

Translation, reliability, and validity of the avoidance endurance questionnaire in Iranian subjects with chronic non-specific neck pain

Sarvenaz Karimi Ghasem Abad¹, Behnam Akhbari¹, Mahyar Salavati¹, Ahmad Saeedi², Mahsa Seydi¹, Mohammad Ali Shakoorianfard³

¹Department of Physical Therapy, University of Social Welfare and Rehabilitation Sciences, Tehran, ²Department of Statistical Research and Information Technology, Institute for Research and Planning in Higher Education, Tehran, ³Department of Physical Therapy, Rehabilitation Faculty, Iran University of Medical Sciences, Tehran, Iran

ABSTRACT

Background: To cross-cultural adaptation, test-retest reliability, construct validity of the Persian version of avoidance endurance questionnaire (AEQ) in Iranian subjects with chronic nonspecific neck pain (CNSNP). **Objective:** The AEQ differentiates endurance responses [ER; positive mood scale (PMS), thought suppression scale (TSS), pain persistence behavior scale (PPS), humor/distraction scale (HDS), and behavioral endurance scale (BES) from fear-avoidance responses (FARs; anxiety/depression scale (ADS), catastrophizing scale (CTS), helplessness/hopelessness scale (HHS), avoidance of social activities scale (ASAS), and avoidance of physical activities scale (APAS)]. **Methods:** One hundred and thirty persons with CNSNP took part in this psychometric study. The translation process was done by Beaton guideline. Test-retest reliability and internal consistency were presented by intraclass coefficient (ICC) and Cronbach's alpha, respectively. The construct validity was measured by the correlation between AEQ subscales and the Short-form health survey (SF-12), visual analog scale (VAS), fear-avoidance beliefs questionnaire (FABQ), pain catastrophizing scale (PCS), Tampa scale for kinesiophobia (TSK), and neck disability index (NDI). **Results:** The Cronbach's alpha of all FAR and ER subscales was more than 0.7, and ICCs of all FAR subscales were more than 0.8 and ICCs of ER subscales were reported between 0.59 and 0.86. The correlation between FAR subscales and TKS, FABQ, FABQ.PA, FABQ.W, NDI, PCS, and VAS were the limit between -0.239 and 0.199, and the association between ER subscales and the abovementioned questionnaires was the limit between 0.179 and 0.644. **Conclusions:** The Persian version of AEQ showed acceptable reliability (test-retest, internal consistency) for FAR and ER, and also the construct validity was acceptable. The Persian version of AEQ had acceptable psychometric properties, thus it is a good instrument to identify fear avoidance and ERs of the pain.

Keywords: Avoidance endurance questionnaire, construct validity, reliability, translation

Introduction

In the past, pain-related responses of subjects with chronic musculoskeletal pain were explained by the fear-avoidance

Address for correspondence: Prof. Behnam Akhbari, Physiotherapy Department of University of Social Welfare & Rehabilitation Sciences, Evin, Daneshjoo Blvd, Tehran, Iran.
E-mail: behnamakhbari@gmail.com

Received: 01-02-2020

Revised: 13-03-2020

Accepted: 08-06-2020

Published: 30-07-2020

model (FAM). This model states the patient's reaction to the pain in two ways; some of them face up to their pain and then they choose an adaptive response, and a number of others deal with fear and pain catastrophizing. The first way leads to a good improvement but the second way leads to avoidance response that ultimately, makes disability, chronicity, and pain-related psychological dysfunction such as anxiety and depression.^[1-3] Based on this model, fear of pain and catastrophizing play a

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Karimi Ghasem Abad S, Akhbari B, Salavati M, Saeedi A, Seydi M, Shakoorianfard MA. Translation, reliability, and validity of the avoidance endurance questionnaire in Iranian subjects with chronic non-specific neck pain. J Family Med Prim Care 2020;9:3565-73.

Access this article online

Quick Response Code:



Website:
www.jfmpc.com

DOI:
10.4103/jfmpc.jfmpc_194_20

mediator role in pain and disability.^[4] But, all patients' reaction to the pain isn't avoidance behavior; rather many of them continue their activities although the pain exists. Hasenbring *et al.*^[4] developed a new model that described endurance and avoidance responses to the pain, based on avoidance endurance model (AEM), people face up to pain in 4 paths; fear-avoidance responses (FARs), adaptive endurance responses (ER) with a positive attitude, maladaptive endurance responses with a negative attitude, and adaptive responses (A balance between FAR and ER that ultimately leads to the improvement of the patients).^[2] The FAR, adaptive, and maladaptive ER results in chronic pain and disability^[5] but Hasenbring *et al.* showed that disability in the adaptive group was less in subjects with subacute nonspecific low back pain at 6-month follow-up,^[6] and also their pain-related psychological profiles are different. The adaptive group was reported to have less anxiety, depression, and disability, but the maladaptive group showed more anxiety, depression, and disability.

About two-third of people experienced chronic non-specific neck pain (CNSNP) at least one time during their life and their 50% reported recurrent neck pain.^[7,8] This problem has expensive psychosocial and burden costs.^[9] In many patients with CNSNP, fear-avoidance belief (FAB) associated with disability and chronicity but based on AEM, they can respond in different ways.^[10] The appropriate instrument is needed to identify endurance and FARs in Iranian subjects with CNSNP, and at first, it should be translated into Persian, and then its reliability and validity are evaluated.

