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Psychometrics of a Scale on the Fatty Liver Disease-Related Health Beliefs in Middle-Aged Iranians

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ABSTRACT

Aims The growing prevalence of fatty liver is a major threat to health. This study aimed to design and measure a psychometric scale on the fatty liver disease-related health beliefs in middle-aged Iranian people.

Instrument & Methods This qualitative descriptive study was performed on middle-aged people referring to the Comprehensive Health Service Centers of Qorveh, Kurdistan Province, Iran, in 2020. An extensive literature review was performed, and interviews were done with people with fatty liver disease and experts in the field. The interviews were analyzed through a directed content analysis approach. The researchers applied an existing theory (health belief model) and designed and compiled 90 items.

Findings Following evaluation of the face and content validity and obtaining item impact mora than 1.5, CVI more than 0.62, and validity mora than 0.79, a research scale with 57 items was designed. After exploratory factor analysis, 49 items with factor loading mora than 0.5 were confirmed, covering seven factors with a predictive power of 57.5. The reliability of perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cue to internal action, cue to external action, and self-efficacy were 0.90, 0.89, 0.85, 0.81, 0.91, 0.86, and 0.88, respectively. The total reliability of the scale was also confirmed (Cronbach's alpha=0.92).

Conclusion The designed scale has appropriate validity and reliability for measuring the health belief constructs associated with fatty liver in middle-aged people.

Keywords Psychometrics; Fatty Liver; Middle-Aged; Iran

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Introduction

The liver plays an important role in the metabolism and breakdown of fats in the body, which causes fat deposition and fatty liver. This disease is a chronic liver disorder, which occurs due to fat accumulation in the liver cells and can lead to inflammation [1]. As the most common chronic liver disease globally, Fatty liver affects one-third of the general population [2, 3]. The prevalence of this disease in the world is estimated at 8 to 45%, in Asia 15 to 20%, and in Iran 21 to 31% [4, 5]. Studies have reported that the prevalence of fatty liver in healthy individuals is 10 to 24%, in obese people 57.5 to 74%, and in patients with type 2 diabetes 59%, and stated that its prevalence is increasing in parallel with the increasing prevalence of obesity, diabetes, and metabolic syndrome [6]. The growing prevalence of this disease is a major threat to health, and its development not only imposes a heavy economic burden on society [7, 8] but also increases mortality, especially in those with cardiovascular diseases [9]. Fatty liver disease presentation in 15 to 20% of sufferers ranges from steatosis (accumulation of fat in the liver) to steatohepatitis (accumulation of fat in the liver associated with inflammation) and may progress to advanced liver fibrosis or cirrhosis [10, 11]. Fatty liver disease is a multifactorial disease that involves a complex interplay between different factors, such as age, sex, genetic, metabolic disorders, lifestyle, eating habits, and consequently obesity [12, 13].

Age is a strong risk factor in the incidence of the disease [2, 14] so that it is most common in middle-aged people [15]. Among age groups, middle-aged people are at higher risk for developing this disease and experiencing more fatty liver disease-related complications [11]. Early detection and prevention of fatty liver disease can reduce premature mortality and complications, including cardiovascular diseases in middle age [2, 16, 17]. Therefore, early identification of those at risk of developing the disease is essential [18], and improving their health beliefs and lifestyle can prevent the disease [19]. On the other hand, implementing interventions is difficult without informing and measuring people's health beliefs [20, 21], which is a major obstacle to a healthy lifestyle [22-24].

One of the successful models for recognizing people's health beliefs is the health belief model. The constructs of this model include perceived susceptibility (person's subjective perception of the risk of developing a disease), perceived severity (person's belief in the extent of the damage caused by a disease or traumatic situation caused by a particular behavior), perceived barriers (person's belief in the expected costs of pursuing a new behavior), perceived benefits (person's belief in the benefits of the proposed methods to reduce the risk or severity of the disease), cue to action (the stimuli that makes one feel the need to take action), and self-efficacy (a person's confidence in his/her ability to prevent a disease successfully). This model could be the case in fatty liver: this belief could cause people's behavior. If people believe that fatty liver could result from many unhealthy habits and behaviors, they will select preventive behaviors to keep themselves away from this disease [25].

