampling method called sequential sampling, where all participants who fulfilled the eligibility criteria were incorporated until the desired sample size was achieved

The inclusion criteria involved: being 60 years old and older, being hospitalized in a specialized heart hospital, having the desire to participate in the study. exclusion criteria involved: suffering from a cognitive disorder (score less than 7 on Abbreviated Mental Test (AMT)), having a history of neurological and psychiatric disorders, having a history of malnutrition, suffering from digestive problems that lead to insufficient absorption of food such as gastric ulcers, having a special diet, suffering from food allergies such as Coeliac disease, undergoing surgery on the digestive system in the last 6 months, having speech, hearing or vision problems and, incomplete questionnaire more than 20%.

Data collection

The data collection instruments included the demographic information questionnaire, mini-nutritional assessment questionnaire [22], and geriatric depression scale [23]. Data were collected through face-to-face interviews.

The demographic information questionnaire included items that focused on the participants' age, gender, education, occupation, marital status, monthly household income, underlying diseases, drug consumption, smoking, and living conditions.

Geriatric Depression Scale (GDS): This scale was developed by Yesavage to evaluate the elderly people's depression. Its initial form had 30 items. In the present study, the researchers used the short form of GDS which involved 15 items. Ten of 15 items indicate the existence of depression in the case of a positive answer (i.e. yes). On the other hand, the rest of the items (i.e. items 1, 5, 7, 11, 13) show the existence of depression in the case of a negative answer (i.e. no). The scale scores range from 0 to 15. The scores which are in the range of 0 to 4 are considered to indicate non-depressive individuals. Moreover, the scores that are in the range of 5 to 8 show mild depression. Furthermore, the scores which are in the range of 9 to 11 show moderate depression. Lastly, the scores that range from 12 to 15 indicates severe depression [24]. The validity and reliability of this instrument were confirmed in elderly society of Iran [25]. The Cronbach's alpha calculated for this study was 0.86.

Mini-Nutritional Assessment (MNA): This instrument involves 18 items in 4 dimensions. Anthropometric measurements include 4 items (BMI, arm circumference, calf circumference, and weight loss), diet examination involves 6 items (number of meals, food and liquid intake, and loss of appetite), general evaluation includes 6 items (lifestyle, medications, movement, acute stress, and dementia), and self-perception involves 2 items (health and nutrition). This questionnaire examines the elderly people's energy-protein malnutrition. Participants had to complete the MNA in 10 to 15 min. If a participant's score is 12 or above 12 in the screening part, the nutritional status of the person will be satisfactory. Nonetheless, if the score is 11 or less than 11, the examiner will be responsible for completing the evaluation part of the MNA questionnaire for the participant. The final scores on this questionnaire range from 0 to 30. The participants are classified into one of 3 groups based on their scores. More specifically, a score of less than 17 indicates malnutrition, 17 to 23.5 shows the risk of malnutrition. And, a score of 24 or above 24 indicates well-nourished the elderly people [26].

In order to measure the participants' height, arm muscle circumference, and leg muscle circumference, the researchers used an inflexible tape measure with an accuracy of 0.1 cm. Moreover, they utilized a digital scale with an accuracy of 0.1 kg to measure the participants' weight while they wore the fewest pieces of clothing and removed their shoes. The participants' BMI was determined based on their height and weight and according to the following formula (BMI = weight in kg / height in m2). Ghazi et al. investigated the validity and reliability of this instrument in the Iranian elderly community [27]. The Cronbach's alpha for current study was 0.81.

The present study utilized the Charlson Comorbidity Index, developed in 1987, to assess comorbidities. This index includes 19 diseases, each assigned a weight from 1 to 6. The total score is obtained by summing the scores for each comorbidity, and the scores are ranked as four degrees of illness: 0, 1–2, 3–4, and greater than 5. A higher score indicates a higher level of comorbidities [28].