To assess endurance response, Hasenbring *et al.* developed the avoidance-endurance questionnaire (AEQ). They derived it from Kiel Pain Inventory (KPI), and the KPI measures ER and FAR and other subscales.^[2,11] The AEQ has 49 items and its role is to discriminate between ER and FAR, the anxiety/depression scale (ADS, 7 items), catastrophizing scale (CTS, 3 items), helplessness/hopelessness scale (HHS, 9 items), avoidance of social activities scale (ASAS, 6 items), and avoidance of physical activities scale (APAS, 5 items) which are a part of FAR and ER subscale as follows: positive mood scale (PMS, 3 items), thought suppression scale (TSS, 4 items), pain persistence behavior scale (PPS, 7 items), and humor/distraction scale (HDS, 5 items) and behavioral endurance scale (BES, 12 items) that is the sum of the PPS and HDS.^[2] The internal consistency ($\alpha > 0.7$) of all subscales is acceptable in the original version and other versions.^[2,12-15] The ER subscales are related negatively to disability kinesiophobia and FAB ($r = -0.234$ to $r = -0.495$) and positively associated with pain intensity ($r = 0.195$ to $r = 0.281$). The FAR subscales are related positively to disability, kinesiophobia, and FAB ($r = 0.188$ to $r = 0.485$) and positively associated with pain intensity ($r = 0.203$ to $r = 0.260$).^[2]

The aim of this study is translation, reliability, and validity of the Persian version of AEQ in subjects with CNSNP. The hypotheses of this study are as follows: (1) the alpha Cronbach's alpha of all subscales is greater than 0.07. (2) The intraclass

coefficient (ICC) of all subscales is more than 0.7. (3) FAR subscales are positively related to pain intensity, neck disability, fear of movement and FAB, and negatively associated with quality of life. (4) ER subscales are negatively related to neck disability, fear of movement, and FAB and positively associated with pain intensity and quality of life.

Methods and Materials

This is a psychometric study. One hundred and thirty subjects with CNSNP were selected by a physical therapist and orthopedic specialist. There are very different ways to obtain an optimal sample of study but in this study, Kline's idea was used, who stated: "study samples of 100 is sufficient".^[16] The subjects who were suffering from neck pain between the sub-occiput and seventh cervical vertebra and without radiating pain to upper extremities and their pain continued for 12 weeks or more, participated in this study. Persian was their first language. Their ages ranged from 18 to 55 years. The candidates with cognition dysfunction, addiction to alcohol, history of fracture, pregnancy, and radiculopathy were excluded from this project. Demographic data such as sex, age, level of education, and physical activities were collected by a costume made self-report questionnaires. After the assessment of candidates if they were being selected, the procedure was explained (filling in the Persian version of AEQ and other relevant questionnaires) and if they would be asked to participate, they signed the consent form of the relevant university. The project was accepted by the ethics committee.

Instruments

At first, the original version of AEQ was translated into Persian and then its reliability and validity were tested in subjects with CNSNP. The adaptation process was done by Beaton guideline.^[17] The first step was worked by two skilled translators (forward translation; English into Persian) and they created a Persian version of AEQ. Disagreement on the Persian version between them was solved in the advisory meeting. And then the Persian version was translated into English by another expert translator (backward translation). This English version was sent to the developer and she confirmed it. And finally, the Persian version of AEQ was developed.

Avoidance endurance questionnaire

This is a self-report questionnaire with 3 parts: pain effective responses (10 items-2 subscales; ADS, PMS), pain cognitive responses (16 items-3 subscales; HHS, CTS, and TSS), and pain behavioral responses (23 items-5 subscales; ASAS, ASPAS, HDS, PPS, and BES, to the questions of which participants were answering in two conditions—mild and severe pain). Each item was 7 point-Likert scale (0: never, 1: almost never, 2: seldom, 3: sometimes, 4: often, 5: most of the time, and 6: always). All subscales Chronbach's alpha were in range from 0.76 to 0.91, which showed acceptable internal consistency.^[2] The participants were asked to fill out a questionnaire considering the pain they experienced in the past 14 days.

The Short-form health survey (SF-12; to measure quality of life with physical functioning and mental health dimensions; 12 items-, $\alpha = 0.89$ and $\alpha = 0.90$), visual analog scale (VAS; to measure pain intensity), fear-avoidance beliefs questionnaire (FABQ; to measure FABs with physical and work-related subscales, 16 items, 7-point scale, $\alpha = 0.77$ and $\alpha = 0.92$), pain catastrophizing scale (PCS; to measure catastrophizing; 13 items, 5-point scale, $\alpha = 0.93$), Tampa scale for kinesiophobia (TSK; to measure fear of movement; 17 items, 4-point scale, $\alpha = 0.77$), and neck disability index (NDI; to measure neck disability; 10 items, 6-point scale, $\alpha = 0.88$) were used in this project. All of them were translated to Persian and they pointed acceptable internal consistency.^[18-27]

Statistical analysis

ICC and Cronbach’s alpha were used to assess test–retest reliability and internal consistency. The interval between the test and retest day was one week, and 60 participants filled in the Persian version of AEQ again.^[28,29] The ICC is more than 0.7 acceptable, and the Cronbach’s alpha between 0.7 and 0.95 is also good and acceptable.^[28] The standard error of measurement and minimal detectable change were used to assess measurement error and real changes in within-subjects, respectively.^[28] The standard error of measurement (SEM) and minimal detectable change (MDC) were calculated by these formulas ($SEM = SD \sqrt{(1-ICC)}$ - SD; standard deviation, $MDC = SEM \times 1.96 \times \sqrt{2}$).^[28] The IBM SPSS 17 (SPSS Inc., Chicago, IL, USA) was used to analyze the measures. The agreement between test and retest score of AEQ subscales was revealed by Bland Altman Plots.

The construct validity was assessed by Spearman’s coefficient correlation between AEQ subscales and TKS, FABQ, FABQ.PA, FABQ.W, NDI, PCS, and VAS. The correlation coefficient <0.3 , $0.3 < r < 0.6$, and $r > 0.6$ are weak, moderate, and strong, respectively.^[30]

Results

One hundred and thirty subjects participated in this study but seven of them didn’t fill in all the questionnaires and so 123 (29 males, 94 females) were included in the final analysis. The participants’ average age was 34.85 (11.29) years. The mean of pain intensity was 5.17 (1.91) centimeters on VAS.

Reliability and agreement

The ICC, SEM and MDC, and Cronbach’s alpha of the FAR subscales (ADS, HHS, CTS, ASAS.MP, APAS.MP, ASAS.SP, APAS.SP) were reported in the range from 0.82 to 0.95, 3.51 to 8.87, 9.74 to 24.6, and 0.90 to 0.97, respectively. To ER subscales (PMS, TSS, HDS.MP, PPS.MP, BES.MP, HDS.SP, PPS.SP, BES.SP), the ICC, SEM, and MDC, and Cronbach’s alpha were in the range from 0.59 to 0.86, 4.26 to 9.47, 11.82 to 26.26 and 0.77 to 0.92, respectively. The details of test–retest reliability and internal consistency were reported in Table 1.

