

Evaluation of the Reliability and Validity of the Persian Version of the Fatigue Assessment Scale in Iranian Sarcoidosis Patients

Somayeh Lookzadeh¹, Arda Kiani², Kimia Taghavi¹, Shirin Kianersi¹, Habib Emami³, Maryam Mirenyat¹, Atefeh Abedini^{1*}

¹Chronic Respiratory Diseases Research Center, National Research Institute of Tuberculosis and Lung Diseases (NRITLD), Shahid Beheshti University of Medical Sciences, Tehran, Iran; ²Tracheal Diseases Research Center, National Research Institute of Tuberculosis and Lung Diseases (NRITLD), Shahid Beheshti University of Medical Sciences, Tehran, Iran; ³Tobacco Prevention and Control Research Center, National Research Institute of Tuberculosis and Lung Disease (NRITLD), Shahid Beheshti University of Medical Sciences, Tehran, Iran

Abstract

Citation: Lookzadeh S, Kiani A, Taghavi K, Kianersi S, Emami H, Mirenyat M, Abedini A. Evaluation of the Reliability and Validity of the Persian Version of the Fatigue Assessment Scale in Iranian Sarcoidosis Patients. Open Access Maced J Med Sci. <https://doi.org/10.3889/oamjms.2018.242>

Keywords: Granuloma; Sarcoidosis; Reliability; Validity; Fatigue Assessment Scale

***Correspondence:** Atefeh Abedini. Chronic Respiratory Diseases Research Center, National Research Institute of Tuberculosis and Lung Diseases (NRITLD), Shahid Beheshti University of Medical Sciences, Tehran, Iran. E-mail: dr.abedini110@srmu.ac.ir

Received: 22-Mar-2018; **Revised:** 13-Jun-2018; **Accepted:** 14-Jun-2018; **Online first:** 14-Jul-2018

Copyright: © 2018 Somayeh Lookzadeh, Arda Kiani, Kimia Taghavi, Shirin Kianersi, Habib Emami, Maryam Mirenyat, Atefeh Abedini. This is an open-access article distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC 4.0)

Funding: This research did not receive any financial support

Competing Interests: The authors have declared that no competing interests exist

INTRODUCTION: Fatigue is one of the common symptoms of sarcoidosis, which occurs in about 50-70% of patients.

AIM: Considering that there are no valid Iranian questionnaires for evaluating fatigue in sarcoidosis, in the present study, for the first time, we translated Fatigue Questionnaire into Persian and evaluated its validity and reliability among Iranian patients with sarcoidosis.

MATERIAL AND METHODS: In methodological research, English version of Fatigue assessment scale (FAS) 10 items questionnaire which is designed to assess physical or mental fatigue in chronic disease patients, was translated into Persian and back-translated into English. Its validity and reliability were studied on the one hundred and thirteen confirmed sarcoidosis patients are referring to respiratory referral hospital of Iran. Reliability analysis was performed by estimation of Cronbach's alpha test.

RESULTS: According to the cut-off point of 22.84 (74%) of the studied patients were suffering from fatigue. The internal consistency calculation revealed that the alpha value of the physical fatigue and mental fatigue was 0.945 and 0.896, respectively.

CONCLUSION: We concluded that the existence of questions number 4 and 10 in the questionnaire reduces the continuity of the questions, and therefore we suggest applying the FAS questionnaire without the two questions 4 and 10. This study showed that FAS questionnaire was very practical and can routinely be applied to assess the fatigue scale in sarcoidosis patients.

Introduction

Sarcoidosis is a chronic inflammatory disease with an unknown cause with non-caseating granulomas manifestations in different organs [1] [2]. The outbreak varies from one region to another, and the general prevalence is about 5-40 cases per 100,000 [3]. Sarcoidosis occurs at all ages, but the highest incidence in patients has been observed in the second and sixth decades of their life [4]. Clinical manifestations include systemic and general signs of fatigue, weight loss, fever, discomfort, and the involvement of specific organs such as the lungs, skin,

eyes, heart, liver, joints and the nervous system [1]. The commonly involved organ is a lung.

