

Psychometric Properties of the Persian-Version of Myocardial Infarction Dimensional Assessment Scale

Abstract

Assessment of quality of life is an important measure of the impact of the disease, and effectiveness of treatment. The myocardial infarction dimensional assessment scale is a disease-specific questionnaire developed for the evaluation of health-related quality of life in patients following myocardial infarction. The purpose of this study was to determine the psychometric properties, the Persian version of myocardial infarction dimensional assessment scale. The translated version of scale was checked for validity and reliability with 350 patients who had suffered a myocardial infarction within the last 90 days. Participants were recruited from five inpatient wards and two outpatient departments at four university hospitals in Tehran between June 2013 and March 2014. Exploratory factor analysis indicated a six-factor solution for the questionnaire: 'physical activity', 'insecurity', 'emotional reaction', 'dependency', 'diet', and 'concerns over medication and side effects'. Together, these accounted for 81.63% of variance observed. Cronbach's alpha of the subscales ranged from 0.88 to 0.98 and test-retest reliability intraclass correlation coefficients ranged from 0.81 to 0.97 indicating that the instrument was reliable. This study gave evidence of reliability and validity of the Persian Version of Myocardial Infarction Dimensional Assessment Scale. The MIDAS scale-Persian version is demonstrated to have an acceptable reliability and validity in Iranian patients with Myocardial Infarction. This scale can be used to measure health outcomes in different clinical settings and research centres; Moreover, it can be used by nurses over the world for both measuring health-related quality of life and determine the effects of different medical and nursing interventions on patients' quality of life.

Key Words: Quality of life, myocardial infarction dimensional assessment scale, reliability and validity.

Introduction

Cardiovascular disease (CVD) is the leading cause of death and disability in both developing and developed countries. It accounted for less than 10% of global mortality at the beginning of the twentieth century, and over 30% of all deaths a hundred years later, Over 80% of CVD deaths take place in low- and middle-income countries (Hatmi et al. 2007; Lloyd-Jones et al. 2010; WHO, 2014) and it is one of the most common causes of hospitalisation in industrial countries (Badir and Sepit, 2007). By 2030, nearly 23.3 million deaths each year will be due to cardiovascular diseases (WHO, 2014). In the UK, it has been predicted that the number of cases of CVD will rise by 44% and its related hospital admissions will increase by 32% (Quinn, 2009). The ongoing investigations illustrate that in the Eastern Mediterranean and Middle Eastern countries, CVD is growing in prevalence with a high number of remaining disabilities (Ham and Kim 2010, Lamotte et al., 2010). CVD has become an important cause of mortality in Eastern Mediterranean countries, the Middle East and Iran, where it is termed the epidemic of the twentieth century (Fakhrzadeh et al. 2000). In Iran, 35% of deaths are due to CVD, and CVD is the leading cause of death in adults aged 35 years and older (AghaYousef et al. 2013). CVD as a clinical syndrome affects many aspects of patients' life (Demir and Unsar, 2011). One of the most challenging healthcare issues is to provide quality care for patients with CVD (Spertus et al. 2003). Therefore, it is equally important that nurses be adequately prepared to assess such patients (Paavilainen et al. 2006). Those patients who survive a CVD event may live for an extended period of time, but often may be disabled. This highlights the need to attend to Health-related quality of life (HRQL) in the studies regarding CVD (Dougher et al. 2000; Hofer, 2004). According to Iqbal et al. (2010), poor quality of life is associated with higher mortality in CVD patients. Thus, patient assessment protocols for CVD should combine clinical prognostic factors and self-reported quality of life scoring to identify those at risk of recurrent hospitalization and death.