Although different studies have been conducted assessing the reliability and validity of the chronic liver disease questionnaire in American adults with nonalcoholic steatohepatitis [26], the role of disease perception and self-efficacy in lifestyle modification in Israeli patients with nonalcoholic fatty liver disease [24], awareness of nonalcoholic fats in the general population of the United States [27], we found no study designing and assessing psychometrics of a scale on the fatty liver disease-related health beliefs. Therefore, this study aimed to design and measure psychometrics of a scale on the fatty liver disease-related health beliefs in middle-aged people to assess health beliefs related to fatty liver and provide solutions and effective interventions and a valid and reliable scale for future studies.

Instrument and Methods

This qualitative-descriptive study was performed on middle-aged people referring to the Comprehensive Health Service Centers of Qorveh, Kurdistan Province, Iran, in 2020. Four hundred samples were selected randomly from all 16 health centers to achieve maximum cultural and social diversity. In many published articles, the number of samples for structural equations varied between 200 and 500 [28].

In the first step, an extensive literature review was performed in international (PubMed, Google Scholar, Science Direct, etc.) and Iranian databases (SID and IranDoc), and interviews were done with people with fatty liver disease and experts in the field. The interviews were analyzed through a directed content analysis approach. The researchers applied an existing theory (health belief model), developed the initial codes, and revised and refined them. Finally, codes were converted into items. After reviewing the texts and observing instrument design principles, the researchers designed and compiled 90 items.

Face validity

A complete list of items was provided to 10 middle-aged participants (6 women and four men) selected from the target group (not from samples). This step of research aimed to assess the index of item impact score in a similar sample of the target population. A five-point Likert scale was used to assess face validity quantitatively to score each item (1=very important, 2= important, 3= of average important, 4= a little important, 5= not important). Items with a score greater than 1.5 were selected as appropriate

items and retained for the next steps. To determine the face validity qualitatively and clarity of items, the comments of the ten members of the target population were obtained, and the necessary changes were made based on their opinions and suggestions.

Content validity

Ten expert panel members were asked to examine each item in detail and report their suggested revisions. In this section, issues such as Persian grammar, use of appropriate words, the location of each item, item scoring, time required to complete the questionnaire, and the proportionality of the selected factors were checked, and the final revision and modification were carried out accordingly. To assess the content validity quantitatively, the content validity ratio and content validity index was calculated:

Content validity ratio: In this stage, to determine content validity, the content validity ratio was determined using a panel of 10 experts. The experts' panel consisted of five experts with a PhD in health education and promotion, one PhD in epidemiology, and four internal specialists. This index was developed by Lawshe. Each member of the expert panel commented about the essentiality of each item (it is essential, it is useful but not essential, it is not essential) [29]. After obtaining a panel of experts' comments, the content validity ratio was determined. Then, items with a content validity ratio mora than the numerical values of the Lawshe table (for ten people 0.62) were considered essential and underwent further investigation.

Content validity index: This index was used to ensure that items were best designed to measure the health belief model constructs. For this purpose, three criteria of simplicity, clarity, and relevance were used. All the aforementioned criteria were assessed by using a 4-point Likert scale (simplicity: 1= very simple, 2= simple, 3= to some extent simple, 4= complicated; relevance: 1= completely relevant, 2= relevant, 3= to some extent relevant, 4= not relevant; and clarity: 1= completely clear, 2= clear, 3= to some extent clear, 4= not clear). The acceptability of each item was set as a content validity score of more than 0.79.

Construct validity

Exploratory factor analysis was used to investigate construct validity and classification of variables that had internal consistency [30].

Reliability

The items of each factor were examined separately. The reliability coefficient for each scale was calculated through Cronbach's alpha, corrected item-total correlation at least 0.3, and no increase of more than 0.1 for Cronbach's alpha when an item was dropped from the scale.

The data were coded and extracted using SSPS 23. Data analysis was done using principal component analysis and Varimax rotation, and alpha Cronbach calculation. To extract factors, factor loading of more than 0.5 was considered.