Furthermore, additional pulmonary involvements occur in 25-30% of patients [2] [3]. Fatigue is one of the common symptoms of sarcoidosis, which occurs in about 50-70% of patients. The definitive cause of fatigue is unknown and is influenced by numerous factors [3] [5]. This symptom is associated with many chronic physical illnesses, such as multiple sclerosis, Parkinson's disease, rheumatoid arthritis, and psychiatric disorders such as depression [6]. The formation of granuloma and the release of cytokines may be factors of the beginning of fatigue in sarcoidosis [7]. Fatigue is more common

during the active period of the disease, as well as depression, cognitive impairment, exercise intolerance, and stress associated with sarcoidosis [8] [9]. In addition to the mentioned factors, it seems that changing the quality of life and the impact on occupational and social activities resulting from sarcoidosis are effective in fatigue. There is no agreement on the physical and mental contrast. Fatigue is seen as a bilateral contrast [10], but many authors still consider it a multi-dimensional structure [11]. Different dimensions of fatigue and general dissonance for fatigue definition are used to evaluate fatigue in different questionnaires. Fatigue associated scale (FAS) is the most reliable questionnaire in the study of fatigue in chronic disease patients. Fatigue assessment Scale is a self-reporting questionnaire. FAS questionnaire is a one-dimensional scale for fatigue testing and consists of 10 questions that examine five physical fatigue and five mental health issues. The whole amount of fatigue and its severity is presented by a total score is between 10 and 50 [3] [12]. This study aimed to assess the fatigue manifestations in Iranian sarcoidosis patients.

Considering that there are no valid Iranian questionnaires for the evaluation of fatigue in sarcoidosis, we evaluated the reliability and validity of the first Persian translation of fatigue associated scale, which was accomplished by the same research group.

Material and Methods

In methodological research, English version of the Fatigue assessment scale (FAS) was translated into Persian and back-translated into English. Its validity and reliability were studied.

One hundred and thirteen confirmed sarcoidosis patients are referring to respiratory referral hospital in Iran, who were over 18 years old, were included in the present study. Written consent was obtained from patients for participation in the study. The entry clause in this study was the person's ability to complete the questionnaire without the help of others. The study was approved by the University Ethics Committee.

The FAS included 10 questions with a five-point response "1 = never" to "5-always". Items were divided into two parts of physical and mental fatigue, and each section contained five questions. Therefore, the total number was between 10 and 50. Except for questions number 4 (I have enough energy for everyday life) and 10 (I can focus very well when I'm busy doing), which represent positive issues, the remaining eight questions out of 10, were negatively related issues. Thus, before the analysis of the data, the answers to items 4 and 10 were reversed.

Translation and back translation was conducted based on convenient guidelines [15] [16]. Steps of the process of translating and validating the questionnaire were as followed.

Step 1: Inviting an expert committee involving two nurses, one epidemiologist and one pulmonologist. All steps of translation/back translation and validity performance of the questionnaire were supervised by this committee.

Step 2: English version of the questionnaire was simultaneously translated into Persian, by two independent native interpreters. The two versions were compared, and the translators were asked to mention the applied changes to the items during translation. The two copies were compared by the expert committee to reach agreement about the final version.

Step 3: The final Persian translation was back-translated into English, by an English-speaking expert in the United States. The expert committee confirmed the final Persian version and inserted it in the validity and reliability step.

Step 4: Face to face Content reliability

For the face to face reality of the questionnaire, a copy of the final Persian translation of it was given to 15 patients. They were asked to give their opinion on each item and to note the meaning of each question. They were also asked to declare whether they understood the concept of the questions. Finally, their opinion was evaluated to approve the principle of the questionnaire.

Reliability analysis was performed by estimation of Cronbach's alpha. The internal consistency of the questionnaire was assessed by Cronbach's alpha coefficient, and alpha of equal or greater than 0.70 was considered as satisfactory [17]. For the repeatability, the test was performed again, and the analysis was retested.

In qualitative reliability, the 15 patients were asked to comment on each item's grammar, the use of proper words, dictionaries, the clarity of the concept of the words and the simplicity of completing the questionnaire. Subsequently, according to their views, the phrases were reviewed and modified.

Step 5 construct validity: To determine the reliability, we distributed two copies of the questionnaire among 15 patients in two weeks interval. We determined the reliability of the questionnaire by calculating the correlation between the first and second answers. For estimating the reliability, the internal correlation of the Cronbach's alpha index was calculated. Items with results above 70% were kept in the questionnaire. The analysis of the parameters was done using the varimax rotation program.

Finally, 113 sarcoidosis patients have entered the study after signing the informed consent.