Despite a growing need to improve the quality in health care, a plurality of perspectives of the actual meaning of quality is available. Therefore, appropriate measures for quality improvement require the development of a shared understanding of this concept that enables clarity for practice (Beattie et al. 2012). HRQL is an appropriate self-reported measure of individuals' emotional, social, and physical satisfaction (Thompson et al. 2002). It is used increasingly as a

measure of the outcome of CVD (Cepeda-Valery et al. 2011; O'Loughlin et al. 2010). HRQL has several components, including: life satisfaction, subjective welfare state, happiness, functional ability, and social welfare. Scales have been developed to quantify HRQL (Uneri and Cakın, 2007). Quality of life can be a sign of quality of medical care and one part of the disease management programme. Therefore, instead of using classical measures like fatality to observe the results of medical care, quality of life can be used (Dehghanzadeh et al. 2001).

HRQL is often measured in clinical studies, sometimes as the primary outcome (Roebuck et al. 2001). Improvement in HRQL is increasingly cited as an outcome in clinical decision-making, assessment of treatment benefit (Treasure, 1999), care planning and nursing research (Uysal and Ozcan, 2011).

The components of the HRQL have many things in common with the Institute of Medicine's quality care dimensions. Therefore, the clarification of HRQL helps with the explication of quality of care, and ensures that the behaviour, attitudes and therapeutic relationships in care are retained by nurses (Beattie et al. 2012).

HRQL scales may be either generic or disease-specific (Thompson and Roebuck, 2001). Disease-specific HRQL questionnaires relate to the course of a specified disease and its progression in specific patient populations, and yield high response rates, due to their relevance to respondents (Uysal and Ozcan, 2011). Disease-specific instruments are responsive to small changes in health status, and are less likely than generic instruments (Dempster and Donnelly, 2000). Therefore, instruments developed to measure HRQL in specific clinical situations are proliferating (Roebuck et al. 2001). CVD is a key area for HRQL measurement, because most interventions aim to improve HRQL, as well as survival (Dougherty et al. 1998). Therefore, it is equally important that nurses be adequately prepared to assess HRQL in the growing population of patients with CVD (Mayberry et al. 2006). Treatments and interventions for CVD are evolving, increasing the demand for CVD-specific HRQL instruments (Roebuck et al. 2001).

Background

While many instruments for the measurement of health-related outcomes are available for instance, the Seattle, the Minnesota Living with Heart Failure questionnaire, the Kansas City Cardiomyopathy Questionnaire, and MacNew Questionnaire, most have not yet been adequately evaluated. Therefore, the evaluation of existing instruments in terms of validity and reliability

should have priority over the development of new instruments (Albers et al. 2010). It is believed that quality of life assessment can complement clinical prognostic markers to identify CVD patients at high risk of adverse health outcomes (Iqbal et al. 2010).

The MI dimensional assessment scale (MIDAS) is a disease-specific questionnaire developed and tested for the evaluation of HRQL in UK patients (Thompson et al. 2002). Cultural adaptation, translation and psychometric properties of the original and translated versions of the UK MIDAS scale have been assessed in Mandarin (Wang et al. 2006), and Turkish (Uysal and Ozcan, 2011). These studies affirmed that the MIDAS scale is a valid and reliable questionnaire for the measurement of HRQL in patients with CVD living in different cultures and contexts. This instrument has been used and translated into different languages. It has been noted that several studies have been conducted using this scale since its initial introduction to the empirical published work. In addition, this scale has been found to possess high reliability and validity values in international research studies conducted in different countries (Yılmaz et al. 2011). It is known that if an instrument is to be used in a different languages and cultures, it is necessary to demonstrate that it has similar validity and reliability as the original instrument (Sencan, 2005; Urizar, 2006). However, to our knowledge, this questionnaire has not yet been translated into Persian. Therefore, this study was carried out to translate and assess the psychometric properties of the Persian version of MIDAS scale (MIDAS-P) using exploratory factor analysis.

Study aim

The study aimed to determine whether, and to what extent, MIDAS-P is a valid and reliable disease-specific HRQL scale in patients suffering from MI.

Methods

Study design

This study was undertaken from June 2013 to March 2014 in Tehran, capital of Iran, where the *lingua franca* is Persian.