Findings

In this study, 400 individuals (203 men and 197 women) with a mean age of 39.3±7.4 years old participated and completed the questionnaire. Most of them were married and at the middle-income level and did not have a university education. About 51.8% of the participants were overweight and obese, and 5.8% of them had a family history of fatty liver disease (Table 1).

Table 1) Frequency distribution of participants' demographic characteristics

Variable	Number	Percent
Sex		
Male	203	50.7
Female	197	49.3
Marital status		
Single	34	8.5
Married	355	88.7
Divorced / Widowed	11	2.8
Place of residence		
City	239	59.8
Village	161	40.2
Income level		
High	56	14
Middle	274	68.5
Low	70	17.5
Body mass index		
Normal	193	48.2
Overweight	132	33
Obese	75	18.8
Family history of fatty liver disease		
yes	23	5.8
no	377	94.2
History of having other diseases		
yes	131	32.8
no	269	67.2

Based on reviewing the literature and consulting with experts, 90 items were designed. By eliminating duplicates, 74 appropriate items on health beliefs related to fatty liver disease in the target group were compiled. Concerning face validity, it was observed that all 74 items were valid, so all were retained in the questionnaire. However, 13 items with values less than 0.62 were not considered necessary concerning the content validity ratio, so they were removed. Regarding content validity, four items were evaluated as inappropriate in terms of simplicity, relevance, and clarity (score<0.79), so they were removed from the questionnaire. Finally, 57 items remained in the questionnaire. Then, based on the written opinions of the panel of experts, the items were reviewed and modified. In addition, attempts were made for the questionnaire items' simplicity, brevity, and grammatical and lexical writing accuracy. For example, the item "I regularly check my weight so that I do not become obese and overweight" was replaced by the item "I try not to become obese and overweight" or the item "because I have abdominal

obesity, I have a higher risk of developing fatty liver" was replaced by the item of "I was more likely to develop fatty liver due to abdominal obesity".

Following exploratory factor analysis, it was observed that the value of Kaiser-Meyer-Olkin (KMO), Bartlett test result, degree of freedom, and significance level of the test were optimal (Table 2).

Table 2) Kaiser-Meyer-Olkin test and Bartlett's test for sampling adequacy

Kaiser-Meyer-Olkin	0.875
Bartlett's test of sphericity	1354.760
degree of freedom	1431
Significant difference	0.001

Considering that the KMO value was 0.87, the sample size (400 people) was sufficient for factor analysis. Bartlett's test of sphericity at the level of $p<0.001$ also indicated the existence of detectable relationships between the variables and the appropriateness of using the factor analysis method.

Figure 1 was a Scree Plot, and seven factors with an eigenvalue higher than 1.5 were selected as relevant factors according to the breaking points of the Figure. A total of 49 items with a factor loading higher than 0.50 were categorized into seven factors. Considering the content of the items and based on the framework of the health belief model, the factors of self-efficacy (11 items), perceived severity (8 items), perceived susceptibility (8 items), due to external action (6 items), perceived obstacles (5 items), cue to internal action (5 items), and perceived benefits (6 items) were extracted and labeled as the first to seven-factor, respectively.

Exploratory factor analysis showed initial, and extraction sharing contained three parts: The first part was about the eigenvalues and determinants of the factors that remain in the factor analysis (factors that had an eigenvalue less than 1.5 were excluded from the analysis). Factors excluded from the analysis are those whose presence does not explain the variance further (Table 3). The second part was related to the specific value of non-rotating extraction agents, and the third part shows the specific amount of extractive agents with rotation. Varimax rotation factor loading values were the criterion for deciding the scale factors (Tables 4 and 5). Factors with an Eigen value greater than 1.5 were selected. Concerning the constructs of the health belief model, seven factors with explained variance and predictive power of 57.5 were chosen for health beliefs related to fatty liver in middle-aged people.

The reliability of the scale was assessed by calculating Cronbach's alpha (Table 6). The overall Cronbach's alpha value was 0.92, indicating good internal consistency between items and an acceptable level of reliability.