Statistical analysis

Data analysis was performed using SPSS 21 software. Demographic characteristics, clinically relevant data, and the participants' state of nutrition and depression analyzed using descriptive statistics. Furthermore chi-square test was used to relation between nutritional status and patients' qualitative characteristics. Ordinal logistic regression, both uni- and multi-variate, used to examine the relation depression with nutritional status. Sociodemographic variables with $p < 0.25$ in the univariate analysis ($\chi 2$ test) were included as confounding factors in the multivariate analysis. The parallel lines test ($P > 0.05$) indicated the ordinal regression model was appropriate, suggesting the model is valid. The goodness of fit analysis ($p = 0.422$) revealed the model fits the data well, supporting its adequacy in explaining the outcome variable. In this study, the significance level of the tests was considered to be $p < 0.05$.

Results

In this study, the mean age of participants was 68.4 ± 6.5. Most of the participants were in the age range of 60-69-year (60.5%) and 96 (50.5%) of 190 elderly people were women. In terms of education, the majority did not have diploma (99.5%). In addition, more than half of the participants were married (55.3%), had 1 or 2 children (52.6%), and lived with their spouses (55.3%). Lastly, 71.1% of the participants suffered from underlying Disease. The examination of Charlson Comorbidity Index showed that half of the participants (50.5%) had a score which was in the range of 3 to 4 (Table 1).

Moreover, based on the results, 35.3% of the participants were at risk of malnutrition, and most of the participants (56.3%) suffered from malnutrition. Regarding depression, 35.3% of the participants suffered from severe depression and 27.9% and 33.2% of the participants

Table 1 Participants' demographic characteristics, nutritional status, and depression status ($n=190$)

Variables		*n* (%)	Variables		*n* (%)
Gender	Male	94(49.5)	Income	Average	38(20)
	Female	96(50.5)		Low	152(80)
Age	60–69 Years Old	115(60.5)	Living Condition	Alone	41(21.6)
	70–79 Years Old	62(32.6)		With Spouses	105(55.3)
	Over 80 Years Old	13(6.8)		With Children	37(19.5)
				With Other	7(3.7)
Education	Illiterate	99(52.1)	Underlying Disease	No	55(28.9)
	Elementary	58(30.5)		Yes	135(71.1)
	Middle School	14(7.4)	CCI	1–2	64(33.7)
	High School	18(9.5)		3–4	96(50.5)
	Diploma	1(0.5)		5 And More Than 5	30(15.8)
Occupation	Housekeeper	58(30.5)	Drug consumption	No	55(28.9)
	Self-Employment	12(6.3)		Yes	135(71.1)
	Retired	49(25.8)	Smoking	No	126(66.3)
	Farmer	21(11.1)		Yes	64(33.7)
	Other	50(26.3)	Nutritional Status	Malnutrition	107(56.3)
Marital Status	Single	3(1.6)		At Risk Of Malnutrition	67(35.3)
	Married	105(55.3)		Normal Nutrition	16(8.4)
	Divorced	2(1.1)			
	Widower /Widow	80(42.1)	Depression Status	Non-Depressive	7(3.7)
Number Of Children	0	6(3.2)		Mild Depression	63(33.2)
	1–2	100(52.6)		Moderate Depression	53(27.9)
	3 And More Than 3	84(44.2)		Severe Depression	67(35.3)

suffered from moderate depression and mild depression respectively (Table 1).

Malnutrition status was found to be higher among male participants (52.3), range of 60-69-year (53.3%), illiterate (58.9%), unmarried (57.9%), with 1–2 children (48.6%), hosekeeper (29%), life status with spouse (43%), and low income (86%).Furthermore, the results of chi-square tests showed that there was a statistically significant relationship between the participants' nutritional status and their marital status ($p<0.001$), living condition ($p=0.003$), income ($p=0.013$), underlying disease ($p<0.001$), Charlson Comorbidity Index ($p=0.003$), and drug consumption ($p<0.001$) (Table 2).

As shown in Table 3, there was a relationship between the participants' severity of depression and their nutritional status. As the participants' depression increased in severity, the percentage of malnutrition also increased ($x2=43.68$ and $p<0.001$).