Results

One hundred and thirteen confirmed cases of sarcoidosis were admitted in the study. Of these, 70 (61%) were male, and 45 (39%) were female. Mean age of the patients was 38.77 ± 9.65 . Males and females were 38.06 ± 8.95 and 39.9 ± 10.66 years old respectively. There was no ceiling or floor factor effect. Three patients (2.7%) had the lowest possible FAS score with the point of 10, and none of the patients could catch the maximum score of 50. Mean FAS score was not different in males (27.8 ± 9.57) comparing to females (27.06 ± 9.59) ($t = 0.424$, $df = 111$, $P = 0.672$).

None of the translators suggested any changes to the final Farsi version. Cronbach's alpha after reversing items 4 and 10 was 0.76 which is acceptable [18]. Table 1 represents item reliability results, means and standard deviation, Item-total correlation, ceiling and floor effects. Total Cronbach's alpha was not increased by eliminating none of the items. The total correlations for the total items were positive ($u > 50$) and ranged from 0.52 to 0.82. We also evaluated internal consistency using Cronbach's alpha once without reversing item four and item 10 and after eliminating these two items and the results were 0.93 and 0.927 respectively.

Table 1: Item reliability results, means and standard deviation, Item-total correlation, ceiling and floor effects

Items	N	Mean	SD	Correct item-total correlation	Alpha	Floor effect	Ceiling effect
I am bothered by fatigue	113	2.7	1.35	0.79	0.68	23.5	11.3
I get tired very quickly	113	3.06	1.4	0.82	0.67	18.3	19.1
I don't do much during the day	113	2.81	1.20	0.83	0.68	15.7	9.6
I have enough energy for everyday life	113	2.85	1.20	0.62	0.86	12.2	9.6
Physically, I feel exhausted	113	3.24	1.33	0.80	0.68	5.2	24.3
I have problems to start things	113	2.59	1.30	0.70	0.70	26.1	9.6
I have problems to think clearly	113	2.29	1.20	0.61	0.71	33.0	5.2
I feel no desire to do anything	113	2.38	1.07	0.70	0.70	24.0	3.5
Mentally, I feel exhausted	113	2.53	1.06	0.52	0.73	12.2	7.0
When I am doing something, I can concentrate quite well	113	3.20	1.03	0.55	0.84	13.2	3.5
Total score	113	27.56	9.54				

The overall KMO for the set of the items included in the analysis was 0.80 which was above the 50% of the minimum requirement for the coefficient KMO (Table 2).

Table 2: KMO and Bartlett's Test

Kaiser-Mayer-Olkin Measures of Sampling Accuracy	0.898
Bartlett's Test of Approx. Chi-Square Sphericity	960.746
df	45
Sig	< 0.0001

The test was correlated with the Bartlett test (0.00) and was appropriate for factor analysis. Based

on the variance factor of more than one (Eigenvalue > 1), two factors were extracted which were 76.544% of the variance cover (Table 3).

Table 3: Total variance explained by the ten extracted factors of the ATTS scale

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.175	61.746	61.746	6.175	61.746	61.746
2	1.480	14.798	76.544	1.480	14.798	76.544
3	.716	7.158	83.701			
4	.398	3.977	87.679			
5	.309	3.088	90.767			
6	.260	2.602	93.368			
7	.231	2.314	95.683			
8	.171	1.707	97.390			
9	.156	1.564	98.954			
10	.105	1.046	100.000			

The responses to the items of FAS are shown in (Table 4).

Table 4: Subscale factors loading scores and loading of items that exceed 0.30

Items	F1	F2
Physical Fatigue		
I am bothered by fatigue	0.880	
I get tired very quickly	0.860	
I don't do much during the day	0.880	
I have enough energy for everyday life	0.717	
Physically, I feel exhausted	0.840	
I have problems to start things	0.817	
Mental Fatigue		
I have problems to think clearly		0.888
I feel no desire to do anything		0.742
Mentally, I feel exhausted		0.916
When I am doing something, I can concentrate quite well		0.696

Depending on the cut-off point identified in other studies [19], people with a mean score of 22 or above were experiencing major fatigue. According to this cutoff point, 84 (74%) of the patients were suffering from fatigue. Among males 54 (77.1%) and in females, 30 (70%) were suffering from fatigue.

Given that the presence of items 4 and 10 reduces Cronbach's alpha, we performed a separate factor analysis after removing these two items, which resulted in two subscales with a variance of 83.119. Physical fatigue subscales included the items one to six, and mental fatigue subscales consisted of items number 7, 8 and 9 (Table 5). The internal consistency calculation revealed that the alpha value of the whole instrument after dropping item 4 and 10 was 0.927. An alpha value of the physical fatigue and mental fatigue was 0.945 and 0.896, respectively.