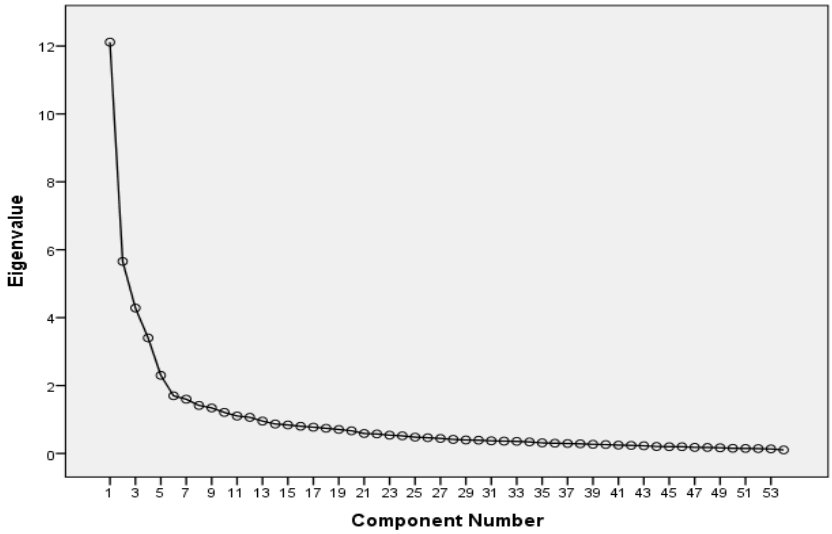

Figure 1) Scatter plot for items of the scale assessing health beliefs related to fatty liver

Table 3) Extraction sharing following rotation of the exploratory factor analysis of the health beliefs related to fatty liver

Factors	1	2	3	4	5	6	7
Initial Eigenvalues							
Eigenvalues	12.114	5.655	4.285	3.402	2.300	1.697	1.598
Percentage of explained variance	22.433	10.473	7.935	6.300	4.260	3.143	2.959
Cumulative variance	22.433	32.9.6	40.840	47.141	51.401	54.544	57.503
Eigenvalues of remained factors without rotation							
Eigenvalues	12.114	5.655	4.285	3.402	2.300	1.697	1.598
Percentage of explained variance	22.433	32.9.6	40.840	47.141	51.401	54.544	57.503
Cumulative variance	22.433	32.906	40.840	47.141	51.401	54.544	57.503
Eigenvalues of remained factors with rotation							
Eigenvalues	5.285	5.218	4.694	4.178	4.090	3.930	3.657
Percentage of explained variance	9.787	9.633	8.692	7.736	7.757	7.278	6.771
Cumulative variance	9.787	19.450	28142	35.879	43.454	50.731	57.503

Table 4) Weights of factors extracted from exploratory factor analysis by varimax rotation

Question	1st factor	2nd factor	3rd factor	4th factor	5th factor	6th factor	7th factor
1	0.729	0.558	0.627	0.723	0.712	0.741	0.640
2	0.754	0.702	0.669	0.769	0.718	0.804	0.794
3	0.626	0.725	0.727	0.753	0.754	0.814	0.719
4	0.705	0.725	0.733	0.672	0.769	0.744	0.619
5	0.690	0.752	0.707	0.692	0.636	0.797	0.672
6	0.727	0.774	0.772	0.603	-	-	0.671
7	0.599	0.749	0.729	-	-	-	-
8	0.615	0.674	0.640	-	-	-	-
9	0.556	-	-	-	-	-	-
10	0.583	-	-	-	-	-	-
11	0.529	-	-	-	-	-	-

Table 5) Rotational factor analysis of the scale of health beliefs related to fatty liver

Scale	Number	Factor loading	Eigenvalues	Explained variance
Perceived susceptibility (3rd factor)	8	0.627-0.772	4.69	8.69
Perceived severity (2nd factor)	8	0.558-0.774	5.21	9.66
Perceived benefits (7th factor)	6	0.619-0.794	3.65	6.77
Perceived barriers (5th factor)	5	0.626-0.769	4.09	5.57
Cue to external action (4th factor)	6	0.603-0.769	4.17	7.72
Cue to internal action (6th factor)	5	0.741-0.814	3.93	7.27
Self-efficacy (1st factor)	11	0.529-0.754	5.28	9.78

Table 6) Results of evaluating the reliability of the scale assessing health beliefs related to fatty liver