Sample and Setting

Patients' notes were reviewed in relation to the inclusion criteria (below). All patients meeting the study's inclusion criteria were approached one of the doctors on the research team. Nurses

informed participants of the study's aims and obtained their informed consent. Three hundred and fifty participants were recruited from seven inpatient wards (after discharge from CCU) and outpatient departments at four university hospitals. The sample size was determined based on the rule that the number of the tool's items is multiplied to 10. Thus, with MIDAS's 35 items, 350 patients were required (Knapp and Brown, 1995).

Inclusion criteria were:

- Persian speaker;
- without previous psychiatric disorder;
- without taking any medicines for their mental health;
- willing to participate in this research;
- diagnosed with MI for the first time within the last three months;

Exclusion criteria were:

- lack of interest to participate in this study;
- any change in the patients' physical condition that might hinder participation

Ethical considerations

Written permission was obtained from Dr. David R. Thompson who held the copyright for the MIDAS. A licence for the SF-36 was obtained from Medical Outcome Trust. The study was approved and overseen by the research council affiliated to Shahed University [Registration code: 68412]. The ethics committee affiliated with Shahed University approved the study. Permission to approach patients was obtained from the teaching hospitals. Participants were provided with verbal information. Participants' autonomy, confidentiality, and anonymity were respected throughout the study. Patients in this research were voluntary and participants were informed that they were free to withdraw from the study at any time without affecting their treatment.

Data collection

The study procedure and instruction for completing the questionnaires were expressed to participants who met the eligibility inclusion criteria by the first author. The HRQL instruments

were distributed and collected by the principal researcher one–two hours later. The questionnaire’s items were read to participants illiterate in Persian, and their answers recorded by a nurse.

Instruments

A three-part questionnaire was used:

- Socio-demographic data were collected as outlined in Table 1.
- MIDAS scale

Quality of life was measured using the MIDAS scale (Thompson et al. 2002). This is a disease-specific instrument for patients with MI. The MIDAS-P contains 35 items to quantify seven clinically relevant domains of CAD including ‘physical activity’, ‘insecurity’, ‘emotional reaction’, ‘dependency’, ‘diet’, ‘concerns over medication’ and ‘side effects’ (defined as the secondary effects of medicines, which may be positive or negative (ICH, 1996). Scores obtained in these domains are transformed and expressed from 0 to 100, where higher scores indicate worse HRQL.

- SF-36 questionnaire

HRQL was assessed against the SF-36 questionnaire, a general health related HRQL instrument, licensed from Medical Outcome Trust. The SF-36 consist: eight subscales including ‘physical functioning’, ‘bodily pain’, ‘general health’, ‘vitality’, ‘social functioning’, ‘role limitations due to physical problems’, ‘role limitations due to emotional problems’, and ‘mental health’. Scores in each scale range from 0 to 100, with zero representing the lowest HRQL and 100 showing the highest possible score. The original UK English and Persian versions of this questionnaire have high reliability and construct validity (Gandek and Ware, 1998; Montazeri et al.2005).

Translation procedures and evaluation of content and face validity:

After obtaining the authors’ written permission for the translation and application of the MIDAS, the questionnaire was translated as part of the international quality of life assessment project (IQoLAP) (Gandek and Ware, 1998). The IQOLA approach to translation and validation was developed for use with the SF-36, but is applicable to other healthcare measurement instruments. The MIDAS was translated from English to Persian by a nurse academic and a cardiologist independently. Differences were reconciled by discussion. The Persian version was back-translated to English by a professional translator with no previous knowledge of the MIDAS