Table 5: Subscale factor loading scores and loading of items that exceed 0.30 after eliminating item 4 and 10

Items	F1	F2
Physical Fatigue		
I am bothered by fatigue	0.891	
I get tired very quickly	0.865	
I don't do much during the day	0.887	
Physically, I feel exhausted	0.847	
I have problems to start things	0.838	
Mental Fatigue		
I have problems to think clearly		0.911
I feel no desire to do anything		0.746
Mentally, I feel exhausted		0.921

Discussion

This was the first study that translated the FAS questionnaire into Persian and analysed its reliability and validity among sarcoidosis patients in Iran. Previous studies have suggested that FAS is reliable and reliable in measuring fatigue in patients with sarcoidosis [19]. This study showed that FAS questionnaire was very practical and because of its brief and usefulness, none of the patients refused to continue during the study. At the time of responding to the questionnaire, they answered the questionnaire completely. In the present study, the two sexes did not differ regarding fatigue, and this contradicts the results of some studies [20]. Some studies have shown a positive effect of age on fatigue [17], while others have shown the opposite [18] [19] [20]. Unlike some studies, two factors were extracted based on three creatures.

Contrary to some studies, in the present study, based on three Indicators of Scree plot, Eigenvalue and total variance, two factors resulted in [21] [22] [23] [24] [25]. In the current study, two physical and mental factors of fatigue with the coverage of over 70% and total variance of more than 70 were extracted. In this study, the Cronbach's alpha coefficient in the case of reversal of questions 4 and 10 was 0.76. Without reversing these two questions, this coefficient increased to 0.93, and when these two questions were eliminated, 0.927 was obtained as the Cronbach's alpha coefficient. The current study showed that by removing these two questions or adding them without reversing them, this questionnaire has more comprehensive capabilities and can be independently used to evaluate fatigue score in sarcoidosis patients. A previous study showed that the FAS questionnaire without questions 4 and 10 was superior to the FAS with these two questions [26]. The previous studies also showed that these two questions were unreliable [27] [28] [29]. We also concluded that the existence of these two questions in the questionnaire reduces the continuity of the questions, and therefore we propose the FAS questionnaire without the two questions 4 and 10. The reason why these two questions are not reliable could be that patients who fill out the questionnaire will rate the two questions alike. Therefore, it can be concluded that the FAS questionnaire has a high alpha coefficient without reversing or eliminating questions 4 and 10. The findings show that the Persian language FAS questionnaire with inverse questions 4 and 10, despite the low internal communication (0.75), can assess fatigue in patients with sarcoidosis.

In conclusion, we suggest that the Persian language FAS questionnaire can be included as a practical, easy and reliable method for assessing fatigue involvement in routine check-ups of patients with sarcoidosis. However, further studies with

applying inversed questions four and 10 in Persian FAS questionnaire would be necessary to elucidate the exact magnitude of the prevalence of fatigue in sarcoidosis patients in Iran.

Acknowledgement

The authors would like to thank all the hospital cooperators for their favour in conducting current study.

Author contributions

Literature search: Somayeh Lookzadeh, Arda Kiani, Kimia Taghavi, Shirin Kianersi, Habib Emami, Maryam mienayat, Atefeh Abedini. Data collection: Somayeh Lookzadeh, Kimia Taghavi, Shirin Kianersi, Atefeh Abedini. Study design: Somayeh Lookzadeh, Arda Kiani, Kimia Taghavi, Shirin Kianersi, Habib Emami, Maryam mienayat, Atefeh Abedini. Data analysis: Somayeh Lookzadeh, Shirin Kianersi, Habib Emami. Manuscript preparation: Somayeh Lookzadeh, Kimia Taghavi. Manuscript review: Somayeh Lookzadeh, Arda Kiani, Kimia Taghavi, Shirin Kianersi, Habib Emami, Maryam mienayat, Atefeh Abedini.