The mean difference and range of LOA for the FAR subscales (ADS, HHS, CTS, ASAS.MP, APAS.MP, ASAS.SP, APAS.SP) were pointed in a range from -0.9 to 0.9 and (-12.2 to -6.8) to (6 to 14), those variables for ER subscales (PMS, TSS, HDS.MP, PPS.MP, BES.MP, HDS.SP, PPS.SP, BES.SP) were in the range from -2.3 to 2.5 and (-11.9 to -4.4) to (5.1 to 13.5).

The Bland Altman plots of all subscales are shown in Figures 1 and 2.

Item-total correlation

The Spearman’s coefficients correlation between each item and relevant subscale (after deducing each item’s score from its relevant subscale) are pointed in Tables 2–5. To FAR subscales (ADS, HHS, CTS, ASAS.MP, APAS.MP, ASAS.SP,

Table 1: Absolute and relative reliability and internal consistency of avoidance endurance questionnaire in subjects with non-specific neck pain (n=60)

Subscale	ICC (95% confidence interval)	Cronbach’s alpha	Mean	Standard. Deviation	SEM	MDC
ADS	0.85 (0.76-0.91)	0.92	20.5246	8.53114	6.429133	17.82065
PMS	0.67 (0.51-0.79)	0.8	8.8115	4.3224	4.266797	11.82696
HHS	0.88 (0.80-0.92)	0.93	20.8607	13.59954	8.877235	24.60644
CTS	0.83 (0.74-0.89)	0.91	4.9918	4.64882	3.517046	9.748755
TSS	0.67 (0.51-0.79)	0.8	12.9344	5.68707	5.841588	16.19206
ASAS.MP	0.84 (0.74-0.90)	0.91	6.3852	6.46599	4.778028	13.24402
ASAS.SP	0.95 (0.92-0.97)	0.97	15.623	9.52537	4.158476	11.52671
APAS.MP	0.82 (0.72-0.89)	0.9	13.4836	5.80714	4.939189	13.69073
APAS.SP	0.87 (0.79-0.92)	0.93	21.6639	6.00359	4.234951	11.73868
HDS.MP	0.59 (0.37-0.74)	0.77	13.3443	6.76741	7.722802	21.40651
HDS.SP	0.66 (0.44-0.79)	0.82	10.6803	6.15269	6.78742	18.81377
PPS.MP	0.77 (0.64-0.85)	0.87	22.3689	7.63442	6.598086	18.28896
PPS.SP	0.81 (0.71-0.88)	0.89	19.4918	7.25366	6.115479	16.95124
BES.MP	0.84 (0.75-0.90)	0.91	35.7131	12.88056	9.474164	26.26104
BES.SP	0.86 (0.78-0.91)	0.92	30.1721	11.48099	8.679938	24.05956

ICC=intraclass correlation coefficient, SEM=standard error of measurement, MDC=minimal detectable change, ADS=Anxiety/Depression scale, PMS=Positive Mood scale, HHS=Help/Hopelessness scale, CTC=Catastrophizing scale, TSS=Thought Suppression scale, ASAS=Avoidance social Activity scale, SP=severe pain, MP=mild pain, APAS=Avoidance physical Activity, HDS=Humor/Distraction scale, PPS=Pain Persistence scale, BES=Behavioral. Endurance scale.