scale. The original scale and back-translated versions were compared item by item and a final Persian version of the scale was agreed by two bilingual experts. A multidisciplinary panel of 15 health professionals and academics tested the content validity of the Persian questionnaire. The panel included: one expert in psychometrics, two cardiologists, six nurse instructors from three different universities in Tehran, and six experienced clinical nurses in Coronary Care Units (CCUs). They were asked to comment on the reasonability, suitability, attractiveness and logical sequence of the items as well as the conciseness and comprehensiveness of the questionnaire, and complete a Content Validity Index (CVI) (Gabe and Jordan, 2014). To assess face validity, the questionnaire was given to 10 patients who had suffered a MI within the three months to test comprehension and readability. Accordingly, some items were simplified and modified to improve the readability and understanding of the items by patients. Wording was changed in five items: 16- “anxious about travelling?” was exchanged to “anxious about walking a long distance?”; 20- “anxious about dying?” to “did you have fright of death and dying?; 29-“felt concerned about your diet?” to “did you take care of your diet condition?”; 30- “felt concerned about your cholesterol level?” to “did you notice your cholesterol level when selecting your diet?”; 34- “felt the cold more?” to “did you feel cold after taking your medicine?”.

Two weeks after the initial survey of 350 patients was completed, the MIDAS-P was again passed to 70 patients who had previously responded and had agreed to complete the MIDAS-P twice.

Data analysis

SPSS software (version 16.0 for Windows; Chicago, IL, USA) was used for data analysis, following precedents set by the English language work (Thompson et al 2002). Patient characteristics and scores for each domain of the MIDAS-P were described. Construct validity of the MIDAS-P was investigated using exploratory factor analysis. Principal components analysis with varimax rotation was applied. The Kaiser-Meyer-Olkin test (KMO) and Bartlett’s Test of Sphericity were used to assess the appropriateness of the sample for the factor analysis. Eigen values above 1 and scree plot were used to select factors. Factor loadings equal or greater than 0.4 were considered appropriate. For a known group comparison, the MIDAS-P scores of patients with and without smoking were checked for distribution and subjected to t-tests. To assess the concurrent validity of the MIDAS-P, Pearson’s correlation coefficients between the

subscale scores of the MIDAS-P and SF-36 were computed. Internal consistency of each scale of the MIDAS-P was determined using Cronbach's alpha.

Cronbach's α coefficient of 0.7 or above was considered to be satisfactory (Schneider 2004). Test-retest reliability was calculated by computing the intraclass correlation coefficient (ICC) of each domain. An ICC >0.80 indicated good test-retest reliability and stability (De Boer, 2004).

Results

Demographic Characteristics

According to the international literature, socio-demographic factors can have significant impacts on the subjective well-being and quality of life of adults with CVD (Vigl et al. 2011) that should be considered for future comparisons between HRQL assessment instruments. In this study, of the 350 participants, 181 (51.7%) were men. In addition, 248 (84.5%) were married. The mean age of participants was 69.40 [SD 6.01] years. Table 1 shows the demographic characteristics of the study sample.

We assessed 350 patients' records to assess eligibility. Only 2 patients did not meet the inclusion criteria due to lack of interest to participate in this study and being transferred to other wards, which were replaced by other patients. Therefore, 350 eligible patients were approached and recruited. Most, (195) were recruited on hospital wards and 155 in outpatient departments. Participants took 10-15 minutes to complete the MIDAS-P questionnaire.

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Content Validity Index (CVI) rated by the experts was value (0.95). Construct validity consisted: a) Exploratory factor analysis (EFA); The KMO coefficient was 0.86 exceeding the recommended value of 0.60 and Bartlett's test of sphericity was significant $\chi^2 (595) = 18860.10395$ ($p \leq 0.001$), showing sampling adequacy and confirming that the data were suitable and sufficient for factor analysis.

A principal component analysis with varimax rotation was used to evaluate the construct validity of the questionnaire. After varimax rotation, 35 items loaded significantly on 6 factors. All 6 factors had an eigenvalue greater than 1.0. Explained variance was 81.63%. The numbers of

items loading ranged from 6.74 to 26.03. No items were deleted (factor loading < 0.4). The Scree plot suggested generating a six-factor model (Fig. 1).