In the univariate ordinal regression analysis, depression showed significant associations with nutritional status (OR = 1.34, $p<0.001$). The multivariate ordinal regression model revealed that participants' depression significantly affected their nutritional status and increased the risk of malnutrition, even after controlling for the impacts of confounding variables(OR = 1.34, $p<0.001$). Moreover, based on the results of the multiple analysis, marriage (OR = 1.52 and $p=0.006$) and underlying disease (OR = 0.814, $p=0.035$) were significantly associated with the participants' nutritional status. More specifically, the unmarried participates were more likely to face the risk of malnutrition in comparison with the married participants and the elderly who did not suffer from underlying disease were less likely to suffer from malnutrition compared to the other elderly participants (Table 4).

Discussion

This study aimed to determine the relationship between nutritional status and depression among elderly people hospitalized due to CVDs. The results showed that 35.3% of the participants were at risk of malnutrition and 56.3% of them suffered from malnutrition. There are different reports about the prevalence of malnutrition in the elderly in Iran and other countries across the world [29, 30]. The differences between these reports may be due to the participants' characteristics, the research instruments, and the care environments. A study in Nepal with 174 elderly myocardial infarction patients found that 49.4% had normal nutrition, 38.5% were at risk of malnourishment, and 12.1% were malnourished [31]. Similarly, a study in Italy revealed that only 4% of elderly patients with acute coronary syndrome were malnourished, while 40% were at risk of malnutrition [32]. In the previous studies, malnutrition was less prevalent than in the current study. This discrepancy can be caused by the differences in the culture, lifestyle, and economic status of Iranian elderly people and the other elderly people, which may affect their nutritional status. In a study conducted in Tehran Teaching Hospital, 30.8% of the

Table 2 Frequency distribution of the participants' nutritional status based on their demographic variables

Variables		Nutritional Status			
		Malnutrition	At Risk of Malnutrition	Normal Nutrition	*P**
		n (%)	n (%)	n (%)	
Gender	Male	56(52.3)	34(50.7)	4(25)	0.121
	Female	51(47.7)	33(49.3)	12(75)	
Age	60–69 Years Old	57(53.3)	46(68.7)	12(75)	0.145
	70–79 Years Old	40(37.4)	9(28.4)	3(18.8)	
	Over 80 Years Old	10(9.3)	2(3)	1(6.3)	
Education	Illiterate	63(58.9)	28(41.8)	8(50)	0.088
	Diploma And Below Diploma	44(41.1)	39(58.2)	8(50)	
occupation	Housekeeper	31(29)	20(29.9)	7(43.8)	0.853
	Self-Employment	7(6.5)	4(6)	1(6.3)	
	Retired	26(24.3)	19(28.4)	5(31.1)	
	Farmer	13(12.1)	8(11.9)	2(12.5)	
	Other	30(28)	16(23.9)	1(6.3)	
Marital Status	Unmarried	62(57.9)	15(22.4)	8(50)	<0.001
	Married	45(42.1)	52(77.6)	8(50)	
Number Of Children	0	4(3.7)	2(3)	0	0.592
	1–2	52(48.6)	40(59.7)	8(50)	
	3 And More Than 3	51(47.7)	25(37.3)	8(50)	
Living Condition	Alone	32(29.9)	5(7.5)	4(25)	0.003
	With spouses	46(43)	51(76.1)	8(50)	
	With Children	24(22.4)	9(13.4)	4(25)	
	With Other	5(4.7)	2(3)	0	
Income	Average	15(14)	16(23.9)	7(43.8)	0.013
	Low	92(86)	51(76.1)	9(56.3)	
Underlying Disease	No	19(17.8)	31(46.3)	5(31.2)	<0.001
	Yes	88(82.2)	36(53.7)	11(68.8)	
CCI	1–2	26(24.3)	34(50.7)	4(25)	0.003
	3–4	58(54.2)	29(43.3)	9(56.2)	
	5 And More Than 5	23(21.5)	4(6.0)	3(18.8)	
drug consumption	No	19(17.8)	31(46.3)	5(31.2)	<0.001
	Yes	88(82.2)	36(53.7)	11(68.8)	
Smoking	No	67(62.6)	46(68.7)	13(81.2)	0.299
	Yes	40(27.4)	21(31.3)	3(18.8)	

**P* value based on Chi-squared test, Significant at 0.05 level

Table 3 The relationship between the participants' nutritional status and their depression