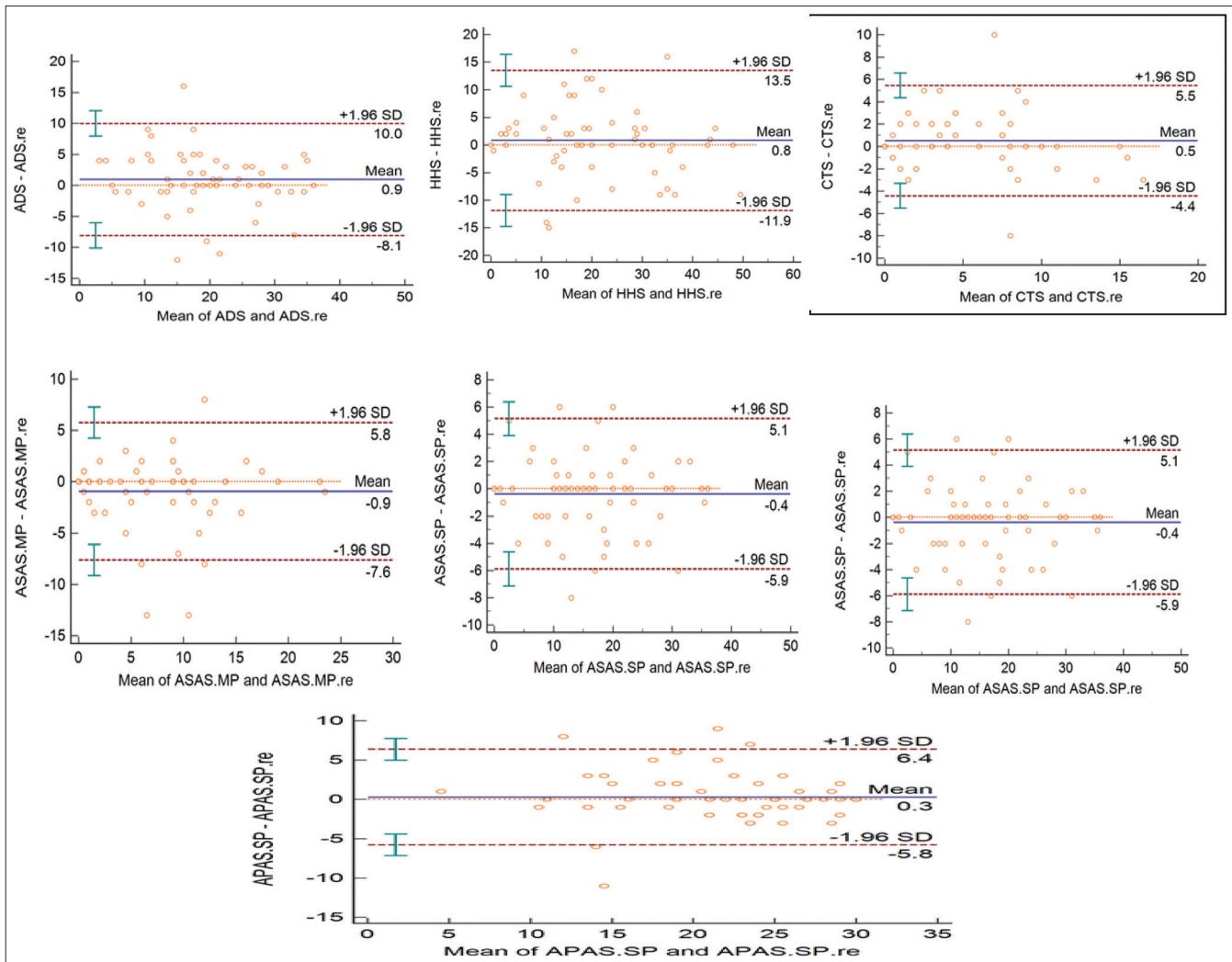


Figure 1: Bland Altman Plots of FAR subscales = ADS = Anxiety/Depression scale, HHS = Help/Hopelessness scale, CTS = Catastrophizing scale, ASAS = Avoidance social Activity scale, SP = severe pain, MP = mild pain, APAS = Avoidance physical Activity

Table 2: Item-total correlation of pain effective response of avoidance endurance questionnaire between each item and relevant subscale after deducting of item scores) in subjects with non-specific neck pain (n=123)

Item	ADS	PMS
E1	0.591**	-0.471**
E3	0.632**	-0.276**
E4	0.691**	-0.400**
E6	0.52**	-0.191*
E7	0.599**	-0.510**
E8	0.652**	-0.369**
E10	0.659**	-0.406**
E2	-0.450**	0.626**
E5	-0.416**	0.792**
E9	-0.467**	0.607**

E=effective item, ADS=Anxiety/Depression scale, PMS=Positive Mood scale. ** = P value<0.005

APAS.SP) the correlation was significant and limited between 0.392 and 0.849, and to ER subscales (PMS, TSS, HDS.MP, PPS.MP, BES.MP, HDS.SP, PPS.SP, BES.SP) the correlation was significant and limited between 0.185 and 0.792.

Table 3: Item-total correlation of pain cognitive response of avoidance endurance questionnaire between each item and relevant subscale after deducting of item scores) in subjects with non-specific neck pain (n=123)

Item	HHS	CTS	TSS
C1	0.611**	0.327**	0.182*
C2	0.849**	0.433**	0.263**
C3	0.769**	0.453**	0.335**
C6	0.774**	0.530**	0.235**
C8	0.713**	0.562**	0.111
C9	0.754**	0.548**	0.067
C11	0.711**	0.546**	0.201*
C12	0.747**	0.592**	0.248**
C4	0.498**	0.602**	0.191*
C7	0.554**	0.701**	0.173
C15	0.491**	0.532**	0.229*
C5	0.202*	0.173	0.435**
C10	0.282**	0.222*	0.67**
C13	0.219*	0.235**	0.49**
C16	0.176	0.199*	0.583**

C=cognitive item, HHS=Help/Hopelessness scale, CTS=Catastrophizing scale, TSS=Thought Suppression scale, ** = P value<0.005