Scale	Number	Internal consistency of subscales	Cronbach's alpha
Self-efficacy (1st factor)	11	0.543-0.648	0.882
Perceived susceptibility (3rd factor)	8	0.524-0.789	0.902
Perceived severity (2nd factor)	8	0.485-0.737	0.892
Perceived benefits (7th factor)	6	0.728-0.827	0.856
Cue to external action (4th factor)	6	0.604-0.710	0.865
Perceived barriers (5th factor)	5	0.443-0.669	0.813
Cue to internal action (6th factor)	5	0.707-0.825	0.910

The results of the reliability study on items were performed by internal consistency test. Values greater than 0.30 were considered. So that question 10 perceived sensitivity and questions 5 and 10 barriers to understanding the intensity of internal correlation of subscale was less than 0.30, and these three items were removed at this stage. The rest of the items used in this study have good reliability.

Discussion

This study aimed to design and measure psychometrics of a scale on the fatty liver disease-related health beliefs in middle-aged people. The designed tool was evaluated and confirmed by measuring its face, content, and construct validity as well as its reliability by Cronbach's alpha. The results of this study provided evidence for the validity and reliability of the tool based on the psychometric analysis done in the study. At the end of exploratory factor analysis, the extracted factors were formed based on the structures and dimensions of the health belief model. This tool can evaluate all the constructs of the health belief model. The final version of the questionnaire was finalized with 49 items comprising seven factors, namely perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cue to external action, cue to internal action, and self-efficacy. In most previous research, the cut-off point for determining the variables loaded by each factor was considered at least 0.3 [31], while the criterion for extracting items with a factor loading greater than 0.5 was considered in this study. This led to the identification of factors with the ability to predict the variable under study properly. According to the research team, no study was found on developing a tool on fatty liver. Therefore, this section addressed studies developing a tool on other subjects using the health belief model. Many studies used this model to design and measure psychometrics of scales on various other diseases, such as osteoporosis, AIDS, diabetes, etc. For instance, Hydarnia et al.'s study [32] was done on the prevention of osteoporosis in middle-aged women using health belief model constructs. They identified 42 items covering seven factors (Cronbach's alpha= 0.87), which was relatively similar to our findings.

Given that Cronbach's alpha between 0.80-0.90 shows high internal consistency, we achieved a good internal consistency between items. Tavafiyan and Niknami are other researchers that used the health belief model to develop tools. Fallahi *et al.* [33] measured reproductive health behavior in men with AIDS. They extracted 47 items covering five constructs and obtained Cronbach's alpha of 0.85, explaining 0.42 of the variance. In the study mentioned above, items related to cue to action were eliminated during exploratory factor analysis.

The reason for the elimination of the mentioned construct can be that the cue to action does not account for individuals' beliefs in the health belief model, but it is one of the environmental and external factors affecting individuals' behavior. In

our study, it was considered a cue to internal action and a cue to external action, so all the health belief model constructs were preserved. Naderimagham *et al.* [34] studied the perceived self-efficacy scale for self-care in middle-aged patients with diabetes mellitus type 2 and developed a tool with 17 items and Cronbach's alpha of 0.70 to 0.85, explaining 67.4% variance. Anagnostopoulos *et al.* [35] evaluated the validity and reliability of health belief scales for mammography screening in asymptomatic women in Greece. They examined only three constructs of the health belief model (perceived benefits, perceived barriers, and self-efficacy) compared to our study. The consistency of Cronbach's alpha coefficient obtained in this study with that of other mentioned studies shows the desirability of this scale. The first factor of health belief tool related to fatty liver (i.e., self-efficacy) with a specific value of 5.28 explained 9.78 of the total variance, and none of the items of this construct was removed during the exploratory factor analysis.

For this reason, it had the most contribution in explaining the variance of this tool. The fifth factor (perceived barriers) with a specific value of 4.09 explained 5.57 of the total variance. Three items of this construct were removed due to a lack of obtaining a minimum score, so it had the least contribution in explaining the variance of this tool.

One of the study's major limitations was the lack of similar studies and scales on measuring health beliefs related to fatty liver—co-occurrence of the study with the COVID-19 epidemic limited access to more participants. The strength of our study was strict adherence to the methodology and provision of documents related to assessing the validity and reliability of the research scale.