Variables			Nutritional Status			Total	X^2
			Malnutrition	At Risk Of Malnutrition	Normal Nutrition		
Depression Status	Non-Depressive	n	0	3	4	7	43.68*
		%	0	42.9	57.1	100	
	Mild Depression	n	26	29	8	63	
		%	41.3	46	12.7	100	
	Moderate Depression	n	29	21	3	53	
		%	54.7	39.6	5.7	100	
	Severe Depression	n	52	14	1	67	
		%	77.6	20.9	1.5	100	
Total		n	107	67	16	190	
		%	56.3	35.3	8.4	100	

*$p < 0.001$

Table 4 Multivariate ordinal regression analysis on the relationship between the participants' nutritional status and depression, adjusted for demographic and health conditions

Variables	Nutritional Status(Normal Nutrition/At Risk Of Malnutrition/ Malnutrition)			
	B	Standard Error	*P*	OR
Depression (GDS)	0.249	0.0636	0.000	1.283
Gender				
Male	0.155	0.0846	0.067	1.168
Female	0[a]	0	0	1
Age	0.007	0.0077	0.390	1.007
Education				
Illiterate	0.040	0.0931	0.670	1.040
Below Diploma	0[a]	0	0	1
Marital Status				
UnMarried	0.418	0.1523	0.006	1.520
Married	0[a]	0	0	1
Living Condition				
Alone	0.153	0.2227	0.492	1.165
With spouses	0.472	0.2442	0.053	1.604
With Children	0.0720	0.2276	0.752	0.931
With Other	0[a]	0	0	1
Income	0.125	0.1322	0.343	1.134
Underlying Diseases				
Not Having Underlying Diseases	0.2050	0.0947	0.035	0.814
Having Underlying Diseases	0[a]	0	0	1
Charlson Comorbidity Index	0.0390	0.0484	0.420	0.962

Dependent Variable: Nutritional Status

OR, adjusted odd ratio; GDS, Geriatric Depression Score;

Significant at <0·05

participants were at risk of malnutrition, and 27.3% were malnourished. The difference between the results of the present study and the above-mentioned study may result from the participants' food restrictions (due to their heart diseases) and the economic problems in Iran in recent years [33]. The results of Tao et al.'s study showed that 27.5% of the patients were at the risk of malnutrition and 52.7% of them were malnourished [34]. These results were almost similar to the results of the present study. Considering the high frequency of malnutrition among the elderly with CVDs, the present study suggests that the health professionals and health providers should take appropriate measures to improve these individuals' nutritional status.

The results of this study showed that 96.3% of the participants suffered from a certain degree of depression. The results of the study, which was conducted in China, showed that 32.8% of the elderly participants showed symptoms of depression [35]. Probably this difference between the results of two studies can be attributed to the policies that are implemented in China to improve the elderly individuals' mental state. A review of 30 studies of elderly patients in Iran in 2021 indicated that the prevalence of depression was equal to 52%, which was less than the present study [36]. One of the possible reasons for the difference in the prevalence of depression between studies may be due to the difference in the target population (our study focused on the elderly people with CVDs). Studies have shown that patients with CVDs are more likely to suffer from depression in comparison with the general population [17, 18]. This issue can affect their and their families' quality of life and may impose high costs on the family and society [37].

In this study, there were significant relationships between the participants' marital status, living conditions, income, diseases, and medication consumption with nutritional status. The results of a systematic review, which included 34 cross-sectional studies and 4 cohort studies, showed that low income level, solitary living condition, single/widowed/separated marital status, and low education level were mainly related to the risk of malnutrition and malnutrition [38]. The elderly people's low income may limit their access to healthy food, choices of food options, and medication needs. This issue can lead to these individuals' dietary inconsistency and inability to maintain their adequate nutrition.

The results of this study showed that there was a relationship between the participants' severity of depression and their malnutrition. Moreover, depression had a significant effect on these participants' nutritional status when the effects of the participants' demographic

variables were controlled. Lastly, the participants' depression increased the risk of malnutrition.