By considering items with initial eigenvalues above 1 (Yu, 2009) and using a loading criterion of 0.40 (Field, 2013), items of MIDAS-P were placed in six dimensions, unlike the English version of MIDAS, which had 35 items and 7 dimensions (Thompson et al. 2002). In the MIDAS-P, items 32-35 were loaded onto a factor labelled 'Concerns over medication'. The factors of the MIDAS-P were:

1. Physical activity (item numbers 1-12; 26.03% of observed variance);
2. Insecurity (item numbers 13-21 ; 21.20% of observed variance);
3. Emotional reaction (item numbers 22-25 ; 10.27% of observed variance);
4. Dependency (item numbers 26-28 ; 9.75% of observed variance);
5. Diet (item numbers 29-31 ; 7.62% of observed variance);
6. Concerns over medication (item numbers 32-35; 6.74% of observed variance).

The principal component analysis of the MIDAS-P is reported in Table 2.

b) Discriminant validity; Non-smokers had significantly lower MIDAS-P scores than smokers in the domains of 'insecurity', 'emotional reaction', 'dependency', and 'concerns over medication and side effects' (Table 3).

Convergent validity

Findings showed correlation between MIDAS-P and SF-36 subscales. There were significant small-to-moderate levels of correlation between all the sub-scales: correlation coefficients ranged from 0.011 to 0.773

The full MIDAS-P score demonstrated a significant and high correlation with the full SF-36 score ($r = 0.733$, $p < 0.01$).

Reliability of MIDAS-P was calculated with Cronbach's alpha internal consistency, item to total correlation and test-retest. Cronbach's alpha for the total scale was measured 0.94, has acceptable internal consistency (Gliem & Gliem 2003). The six subscales' alpha coefficients ranged from 0.82 to 0.96. Correlations between MIDAS-P subscales and total scores were positive, ranging 0.396 to 0.682, and significant. In test-retest reliability, the ICC coefficients ranged between 0.81 and 0.97, for the overall score, statistically significant ($n=70$, $p < 0.001$).

Discussion

The aim of this study was to purpose the psychometric properties of the MIDAS-P. Face and content validity were confirmed after minor revisions. Many studies in different cultures have assessed HRQL in patients with cardiac disease, particularly MI, and investigated the effects of nursing interventions on HRQL. However, such studies need standardised, valid and reliable questionnaires.

Differences between the MIDAS-P and the English, Turkish and Mandarin versions of the MIDAS are summarized in Table 4.

The main difference between the original and MIDAS-P was that the in this Persian version, subscales of the ‘concerns over medication’ (consisting of two items, 32-33) and ‘side effects’ (consisting of two items 34-35) were integrated. Similarly, Uysal and Ozcan (2011) reported summarized subscales and deleted items 6, 9, 13, 15, 26, 28, 29, 30, 31, 34, and 35 in patients with MI.

In order to adaptive CM-MIDAS to East-Asian culture and TR-MIDAS to Turkish and ensure that participants might more readily perceive it, item 16 was changed (Uysal and Ozcan, 2011; Wang et al. 2006). Similarly, in this research, item 34 was changed.

In our research, CVI value (0.95) was higher than that (0.89) specified in Chinese version of MIDAS and similarly TR-MIDAS (0.95) (Uysal and Ozcan, 2011; Wang et al. 2006), indicating that the scale could be statistically evaluated without excluding any items.

Exploratory factor analysis (EFA) was calculated to evaluate the construct validity, as for the CM-MIDAS and TR-MIDAS versions (Uysal and Ozcan, 2011; Wang et al. 2006), with a similar validity process (Waltz, 1993).

In this study, the KMO value for sampling adequacy was high (0.86), and Bartlett's test of the model was statistically significant ($p \leq 0.001$), as in the CM-MIDAS and TR-MIDAS versions (Uysal and Ozcan, 2011; Wang et al. 2006). The scree plot showed that the MIDAS-P had six factors: ‘physical activity’, ‘insecurity’, ‘emotional reaction’, ‘dependency’, ‘diet’, and ‘concerns over medication. This structure differs from the original (Thompson et al. 2002) and Mandarin versions (Wang et al. 2006).