Conclusion

The designed scale has appropriate validity and reliability for measuring the health belief constructs associated with fatty liver in middle-aged people.

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References

1- Jamali R, Jamali A. Nonalcoholic fatty liver disease. FEYZ. 2010;14(2):169-79. [Persian]

2- Kwak MS, Kim D. Nonalcoholic fatty liver disease and lifestyle modifications, focusing on physical activity. Korean J Intern Med. 2018;33(1):64-74.

3- Vernon G, Baranova A, Younossi Z. Systematic review: The epidemiology and natural history of nonalcoholic fatty liver disease and nonalcoholic steatohepatitis in adults. Aliment Pharmacol Ther. 2011;34(3):274-85.

4- Perdomo CM, Fruhbeck G, Escalada J. Impact of nutritional changes on nonalcoholic fatty liver disease. Nutrients. 2019;11(3):677.

5- Ghaemi A, Taleban F, Hekmatdoost A, Rafiei A, Hosseini V, Amiri Z, et al. Effect of weight reduction diet on nonalcoholic fatty liver disease. Iran J Nutr Sci Food Technol. 2013;8(2):123-34. [Persian]

6- Kalvandi R, Rajabi M, Kahramfar Z, Chaleh Cheleh T. Investigation of the effect of artichoke (Cynara Scolymus L.) on characteristics of the fatty liver. Complement Med J Facu Nurs Midwifery. 2020;10(2):134-47. [Persian]

7- Schattenberg JM, Ekstedt M. Assessing the disease burden of nonalcoholic fatty liver disease in the real world–big data and big numbers. BMC Med. 2019;17(1):123.

8- Cai J, Zhang XJ, Li H. Progress and challenges in the prevention and control of nonalcoholic fatty liver disease. Med Res Rev. 2019;39(1):328-48.

9- Alswat K, Aljumah AA, Sanai FM, Abaalkhail F, Alghamdi M, Al Hamoudi WK, et al. Nonalcoholic fatty liver disease burden–Saudi Arabia and United Arab Emirates, 2017-2030. Saudi J Gastroenterol. 2018;24(4):211-9.

10- Tapper EB, Lai M. Weight loss results in significant improvements in quality of life for patients with nonalcoholic fatty liver disease: A prospective cohort study. Hepatology. 2016;63(4):1184-9.

11- Alam S, Fahim SM, Chowdhury MAB, Hassan MZ, Azam G, Mustafa G, et al. Prevalence and risk factors of nonalcoholic fatty liver disease in Bangladesh. JGH Open. 2018;2(2):39-46.

12- Shi L, Liu ZW, Li Y, Gong C, Zhang H, Song LJ, et al. The prevalence of nonalcoholic fatty liver disease and its association with lifestyle/dietary habits among university faculty and staff in Chengdu. Biomed Environ Sci. 2012;25(4):383-91.

13- Bellentani S, Scaglioni F, Marino M, Bedogni G. Epidemiology of nonalcoholic fatty liver disease. Dig Dis. 2010;28(1):155-61.

14- Keating SE, Adams LA. Exercise in NAFLD: Just do it. J Hepatol. 2016;65(4):671-3.

15- Lu FB, Zheng KI, Rios RS, Targher G, Byrne CD, Zheng MH. Global epidemiology of lean nonalcoholic fatty liver disease: A systematic review and meta-analysis. J Gastroenterol Hepatol. 2020;35(12):2041-50.

16- Della Pepa G, Vetrani C, Lombardi G, Bozzetto L, Annuzzi G, Rivellese AA. Isocaloric dietary changes and nonalcoholic fatty liver disease in high cardiometabolic risk individuals. Nutrients. 2017;9(10):1065.

17- Mlynarsky L, Schlesinger D, Lotan R, Webb M, Halpern Z, Santo E, et al. Nonalcoholic fatty liver disease is not associated with a lower health perception. World J Gastroenterol. 2016;22(17):4362-72.

18- Mahady SE, Adams LA. Burden of nonalcoholic fatty liver disease in Australia. J Gastroenterol Hepatol. 2018;33 Suppl 1:1-11.