References

1. Chowdhry S, Shukla A, D'souza P, Dhali T, Jaiswal P. Treatment of severe refractory erythema nodosum leprosum with tumor necrosis factor inhibitor etanercept. *Int J Mycobacteriol.* 2016; 5(2):223-5. <https://doi.org/10.1016/j.ijmyco.2016.02.002> PMID:27242236
2. Mortaz E, Adcock IM, Barnes PJ. Sarcoidosis: Role of non-tuberculosis mycobacteria and Mycobacterium tuberculosis. *Int J Mycobacteriol.* 2014; 3(4):225-9. <https://doi.org/10.1016/j.ijmyco.2014.10.008> PMID:26786620
3. Kiani A, Abedini A, Adcock IM, et al. Association Between Vitamin D Deficiencies in Sarcoidosis with Disease Activity, Course of Disease and Stages of Lung Involvements. *J. Med. Biochem.* 2018; 37(2):103-9. <https://doi.org/10.1515/jomb-2017-0041>
4. Mortaz E, Masjedi MR, Matroodi S, Abedini A, Kiani A, Soroush D, Adcock IM. Concomitant patterns of tuberculosis and sarcoidosis. *Tanaffos.* 2013; 12(4):6. PMID:25191477 PMID:PMC4153265
5. Bosse-Henck A, Koch R, Wirtz H, Hinz A. Fatigue and excessive daytime sleepiness in sarcoidosis: prevalence, predictors, and relationships between the two symptoms. *Respiration.* 2017; 94(2):186-97. <https://doi.org/10.1159/000477352> PMID:28609770
6. Paulo BX, Peixoto B. Emotional distress patients with several types of tuberculosis. A pilot study with patients from the Sanatorium Hospital of Huambo. *Int J Mycobacteriol.* 2016; 5:S58.