Total variance (81.63%) differed from that of CM-MIDAS (67.2%) and TR-MIDAS versions (65.15%) (Uysal and Ozcan, 2011; Wang et al. 2006). Following varimax rotation, subscales of medication side effects and concern over medication were removed and a new subscale with 4

items was added, which was different from the Chinese version of MIDAS and TR-MIDAS versions (Uysal and Ozcan, 2011; Wang et al. 2006).

Participants who smoked had significantly lower HRQL scores in five dimensions of the MIDAS-P including: 'insecurity', 'emotional reaction', 'dependency', and 'concern over medication', reinforcing messages on the negative impact of smoking.

The MIDAS-P, the MIDAS and SF-36 HRQL questionnaires had significant small-to-moderate levels of correlation, as in previous studies (Yılmaz et al. 2011; Wang et al. 2006).

The high level of internal consistency is partly attributable to the large number of items (Waltz, 1993). Similar findings have been achieved in Cronbach's alpha values in the studies conducted using the English version of MIDAS, TR-MIDAS, and Chinese version of MIDAS with the patients population exposed to MI (Thompson et al. 2002; Uysal and Ozcan, 2011; Wang et al. 2006).

In this research, item to total correlation coefficients ranged 0.39-0.86, above the threshold for acceptability (>0.29) (Costa Santos et al. 2005; Yu, 2009).

The MIDAS-P was assessed to the study participants twice—with a two-week interval. The lowest ICC coefficients were related to the 'insecurity and dependency' sub-scales, possibly representing a change in participants' emotions. Others demonstrated less stability (Uysal and Ozcan, 2011; Wang et al. 2006).

Conclusions

The MIDAS-P has acceptable psychometric properties. This instrument introduces a modification of the quality of life after CVD, which was originally developed for those patients who survived a CVD event and referred for subsequent cardiac treatments. Since the healthcare indicators of Iran show a consistent improvement that are near those of developed countries, the results of this study can be generalized to other healthcare settings in both transitional and developed countries. It provides researchers, clinicians and especially clinical nurses with valuable additional information about the impact of either the condition or treatment from the patient's perspective, particularly in cardiac diseases as major causes of disability.

The MIDAS-P is easy to understand and complete in ten to 15 minutes, and its acceptability is demonstrated by the response rates of over 90%. The MIDAS-P has potential for measuring health-related HRQL, determining the effects of medical and nursing interventions on patients'

HRQL, increasing understanding of patients' needs, and optimizing their treatments. The six factor solution with 35 items of MIDAS-P seems more appropriate than the seven factor version for patients exposed to MI in Iran. CVD impairs the function and mobility of the patient and also reduces his/her quality of life; The MIDAS scale-Persian version is demonstrated to have an acceptable reliability and validity in Iranian patients with CVD; it can be used to evaluate how daily activities, as well as physical, emotional, and social functioning are affected by the disease and its treatment process. This scale can be used to measure health outcomes in different clinical settings and research centres; moreover, it can be used by nurses for both measuring health-related quality of life and determine the effects of different medical and nursing interventions on patients' quality of life. Also, the Persian version of the MIDAS can be used by nurses and other clinicians to prepare future healthcare professionals who are capable to meet the needs of patients with CVD.

Non-random sampling and a relatively small sample size restrict the generalizability of the study findings. This study involved patients in Tehran, and these findings should be tested in other regions of Iran. Consequently, multi-centre or multi-state studies with larger sample sizes are recommended. The high participation rate (100%), typical for research in our hospitals, indicates absence of volunteer bias, enhancing generalizability within the hospitals studied (Jordan et al. 2013). We evaluated the validity and reliability of the MIDAS-P, but further work is needed to assess the responsiveness of MIDAS to changes in patients' conditions. These findings would be strengthened by qualitative work to improve understanding of the patients' perspectives of the factors delineated in the statistical analysis. In addition, longitudinal investigations evaluating the predictive nature of the identified MIDAS items are suggested.