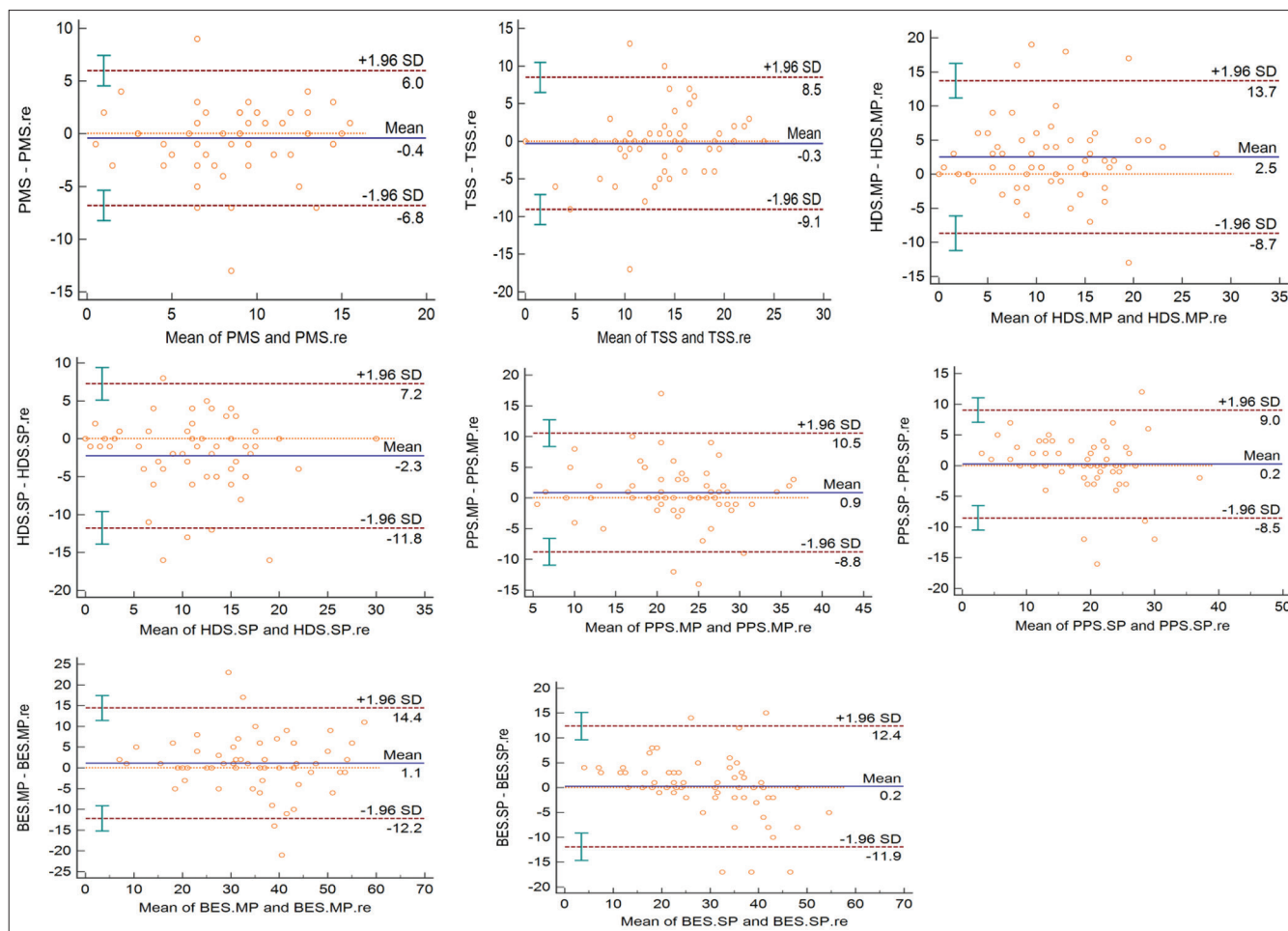


Figure 2: Bland Altman Plots of ER subscales: PMS = Positive Mood scale, TSS = Thought Suppression scale, SP = severe pain, MP = mild pain, HDS = Humor/Distraction scale, PPS = Pain Persistence scale, BES = Behavioral. Endurance scale

Construct validity

Among the FAR subscales, the ADS showed a positive and significant association with TKS, FABQ, FABQ.PA, FABQ.W, NDI, PCS, and VAS in range from 0.278 to 0.51 and it was negatively related to total score of SF-12 and mental and physical health dimensions (correlation was between -0.241 and -0.55), also the PMS (ER subscale) had a negative and positive significant association with TKS (-0.293) and total score of SF-12- physical health dimension (0.306 and 0.41), respectively. The two HHS, CTS demonstrated a positive and significant correlation with TKS, FABQ, FABQ.PA, FABQ.W, NDI, PCS, and VAS in range from 0.287 to 0.644 and 0.193 to 0.529, these two FAR subscales were negatively correlated with a total score of SF-12- physical health dimension (correlation was between -0.359 and -0.653). The TSS (ER subscale) had a positive and significant correlation with TKS and PCS (correlation was between 0.189 and 0.199, respectively). Also three FAR subscales; the ASAS.MP showed a positive and significant correlation with TKS and PCS (0.297 and 0.218), the ASAS.SP had a positive and significant correlation with TKS and FABQ (0.197 and 0.179) and also APAS.MP pointed a positive and significant association with TKS, FABQ.PA, and PCS (0.295, 0.232, and 0.203), these subscales and APAS.

PS demonstrated a negative and significant correlation with a total score of SF-12 and physical health dimension (in ranging from -0.23 to -0.4). The PPS.MP (ER subscale) had a negative and significant association with FABQ.PA and FABQ (-0.179 and -0.186) and finally total score of SF-12 and physical health dimension had positive and significant associations with behavioral endurance responses (HDS.MP, HDS.SP, PPS.MP, PPS.SP, BES.MP, and BES.SP) that were limited between 0.187 and 0.327. The results of the construct validity of all subscales and questionnaires were pointed in Table 6.

Discussion

The results of this study confirmed the first and second hypotheses, the internal consistency of the Persian version of AEQ in individuals with CNSNP was good and excellent. The test-retest reliability was high except for 4 ER subscales (PMS, TSS, HDS.MP, HDS.SP) that had moderate ICCs. The Bland Altman plots of all subscales showed that the means differences were in the range of agreement. The item-total correlation analysis revealed that all items had a significant correlation with relevant subscales, except for the sixth item that didn't

Table 4: Item-total correlation of pain behavioral response of Avoidance endurance questionnaire with mild pain between each item and relevant subscale after deducting of item scores) in subjects with non-specific neck pain (n=123)

Item	ASAS.MP	APAS.MP	HDS.MP	PPS.MP	BES.MP
B2	0.616**	0.356**	-0.216*	-0.299**	-0.287**
B7	0.693**	0.346**	-0.256**	-0.244**	-0.262**
B8	0.727**	0.294**	-0.215*	-0.180*	-0.205*
B14	0.671**	0.304**	-0.119	-0.254**	-0.213*
B18	0.63**	0.254**	-0.071	-0.166	-0.135
B21	0.717**	0.428**	-0.219*	-0.269**	-0.265**
B1	0.320**	0.457**	-0.13	-0.210*	-0.204*
B3	0.461**	0.392**	-0.061	-0.257**	-0.173
B9	0.267**	0.607**	-0.173	-0.221*	-0.220*
B10	0.267**	0.442**	-0.241**	-0.317**	-0.301**
B20	0.302**	0.572**	-0.077	-0.272**	-0.197*
B13	-0.282**	-0.214*	0.54**	0.467**	0.655**
B16	-0.05	-0.200*	0.592**	0.422**	0.651**
B17	0.043	-0.022	0.247**	0.210*	0.368**
B22	-0.230*	-0.112	0.601**	0.524**	0.718**
B23	-0.233**	-0.095	0.631**	0.507**	0.712**
B4	-0.174	-0.001	0.477**	0.284**	0.369**
B5	-0.253**	-0.276**	0.652**	0.445**	0.531**
B6	0.284**	0.149	0.141	0.095	-0.028
B11	-0.246**	-0.053	0.677**	0.551**	0.478**
B12	-0.475**	-0.499**	0.503**	0.37**	0.340**
B15	-0.168	-0.340**	0.597**	0.494**	0.369**
B19	-0.270**	-0.368**	0.621**	0.542**	0.423**
B4	-0.174	-0.001	0.369**	0.476**	0.374**
B5	-0.253**	-0.276**	0.531**	0.630**	0.554**
B6	0.284**	0.149	-0.028	0.256**	0.049
B11	-0.246**	-0.053	0.478**	0.726**	0.589**
B12	-0.475**	-0.499**	0.340**	0.563**	0.399**
B13	-0.282**	-0.214*	0.746**	0.467**	0.551**
B15	-0.168	-0.340**	0.369**	0.690**	0.484**
B16	-0.05	-0.200*	0.768**	0.422**	0.552**
B17	0.043	-0.022	0.450**	0.210*	0.269**
B19	-0.270**	-0.368**	0.423**	0.686**	0.546**
B22	-0.230*	-0.112	0.754**	0.524**	0.642**
B23	-0.233**	-0.095	0.780**	0.507**	0.635**