- <https://doi.org/10.1016/j.ijmyco.2016.11.002> PMID:28043613
7. Mansouri D, Mahdavi SA, Khalilzadeh S, et al. IL-2-inducible T-cell kinase deficiency with pulmonary manifestations due to disseminated Epstein-Barr virus infection. *Int Arch Allergy Imm.* 2012; 158(4):418-22. <https://doi.org/10.1159/000333472> PMID:22487848
 8. Karimi S, Shamaei M, Pourabdollah M, Sadr M, Karbasi M, Kiani A, Bahadori M. Immunohistochemical findings of the granulomatous reaction associated with tuberculosis. *Int J Mycobacteriol.* 2016; 5:S234-5. <https://doi.org/10.1016/j.ijmyco.2016.11.001> PMID:28043576
 9. Bahmer T, Watz H, Develaska M, Waschki B, Rabe KF, Magnussen H, Kirsten D, Kirsten AM. Physical Activity and Fatigue in Patients with Sarcoidosis. *Respiration.* 2017; 95(1):18-26. <https://doi.org/10.1159/000481827> PMID:29131111 PMID:C5804844
 10. Janagond AB, Ganesan V, Kumar GV, Ramesh A, Anand P, Mariappan M. Screening of health-care workers for latent tuberculosis infection in a Tertiary Care Hospital. *Int J Mycobacteriol.* 2017; 6(3):253. https://doi.org/10.4103/ijmy.ijmy_82_17 PMID:28776523
 11. Baghaei P, Marjani M, Javanmard P, Tabarsi P, Masjedi MR. Diabetes mellitus and tuberculosis facts and controversies. *Journal of Diabetes & Metabolic Disorders.* 2013; 12(1):58. <https://doi.org/10.1186/2251-6581-12-58> PMID:24360398 PMID:C3922915
 12. Qi Z, Yang W, Wang YF. Epidemiological analysis of pulmonary tuberculosis in Heilongjiang province China from 2008 to 2015. *Int J Mycobacteriol.* 2017; 6(3):264. https://doi.org/10.4103/ijmy.ijmy_104_17 PMID:28776525
 13. Michielsen HJ, De Vries J, Drent M, Peros-Golubicic T. Psychometric qualities of the Fatigue Assessment Scale in Croatian sarcoidosis patients. *Sarcoidosis Vasc Diffuse Lung Dis.* 2005; 22(2):133. PMID:16053029
 14. Alikari V, Fradelos E, Sachlas A, Panoutsopoulos G, Lavdaniti M, Palla P, Lappa T, Giatrakou S, Stathoulis J, Babatsikou F, Zyga S. Reliability and validity of the Greek version of «the Fatigue Assessment Scale». *Int J Rehabil Res.* 2014; 37(3):271-6. <https://doi.org/10.1097/MRR.000000000000057> PMID:24557490
 15. Michielsen HJ, De Vries J, Van Heck GL. Psychometric qualities of a brief self-rated fatigue measure: The Fatigue Assessment Scale. *J Psychosom Res.* 2003; 54(4):345-52. [https://doi.org/10.1016/S0022-3999\(02\)00392-6](https://doi.org/10.1016/S0022-3999(02)00392-6)
 16. Bourbonnais JM, Malaisamy S, Dalal BD, Samarakoon PC, Parikh SR, Samavati L. Distance saturation product predicts health-related quality of life among sarcoidosis patients. *Health Qual Life Outcomes.* 2012; 10(1):67. <https://doi.org/10.1186/1477-7525-10-67> PMID:22694853 PMID:C3409072
 17. Ren H, Yu Y, Hu JY, Shi Y, Lu YH, Meng W. Caregiver burden and its determinants among family members of patients with chronic viral hepatitis in Shanghai, China: a community-based survey. *BMC Infect Dis.* 2014; 14(1):82. <https://doi.org/10.1186/1471-2334-14-82> PMID:24521097 PMID:C3927630
 18. Walters SJ, Stern C, Robertson-Malt S. The measurement of collaboration within healthcare settings: a systematic review of measurement properties of instruments. *JBI Database System Rev Implement Rep.* 2016; 14(4):138-97. <https://doi.org/10.11124/JBISRIIR-2016-2159> PMID:27532315
 19. Atkins C, Fordham R, Clark AB, Stockl A, Jones AP, Wilson AM. Feasibility study of a randomised controlled trial to investigate the treatment of sarcoidosis-associated fatigue with methylphenidate (FaST-MP): a study protocol. *BMJ Open.* 2017; 7(12):e018532. <https://doi.org/10.1136/bmjopen-2017-018532> PMID:29208618 PMID:C5719286
 20. Van Mens-Verhulst J, Bensing J. Distinguishing between chronic and nonchronic fatigue, the role of gender and age. *Soc Sci Med.* 1998; 47(5):621-34. [https://doi.org/10.1016/S0277-9536\(98\)00116-6](https://doi.org/10.1016/S0277-9536(98)00116-6)
 21. Loge JH, Ekeberg Ø, Kaasa S. Fatigue in the general Norwegian population: normative data and associations. *J Psychosom Res.* 1998; 45(1):53-65. [https://doi.org/10.1016/S0022-3999\(97\)00291-2](https://doi.org/10.1016/S0022-3999(97)00291-2)
 22. Uttl B, Graf P, Cosentino S. Exacting assessments: Do older adults fatigue more quickly?. *J Clin Exp Neuropsychol.* 2000; 22(4):496-507. [https://doi.org/10.1076/1380-3395\(200008\)22:4:1-0:FT496](https://doi.org/10.1076/1380-3395(200008)22:4:1-0:FT496)
 23. Sharif K, Watad A, Bragazzi NL, Lichtbroun M, Martini M, Perricone C, Amital H, Shoenfeld Y. On chronic fatigue syndrome and nosological categories. *Clin Rheumatol.* 2018;1-0. <https://doi.org/10.1007/s10067-018-4009-2>
 24. Fairbrother N, Hutton EK, Stoll K, Hall W, Kluka S. Psychometric evaluation of the Multidimensional Assessment of Fatigue Scale for use with pregnant and postpartum women. *Psychol Assess.* 2008; 20(2):150. <https://doi.org/10.1037/1040-3590.20.2.150> PMID:18557692
 25. Cano-Climent A, Oliver-Roig A, Cabrero-García J, de Vries J, Richart-Martínez M. The Spanish version of the Fatigue Assessment Scale: reliability and validity assessment in postpartum women. *Peer J.* 2017; 5:e3832. <https://doi.org/10.7717/peerj.3832> PMID:28970968 PMID:C5622603
 26. Mortaz E, Masjedi MR, Abedini A, Matroodi S, Kiani A, Soroush D, Adcock IM. Common features of tuberculosis and sarcoidosis. *Int J Mycobacteriol.* 2016; 5:S240-1. <https://doi.org/10.1016/j.ijmyco.2016.09.031> PMID:28043581
 27. Michielsen HJ, De Vries J, Drent M, Peros-Golubicic T. Psychometric qualities of the Fatigue Assessment Scale in Croatian sarcoidosis patients. *Sarcoidosis Vasc Diffuse Lung Dis.* 2005; 22(2):133. PMID:16053029
 28. Hinz A, Fleischer M, Brähler E, Wirtz H, Bosse-Henck A. Fatigue in patients with sarcoidosis, compared with the general population. *Gen Hosp Psychiatry.* 2011; 33(5):462-8. <https://doi.org/10.1016/j.genhosppsy.2011.05.009> PMID:21749844
 29. Kalkanis A, Yucel RM, Judson MA. The internal consistency of PRO fatigue instruments in sarcoidosis: superiority of the PFI over the FAS. *Sarcoidosis Vasc Diffuse Lung Dis.* 2013; 30(1):60-4. PMID:24003536