Key points for policy, practice and/or research

- Health-related quality of life (HRQL) is an appropriate self-reported measure of individuals' emotional, social, and physical satisfaction.
- The MI dimensional assessment scale (MIDAS) is a disease-specific questionnaire developed and tested for the evaluation of HRQL in UK patients.
- This study gave evidence of reliability and validity of the Persian Version of Myocardial Infarction Dimensional Assessment Scale.

- The MIDAS-P has potential for measuring health-related HRQL, determining the effects of medical and nursing interventions on patients' HRQL, increasing understanding of patients' needs, and optimizing their treatments. The six factor solution with 35 items of MIDAS-P seems more appropriate than the original seven factor version for patients exposed to MI.
- This scale can be used easily by nurses for both measuring health-related quality of life and determine the effects of different medical and nursing interventions on patients' quality of life.
- Healthcare managers and nurse educators can use this instrument to make nurses familiar with the needs of patients with CVD and factors influencing patients' quality of life and prepare them for the delivery of high quality care to the booming population of patients with CVD.
- This comprehensible tool may enable the screening and detection of patients with CVD who may suffer from quality of life-related issues in the dimensions of physical activity, insecurity, emotional reaction, dependency, diet, and concerns over medication.

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Table 1. Clinical and socio-demographic information of the patients (N = 350)

		Count (%)	
Gender	Male	181(51.70)	
	Female	169(48.30)	
Age group (year)	≤70	231(66.0)	
	71-80	99 (28.3)	
	>80	20(5.7)	
Education level	Illiterate	171(48.86)	
	Primary school	96(27.43)	
	High school	66(18.86)	
	Higher than diploma	17(4.85)	
Marital status	Married	284(84.5)	
	Divorced & Widowed	66(15.5)	
Employment status	Employed	164(46.86)	I: no limitation of ordinary activity
	Unemployed	35(10.10)	II: slight limitation of ordinary activity.
	Housewife	108(30.86)	III: marked limitation of ordinary physical activity
Economic status	Retried	43(12.28)	IV: unable to carry on any physical activity without discomfort
	Poor	199(56.9)	
Family history of CAD	Good	151(43.1)	
	Yes	245(73.0)	
Functional class*	No	102(37.0)	
	I	22(6.28)	
	II	70(20.02)	
	III	99(28.28)	
	IV	159(45.42)	

Table 2. Principal component analysis of the IR-MIDAS (These items represent the back translation from Persian)

Factors and Items	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6
Physical activity						
1-Thought twice before undertaking physical activity (such as housework or going to the shopping)?	0.932					
2-Had angina symptoms (such as chest pain or tightness)?	0.956					
3-Had angina (chest pain or tightness) that affected your life?	0.836					
4-Felt slowed down?	0.918					
5-Had no energy?	0.703					
6-Been breathless?	0.787					
7-Had chest pain or tightness when undertaking physical activity?	0.928					
8-Felt frustrated at your limitations?	0.794					
9-Needed to rest more?	0.806					
10-Felt you have a reduced social life?	0.858					
11-Felt you cannot perform your domestic duties?	0.940					
12-Found the weather made your pain worse?	0.714					
Insecurity						
13-Worried or felt anxious about the future		0.892				
14-Did you have fright of death and dying?		0.875				
15-Felt frightened you will have another heart attack?		0.890				
16-Felt isolated?		0.846				
17-Felt lonely?		0.712				
18-Felt anxious about walking a longer distance?		0.868				
19-Felt vulnerable?		0.956				
20-Felt insecure?		0.956				
21-Been affected?		0.956				
Emotional reaction						
22-Felt irritable?			0.902			
23-Felt down or depressed?			0.897			
24- Felt bad tempered?			0.855			
25-Felt stressed?			0.879			
Dependency						
26-Felt your family or friends are over protective?				0.943		
27-Felt you have lost your independence?				0.871		
28-Felt you have to rely on others?				0.903		

Diet situation

29-Worried about your weight?	0.904
30- Did you take care of your diet?	0.927
31-Did you notice the importance of diet for your cholesterol level?	0.730

Concerns over medication

32-Worried about taking medicines?	0.884
33-Worried about side effects from your medicines?	0.842
34- Did you feel that you were colder after you took your medicine Felt the cold more?	0.838
35-Experienced unwanted side effects	0.899

*Kaiser-Meyer-Olkin measure of sampling adequacy=0.80, Bartlett's test of Sphericity was significant ($p < 0.001$).