B=behavioral, ASAS=Avoidance social Activity scale, MP=mild pain, APAS=Avoidance physical Activity, HDS=Humor/Distraction scale, PPS=Pain Persistence scale, BES=Behavioral. Endurance scale. ** = P value<0.01, * = P value<0.05

Table 5: Item-total correlation of pain behavioral response of Avoidance endurance questionnaire with severe pain between each item and relevant subscale after deducting of item scores) in subjects with non-specific neck pain (n=123)

Item	ASAS.SP	APAS.SP	HDS.SP	PPS.SP	BES.SP
B2	0.685**	0.525**	-0.221*	-0.101	-0.184*
B7	0.754**	0.527**	-0.262**	-0.143	-0.226*
B8	0.774**	0.598**	-0.263**	-0.276**	-0.304**
B14	0.76**	0.472**	-0.186*	-0.13	-0.180*
B18	0.533**	0.385**	-0.124	-0.105	-0.131
B21	0.745**	0.586**	-0.159	-0.107	-0.15
B1	0.507**	0.615**	-0.049	-0.121	-0.106
B3	0.547**	0.61**	-0.194*	-0.165	-0.201*
B9	0.502**	0.68**	-0.232*	-0.235**	-0.263**
B10	0.473**	0.576**	-0.208*	-0.147	-0.193*
B20	0.373**	0.619**	-0.109	-0.236**	-0.208*
B13	-0.354**	-0.334**	0.426**	0.338**	0.562**
B16	-0.073	-0.152	0.524**	0.351**	0.591**
B17	0.089	0.026	0.29**	0.249**	0.459**
B22	-0.238**	-0.182*	0.616**	0.350**	0.648**
B23	-0.225*	-0.178*	0.619**	0.356**	0.649**
B4	-0.09	0.118	0.238**	0.244**	0.419**
B5	-0.126	-0.219*	0.341**	0.349**	0.518**
B6	0.208*	0.062	0.063	0.185*	0.276**
B11	-0.301**	-0.195*	0.322**	0.46**	0.564**
B12	-0.408**	-0.363**	0.346**	0.426**	0.562**
B15	0.085	-0.117	0.302**	0.49**	0.577**
B19	-0.190*	-0.326**	0.426**	0.478**	0.602**
B4	-0.09	0.118	0.238**	0.447**	0.292**
B5	-0.126	-0.219*	0.341**	0.538**	0.406**
B6	0.208*	0.062	0.063	0.427**	0.138
B11	-0.301**	-0.195*	0.322**	0.627**	0.456**
B12	-0.408**	-0.363**	0.346**	0.621**	0.437**
B13	-0.354**	-0.334**	0.657**	0.338**	0.438**
B15	0.085	-0.117	0.302**	0.674**	0.463**
B16	-0.073	-0.152	0.698**	0.351**	0.504**
B17	0.089	0.026	0.526**	0.249**	0.342**
B19	-0.190*	-0.326**	0.426**	0.632**	0.518**
B22	-0.238**	-0.182*	0.780**	0.350**	0.54**
B23	-0.225*	-0.178*	0.782**	0.356**	0.544**

B=behavioral, ASAS=Avoidance social Activity scale, SP=severe pain, APAS=Avoidance physical Activity, HDS=Humor/Distraction scale, PPS=Pain Persistence scale, BES=Behavioral. Endurance scale. ** = P value<0.01, * = P value<0.05

associate with PPS.MP, BES.MP, and BES.SP. The three FAR subscales (ADS, HHS, and CTS) had a positive and significant correlation with fear of movement, fear-avoidance belief (FAB), disability, and Catastrophizing and pain intensity. The two ER subscales (PMS, PPS.MP) had a negative association with fear of movement and FAB, respectively. The TSS (another ER subscale) showed a positive correlation with fear of movement and Catastrophizing. Three FAR subscales (ASAS.MP, ASAS.SP, and APAS.MP) demonstrated a positive association with fear of movement—catastrophizing, fear of movement—FAB, and fear of movement—FAB—catastrophizing, respectively. And the ER subscales were positively related to the quality of life but the FAR subscales were negatively correlated with quality of life measure, and also the third and fourth hypotheses were confirmed.

In this study, all the subscales had acceptable to good internal consistency ($\alpha > 0.7$) similar to Parraga *et al.* study.^[31] The test–retest reliability was reported high except for 3 endurance responses (TSS, HDS,) which had moderate ICC. These results consisted of An *et al.* article but the ICC which they reported was less and their study did in subjects with chronic pain (low back pain, fibromyalgia) but this study was done in subjects with CNSNP.^[15] The MDC tests of all the subscales of the Persian version of AEQ assisted researchers and clinicians in finding reliable and real avoidance or endurance responses to the chronic pain.^[32] The mean difference of all the subscales was between the upper and lower band of the limits of agreement (LOA), and those confirmed that there weren't real differences between scores of test and retest day.^[33,34]

Table 6: Construct validity of Avoidance Endurance Questionnaire in subjects with non-specific neck pain (n=123)