19- Sohrabpour AA, Rezvan H, Amini-Kafiabad S, Dayhim MR, Merat S, Pourshams A. Prevalence of nonalcoholic steatohepatitis in Iran: A population based study. Middle East J Dig Dis. 2010;2(1):14-19. [Persian]
20- Parkash O, Hamid S. Are we ready for a new epidemic of under recognized liver disease in south Asia especially in Pakistan? nonalcoholic fatty liver disease. J Pak Med Assoc. 2013;63(1):95-9.
21- Akbari M, Zohari-Anboohi S. Comparison of the nutrition of patients with and without nonalcoholic fatty liver in Tehran. Intern Med Med Investig J. 2018;3(4):18-22.
22- Hallsworth K, Fattakhova G, Hollingsworth KG, Thoma C, Moore S, Taylor R, et al. Resistance exercise reduces liver fat and its mediators in nonalcoholic fatty liver disease independent of weight loss. Gut. 2011;60(9):1278-83.
23- Hallsworth K, Dombrowski SU, McPherson S, Anstee QM, Avery L. Using the theoretical domains framework to identify barriers and enabling factors to implementation of guidance for the diagnosis and management of nonalcoholic fatty liver disease: A qualitative study. Transl Behav Med. 2020;10(4):1016-30.
24- Zelber-Sagi S, Bord S, Dror-Lavi G, Smith ML, Towne Jr SD, Buch A, et al. role of illness perception and self-efficacy in lifestyle modification among nonalcoholic fatty liver disease patients. World J Gastroenterol. 2017;23(10):1881-90.
25- Glanz K, Rimer BK, Viswanath K. Health behavior and health education: Theory, research, and practice. San Francisco: Jossey-Bass; 2008.
26- Chawla KS, Talwalkar JA, Keach JC, Malinchoc M, Lindor KD, Jorgensen R. Reliability and validity of the Chronic Liver Disease Questionnaire (CLDQ) in adults with nonalcoholic steatohepatitis (NASH). BMJ Open Gastroenterol. 2016;3(1):000069.
27- Ghevariya V, Sandar N, Patel K, Ghevariya N, Shah R, Aron J, et al. Knowing what's out there: Awareness of nonalcoholic fatty liver disease. Front Med. 2014;1:4.
28- Kline RB. Principles and practice of structural equation modeling. Unknown city: Guilford publications; 2015.
29- Vakili MM, Jahangiri N. Content validity and reliability of the measurement tools in educational, behavioral, and health sciences research. J Med Educ Dev. 2018;10(28):106-18. [Persian]
30- Beavers AS, Lounsbury JW, Richards JK, Huck SW, Skolits GJ, Esquivel SL. Practical considerations for using exploratory factor analysis in educational research. Pract Assess Res Eval. 2013;18(1):6.
31- Haghdoost AA, Pourkhandani A, Motaghipisheh S, Farhoudi B, Fahimifar N, Sadeghirad B. Knowledge and attitude concerning HIV/AIDS among Iranian population: A systematic review and meta-analysis. Iran J Epidemiol. 2011;6(4):8-20. [Persian]
32- Khani Jeihooni A, Kaveh MH, Hajizadeh E, Askari A, Naghizadeh MM. Designing the validity and reliability of osteoporosis prevention instrument based on health belief model in women. J Ilam Univ Med Sci. 2013;22(3):127-36. [Persian]
33- Fallahi H, Tavafian SS, Yaghmaie F, Hajizadeh E. Developing and Measuring Psychometric Properties of reproductive health behavior in people living with HIV based on health belief model. Hakim Res J. 2013;16(2):118-27. [Persian]
34- Naderimagham S, Niknami S, Abolhassani F, Hajizadeh E. Development and psychometric properties of perceived self-efficacy scale (SES) for self-care in middle-aged patients with diabetes mellitus type 2. PAYESH. 2013;12(6):679-90. [Persian]
35- Anagnostopoulos F, Dimitrakaki C, Niakas D, Tountas Y. Validity and reliability assessment of health belief scales for mammography screening in Greek asymptomatic women. Psychooncology. 2013;22(8):1912-7.