Table 3. Known-group comparison between smokers and non-smokers of the IR-MIDAS

Domain	With experience of smoking	Without experience of smoking	p value
	Mean Score (SD) (n=171)	Mean Score (SD) (n=179)	
Physical activity	66.01(21.87)	44.26(23.09)	.03
Insecurity	61.53(26.12)	29.99(11.79)	.00
Emotional reaction	56.95(25.74)	32.32(16.79)	.00
Dependency	59.49(26.95)	34.48(21.73)	.01
Diet situation	54.26(25.02)	39.10(23.62)	.04
Concerns over medication	61.98(26.23)	30.75(14.13)	.00

All variables were normally distributed

Table 4. Differences between IR-MIDAS and other versions of the MIDAS

Developmental stage	IR-MIDAS (n=350)	UK MIDAS (n=410)	Turkish MIDAS (n=230)	Mandarin MIDAS (n=180)
Factor analysis	6 factors	7 factors	6 factors	7 factors
KMO	0.86	0.87	0.82	0.87

The Bartlett's test	$\chi^2(595) = 18860.10395$	-	$\chi^2(276) = 2612.375$	$\chi^2(595) = 4065.145$
Total variance (%)	81.63	70.8	65.15	67.18
Item to total correlation	0.39 - 0.86	-	0.34 to 0.84	0.68 - 0.89
total variance	81.63%		65.15%	67.2%
Coronbach's alpha	0.82 - 0.96	0.71-0.94	0.65 to 0.88	0.71-0.93
Known group comparison	smoking and without smoking	-	-	-
reliability Test-retest ICC	0.814- 0.970	0.34 - 0.84	0.41-0.86	0.74-0.94
Correlation with SF36	0.011 to 0.77	0.121- 0.76	-	0.042 to-0.78

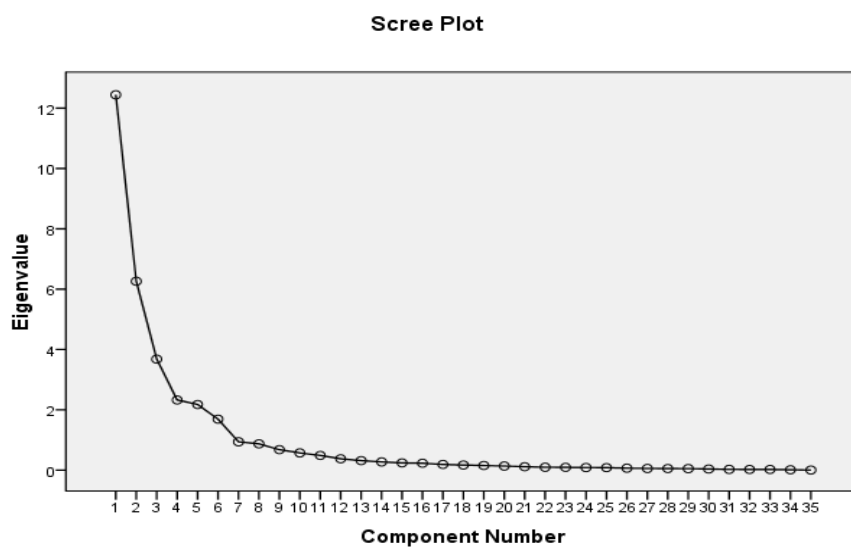


Figure 1: Scree plot of generating a six-factor model

Psychometric properties of the Persian version of myocardial infarction dimensional assessment scale

Short Title: Persian Version of the MIDAS

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Declaration of conflicting interest

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Contributions

Study Design: NR, MHK, AM.

Data Collection and Analysis: NR, MHK, AM, ZTK, MV, SJ.

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