	TKS	FABQ.PA	FABQ.W	FABQ	NDI	PCS	SF-12; Mental health dimension	SF-12; Physical health dimension	SSF-12	VAS
ADS	0.39**	0.312**	0.337**	0.385**	0.357**	0.51**	-0.241**	-0.378**	-0.55**	0.278**
PMS	-0.293**	-0.168	-0.086	-0.155	-0.137	-0.172	0.149	0.306**	0.41**	0.038
HHS	0.546**	0.334**	0.287**	0.393**	0.472**	0.644**	-0.168	-0.54**	-0.653**	0.409**
CTS	0.395**	0.257**	0.193*	0.281**	0.378**	0.529**	-0.173	-0.359**	-0.48**	0.29**
TSS	0.189*	0.104	0.133	0.142	0.171	0.199*	-0.055	-0.094	-0.132	0.139
ASAS.MP	0.297**	0.159	0.093	0.166	0.08	0.218*	-0.164	-0.284**	-0.4**	0.107
ASAS.SP	0.197*	0.167	0.144	0.179*	0.076	0.119	-0.082	-0.23**	-0.286**	0.057
APAS.MP	0.295**	0.232*	0.055	0.086	0.14	0.203*	0.02	-0.299**	-0.278**	0.119
APAS.SP	0.155	0.169	0.059	0.097	0.128	0.092	0.104	-0.257**	-0.174	0.075
HDS.MP	-0.111	-0.077	-0.063	-0.090	-0.075	-0.111	-0.033	0.327**	0.296**	-0.016
HDS.SP	-0.05	-0.088	-0.094	-0.071	0.006	-0.094	0.016	0.258**	0.264**	-0.006
PPS.MP	-0.105	-0.179*	-0.106	-0.186*	-0.003	0.008	-0.107	0.261**	0.176	0.038
PPS.SP	-0.1	-0.045	-0.003	-0.020	0.084	0.088	-0.175	0.187*	0.053	0.038
BES.MP	-0.12	-0.143	-0.097	-0.153	-0.041	-0.044	-0.08	0.326**	0.26**	0.008
BES.SP	-0.105	-0.083	-0.057	-0.053	0.046	0.002	-0.102	0.256**	0.175**	0.004

TKS=tampa kinesiphobia scale, FABQ.PA=fear-avoidance belief questionnaire. Physical activity, FABQ.W=fear-avoidance belief questionnaire about work, NDI=neck disability scale, PCS=pain catastrophizing scale, VAS=visual analog scale, SF-12=short form, ADS=Anxiety/Depression scale, PMS=Positive mood scale, HHS=Help/Hopelessness scale, CTS=Catastrophizing scale, TSS=Thought suppression scale, ASAS=Avoidance social activity scale, SP=severe pain, MP=mild pain, APAS=Avoidance physical activity, HDS=Humor/Distraction scale, PPS=Pain persistence scale, BES=Behavioral endurance scale. ** = P value < 0.01, * = P value < 0.05

The item-total correlation demonstrated that each item can be a strong measure for the relevant subscale; however, item 6 didn't correlate with the hypothesized subscale so this item was removed.

Only three avoidance subscales were associated with fear of movement, FAB, disability, and catastrophizing and pain intensity that this was in line with An *et al.* and Parrage *et al.* studies and the original version of AEQ.^[2,15,31] Also, other avoidance responses are positively associated with fear of movement, FAB, and catastrophizing like other studies.^[15,31] The chronicity of the pain leads to a maladaptive response and subjects prefer to avoid physical activities and participating in society so it can make a “disuse syndrome” and psychological dysfunction (anxiety, depression), These results are in line with FAM of Vlaeyen and Linton.^[1,31] The PMS and PPS.MP are two adaptive endurance responses that based on AEM of Hasenbring *et al.*, these responses were associated with low disability, FAB, psychological dysfunction.^[2] The results showed a negative association between PMS, PPS.MP, and fear of movement and FAB that it was in line with other studies.^[15,31] The TSS is a maladaptive ER that leads to “overuse syndrome” and finally disability and psychological dysfunction so it is positively related to fear of movement and Catastrophizing.^[2,31] The difference between cultured and type of disorder can be causes of no association between other subscales and questionnaires.

The AEQ can classify subjects with neck pain into FAR and ER groups in primary care and each group receives a relevant treatment, this classification can improve the outcome of treatment.

In this study, the anxiety and depression were not reported and they didn't include construct validity analytic, so this is one of the limitations of this study. Also to find the optimal factor structure of the Persian version of AEQ is better to have a

confirmatory factor analysis and exploratory factor analysis in the future study.

Conclusions

The Persian version of the AEQ is a good instrument to distinguish between endurance and FARs. And as it was hypothesized, the ERs were associated with less disability, catastrophizing, fear of movement, and more quality of life. And the FARs were associated with more disability, catastrophizing, fear of movement, and less quality of life. The AEQ pointed an acceptable test-retest reliability and good internal consistency, and acceptable construct validity, so it has acceptable psychometric properties and it can be used as a valuable instrument to assess pain responses in subjects with CNSNP.

Key Messages

1. This questionnaire can use as a good instrument to determine types of coping strategies and distinguish between fear-avoidance responses and endurance responses.
2. According to the acceptable construct validity of AEQ, it can be a good alternative scale of assessing fear-avoidance beliefs, fear of movement, and catastrophizing thought.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