In the present study, depression was a predictive factor in elderly people's malnutrition. This finding supports the results of the previous studies in different environments including, community, outpatient clinics, and hospitalized patients [39, 40]. Depression leads to the people's loss of appetite, reduced food consumption, and weight loss [41].

The results of a study, which focused on the elderly people in Mexico, showed that there was a significant relationship between the participants' depression and their malnutrition. That is, the people who showed symptoms of depression were almost 5 times more likely to be malnourished in comparison with the healthy people [42]. Moreover, On the basis of Gündüz et al. study, carried out on Turkish elderly, there was a significant correlation between the participants' GDS and MNA. A GDS score above 14 was independently introduced as a predictive factor in malnutrition [43]. The results of another study, which involved 282 elderly people with cancer in Spain, showed that the probability of the symptoms of depression in malnourished participants was 6.29 times more likely than elderly people with normal [44]. In addition to the above-mentioned studies which have highlighted the role of depression as a factor in the state of nutrition, Grases et al. reported that depressed people consumed less fruits, vegetables, and legumes and preferred more sweets [45]. Moreover, lack of pleasure, which is a symptom of depression, can lead to insufficient food intake [46]. Nonetheless, it should be noted that the relationship between depression and nutrition is an interactive, complex, and interdependent relationship. Depression causes certain changes in appetite and weight. These changes can lead to the elderly people's malnutrition. Furthermore, improper nutrition may make these people prone to mental disorders including depression [41].

There was a significant relationship between the participants' marital status, living conditions, underlying diseases, and drug consumption and their nutrition. Notwithstanding, only underlying diseases and marital status remained in the final model. Chen et al. reported that the symptoms of depression and multiple comorbidities increased the risk of malnutrition. They stated that when experts encounter elderly people with multiple diseases who show symptoms of depression, they should carry out a detailed assessment of their nutritional status. Moreover, if they become aware of the risk of these people's malnutrition, they should provide them with appropriate health care and nutrition [40]. The results of a study, which was carried out in Turkey and focused on 549 elderly people with an average age of 68.9 ± 6.4, showed that depression (OR = 4.94) and the history of chronic diseases (OR = 1.62) were the risk factors in malnutrition. These results are in line with the results of the present study. The researchers believed that increasing the elderly people and the caregivers' awareness of malnutrition was useful for reducing the frequency of malnutrition [47]. The study by Shuremu et al. in Nigeria supports the findings of the present study, which identified depression and marital status (being single) as risk factors for malnutrition among the participants [48].

The present study had several limitations. It was conducted in a specialized hospital, which may limit the generalizability of the findings to the broader patient population in Iran. Additionally, the focus on elderly individuals restricts the ability to extend the results to other age groups. The cross-sectional design precludes causal inferences, and the reliance on self-reports may introduce response bias. Furthermore, the influence of unknown factors and residual confounding from unmeasured variables cannot be ruled out.

Conclusion

According to the results of the present study, most of the elderly were at risk of malnutrition or suffered from malnutrition. Moreover, the prevalence of depression among the elderly with CVD was high. Furthermore, there was a significant relationship between the participants' depression and their nutritional status. Therefore, it seems that early diagnosis and rapid treatment of depression in patients with CVDs is necessary for preventing the effects of depression on their nutritional status. To confirm these findings, additional research on a larger population and different regions is required.

Abbreviations

CVD	Cardiovascular Diseases
GDS	Geriatric Depression Scale
AMT	Abbreviated Mental Test
MNA	Mini-Nutritional Assessment
CCI	Charlson Comorbidity Index
BMI	Body mass index

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Author contributions

N.S. was involved in conceptualizing, generating of the project, data collection, and also drafting the manuscript; F.B. was involved in conceptualizing, generating of the project, data analyses, and also drafted the manuscript; A.D. assisted with the conceptualization of the project nd review of the report; E.K.L. assisted with the data statistical analyses and interpretation of data. All authors read drafts of the manuscript and provided comments.

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Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

This study protocol was in accordance with the Declaration of Helsinki and was approved by the Ethics Committee of Guilan University of Medical Sciences in Rasht, Iran with the code number IR.GUMS.REC.1401.096, and informed consent was obtained from all subjects.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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