- Vlaeyen JW, Linton SJ. Fear-avoidance and its consequences in chronic musculoskeletal pain: A state of the art. *Pain* 2000;85:317-32.
- Hasenbring MI, Hallner D, Rusu AC. Fear-avoidance- and endurance-related responses to pain: Development and validation of the avoidance-endurance questionnaire (AEQ). *Eur J Pain* 2009;13:620-8.
- Pereira D, Hasenbring MI, Straube A. Pain-related avoidance and endurance behaviour in migraine: An observational study. *J Headache Pain* 2019;20:9.
- Hasenbring MI, Verbunt JA. Fear-avoidance and endurance-related responses to pain: New models of behavior and their consequences for clinical practice. *Clin J Pain* 2010;26:747-53.
- Gajsar H, Titze C, Levenig C, Kellmann M, Heidari J, Kleinert J, *et al.* Psychological pain responses in athletes and non-athletes with low back pain: Avoidance and endurance matter. *Eur J of Pain* 2019;23:1649-62.
- Hasenbring MI, Hallner D, Klasen B, Streitlein-Böhme I, Willburger R, Rusche H. Pain-related avoidance versus endurance in primary care patients with subacute back pain: Psychological characteristics and outcome at a 6-month follow-up. *Pain* 2012;153:211-7.
- De Pauw R, Coppieters I, Palmans T, Danneels L, Meeus M, Cagnie B. Motor impairment in patients with chronic neck pain: Does the traumatic event play a significant role? A case-control study. *Spine J* 2018;18:1406-16.
- Areerak K, van der Beek AJ, Janwantanakul P. Recovery from nonspecific neck pain in office workers. *J Back Musculoskelet Rehabil* 2018;31:727-34.
- Kashfi, Karimi N, Peolsson A, Rahnama L. The effects of deep neck muscle-specific training versus general exercises on deep neck muscle thickness, pain and disability in patients with chronic non-specific neck pain: Protocol for a randomized clinical trial (RCT). *BMC Musculoskelet Disord* 2019;20:540.
- Morisaki H, Thompson DP, Woby SR. Acceptance in chronic neck pain: Associations with disability and fear avoidance beliefs. *PLoS One* 2017;40:220-6.
- Hasenbring M. Das Kieler Schmerzinventar [The Kiel Pain Inventory-Manual: Three questionnaire scales for the assessment of pain-related cognitions, emotions and coping strategies]. Bern: Huber; 1994.
- Schlich SL, Hallner D, Wittenberg RH, Rusu AC, Hasenbring MI. Pilot study on pain response patterns in chronic low back pain. The influence of pain response patterns on quality of life, pain intensity and disability. *Schmerz* 2011;25:184-90.
- Rusu AC, Kreddig N, Hasenbring M, Burghardt K, Wittenberg R. S423 pain anxiety and kinesiophobia in back pain patients: Is fear of pain automatically related to avoidance or also to endurance? *Eur J Pain* 2011;5:258.
- Párraga GTR, Martínez AEL, Rusu AC, Maestre CR, Zarazaga RE, Ortega SG, *et al.* T516 factor structure and psychometric properties of the avoidance-endurance questionnaire (aeq) in a spanish sample of patients with chronic spinal pain. *Eur J Pain* 2011;5:78. doi: 10.1016/S1754-3207 (11) 70264-4
- An J, Kim YH, Cho S. Validation of the Korean version of the avoidance endurance behavior questionnaire in patients with chronic pain. *Health Qual Life Outcomes* 2018;16:188.
- Kline P. An easy guide to factor analysis. Routledge, London 1994.
- Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine* 2000;25:3186-91.
- Sullivan MJ, Bishop SR, Pivik J. The pain catastrophizing scale: Development and validation. *Psychol Assess* 1995;7:524-32.
- Kori S, Miller R, Todd D. Kinesiophobia: A new view of chronic pain behavior. *Pain Manag* 1990;3:35-43.
- Waddell G, Newton M, Henderson I, Somerville D, Main CJ. A fear-avoidance beliefs questionnaire (FABQ) and the role of fear-avoidance beliefs in chronic low back pain and disability. *Pain* 1993;52:157-68.
- Vernon H, Mior S. The neck disability index: A study of reliability and validity. *J Manipulative Physiol Ther* 1991;14:409-15.
- Rostami M, Noorian N, Mansournia MA, Sharafi E, Babaki AE, Kordi R. Validation of the Persian version of the fear avoidance belief questionnaire in patients with low back pain. *J Back Musculoskelet Rehabil* 2014;27:213-21.
- Raeissadat S, Sadeghi S, Montazeri A. Validation of the pain catastrophizing scale (PCS) in Iran. *J Basic Appl Sci Res* 2013;3:376-80.
- Price DD, McGrath PA, Rafii A, Buckingham B. The validation of visual analogue scales as ratio scale measures for chronic and experimental pain. *Pain* 1983;17:45-56.
- Pakpour AH, Nourozi S, Molsted S, Harrison AP, Nourozi K, Fridlund B. Validity and reliability of short-form: 12 questionnaire in Iranian hemodialysis patients. *Iran J Kidney Dis* 2011;5:175-81.
- Parnianpour M, Montazeri A, Mehdian H, Karimi A, Abedi M, *et al.* Translation and validation study of the Iranian versions of the neck disability index and the neck pain and disability scale. *Spine* 2007;32:E825-31.
- Askary-Ashtiani A, Ebrahimi-Takamejani I, Torkaman G, Amiri M, Mousavi SJ. Reliability and validity of the persian versions of the fear avoidance beliefs questionnaire and tampa scale of kinesiophobia in patients with neck pain. *Spine* 2014;39:E1095-102.
- Terwee CB, Bot SD, de Boer MR, van der Windt DA, Knol DL, Dekker J, *et al.* Quality criteria were proposed for measurement properties of health status questionnaires. *J Clin Epidemiol* 2007;60:34-42.
- Kleinbaum DG, Kupper LL, Nizam A, Muller KE. Applied regression analysis and other multivariable methods. Vol. 601. Duxbury Press Belmont, CA; 1988.
- Shanbehzadeh S, Salavati M, Tavahomi M, Khatibi A, Talebian S, Khademi-Kalantari K. Reliability and validity of the pain anxiety symptom scale in persian speaking chronic low back pain patients. *Spine (Phila Pa 1976)* 2017;42:E1238-244.
- Ruiz-Parraga GT, López-Martínez AE, Rusu AC, Hasenbring MI. Spanish version of the avoidance-endurance questionnaire: Factor structure and psychometric properties. *Span J Psychol* 2015;18:E88.
- Haley SM, Fragala-Pinkham MA. Interpreting change scores

- of tests and measures used in physical therapy. *Physical Ther* 2006;86:735-43.
33. Bland JM, Altman D. Statistical methods for assessing agreement between two methods of clinical measurement. *Lancet* 1986;327:307-10.
34. Lexell JE, Downham DY. How to assess the reliability of measurements in rehabilitation. *Am J physical Med Rehabil* 2005;84:719-23.