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Psychometric Analysis of Validity and Reliability of The Indonesian Version of The Modified Fatigue Impact Scale in Chronic Disease Patients

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ABSTRACT

Fatigue is a lack of physical or mental energy that can be felt by individuals and can disrupt daily activities. Fatigue causes a constant decrease in vitality, a lack of energy, and prevents sleep gaps from being filled, ultimately leading to a decline in productivity and quality of life. The prevalence of fatigue in chronic patients varies, as there is no specific data available. However, the prevalence of fatigue depends on the chronic disease in question, such as chronic kidney disease, diabetes mellitus, and heart disease. To obtain a valid and reliable Indonesian version of the MFIS instrument that can measure fatigue in patients with chronic diseases. The sampling technique used was based on the population, using a non-probability sampling method with purposive sampling. The population in this study consisted of patients with chronic diseases (Diabetes Mellitus, Congestive Heart Failure, Stroke). The population was 244 respondents (4 respondents for language comprehension, 30 respondents for validity and reliability testing, and 210 respondents for the final instrument test). The validity test results, with a sample of (n=210 respondents), showed a loading factor value greater than 0.135, indicating that all MFIS items were valid and highly correlated. The reliability test (n=210 respondents) yielded a Cronbach's Alpha coefficient of 0.869. This study demonstrates that the Indonesian version of the MFIS instrument is valid and highly correlated. This instrument can be used to identify fatigue in chronic diseases and can serve as a guideline for nurses to implement fatigue interventions, thus helping to reduce and address fatigue issues in patients with chronic diseases.

Keywords : *Chronic disease; Fatigue; MFIS, Validity; Reliability*

ABSTRAK

Kelelahan merupakan kekurangan energi fisik atau mental yang dapat dirasakan orang dan dapat mengganggu aktivitas sehari-hari. Kelelahan menyebabkan penurunan vitalitas yang konstan,

kekurangan energi dan juga mencegah pengisian celah tidur, yang pada akhirnya menyebabkan penurunan produktivitas dan kualitas hidup. Prevalensi kelelahan pada pasien kronis, namun tidak ada data yang khusus, tergantung penyakit kronis yang dimaksud, namun prevalensi kelelahan tergantung pada penyakit yang diderita seperti penyakit gagal ginjal kronik, diabetes mellitus, penyakit jantung. Tujuan untuk memperoleh instrumen MFIS valid dan reliable dalam bahasa Indonesia serta dapat mengukur kelelahan pada pasien penyakit kronis. Teknik pengambilan sampel yang digunakan berdasarkan populasi, dengan cara menggunakan Teknik *non probability* samping dengan metode *purposive sampling*. Populasi dalam penelitian ini adalah pasien dengan penyakit kronis (Diabetes Melitus, Congestive Heart Failure, Stroke). Populasinya 244 responden (4 responden untuk pemahaman bahasa, 30 responden uji validitas dan reliabilitas dan 210 responden uji akhir instrument). Hasil uji validitas penelitian dengan jumlah (n=210 responden) menghasilkan nilai *loading factor* lebih dari 0,135 sehingga dinyatakan semua pertanyaan MFIS valid dan berkolerasi tinggi. Hasil Uji Reabilitas (n=210 responden) nilai koefisien *Cronbach's Alpha* yaitu 0,869. Penelitian ini menunjukkan uji validitas instrument MFIS versi Bahasa Indonesia dinyatakan valid dan berkolerasi tinggi. Instrument ini dapat digunakan untuk mengidentifikasi kelelahan pada penyakit kronis, dan dijadikan pedoman pada perawat untuk melakukan intervensi kelelahan sehingga dapat mengurangi dan mengatasi masalah kelelahan pada pasien penyakit kronis.
Kata Kunci : Penyakit kronis; Kelelahan; MFIS; Validitas; Reliabitas

INTRODUCTION

Chronic disease is a health condition that persists for more than six months, caused by genetic, physiological, environmental, and behavioral factors. According to the World Health Organization (2018), the global prevalence of chronic disease is approximately 41 million cases each year, which accounts for 74% of worldwide deaths. Seventeen million people die from chronic diseases before reaching the age of 70, with 86% of these premature deaths occurring in low- and middle-income countries. In Indonesia, the Ministry of Health (2018) reported that the incidence of chronic diseases has increased significantly year by year. For instance, the prevalence of diabetes mellitus rose from 6.9% in 2013 to 8.5% in 2018, while heart disease increased from 0.5% in 2013 to 1.5% in 2018. The prevalence of stroke also rose from 7‰ to 10.9‰. In DKI Jakarta, the Ministry of Health (2018) reported an incidence of diabetes mellitus at 3.4%, heart disease at 1.9%, and stroke at 4.07% in 2018. Chronic diseases cause a range of health issues, impacting not only physical but also psychological, economic, and social well-being. Health problems associated with chronic diseases include pain and fatigue (Kartika et al., 2015; Nugraha & Ramdhanie, 2018; Romero et al., 2018). These health issues reduce energy production, eventually leading to complaints of fatigue.

Fatigue is a subjective, unpleasant feeling of physical and psychological exhaustion, which prevents patients from carrying out normal activities. It manifests as weakness,

limited energy, and a pervasive, prolonged sense of tiredness (Matura et al., 2018; Noor, 2018; Nugraha, 2018). Data on fatigue in chronic disease is variable depending on the specific condition. Fatigue prevalence is estimated to range from 60% to 97% (Karadag & Samancioglu Baglama, 2019). In patients with diabetes mellitus, 60% experience symptoms of fatigue (Seo et al., 2015), while 80% of patients with heart failure report fatigue (Virani et al., 2020).

Fatigue in patients with chronic diseases can be measured using the MFIS (Modified Fatigue Impact Scale), which assesses fatigue symptoms. This questionnaire has been validated, especially for patients with multiple sclerosis (Maisel et al., 2021).

METHOD

Research Design

This study employs a psychometric research design, adapting an instrument to measure fatigue in patients with chronic diseases, specifically those diagnosed with diabetes mellitus, stroke, or congestive heart failure (CHF) for at least six weeks. Data collection took place from November 2023 to January 2024 in the cardiology, internal medicine, and neurology clinics at Gatot Soebroto Army Hospital.

This research method is based on a questionnaire adopted from Mapi Research Trust, translating the 21 items in the MFIS (Modified Fatigue Impact Scale) instrument into Indonesian without altering the meaning and content, in accordance with Mapi Research Trust standards. The translation process was divided into nine procedural steps:

1. Obtaining permission from the original author and Mapi Research Trust,
2. Translating the original language into Indonesian,
3. Conducting the first expert panel to discuss the translations by two translators with the researcher and relevant experts
4. Pilot testing the instrument for cultural and linguistic comprehension with four respondents.
5. Conducting back translation,
6. Holding a second expert panel,
7. Validating the instrument with 30 respondents,
8. Performing test-retest reliability testing,
9. Collecting data for cross-cultural adaptation and evaluating the validity and reliability of the Indonesian version of the MFIS instrument among chronic disease patients.

Since the MFIS contains 21 items, a total of 210 respondents were required

Data Analysis

The initial step involved obtaining permission from the original author and submitting a request to Mapi Research Trust to translate the 21 questions in the MFIS instrument into Indonesian without altering its intended meaning and content, in accordance with Mapi Research Trust standards. The translation process followed the specified procedures. This instrument comprises 21 questions using a 5-point Likert scale, where 0 represents "never," 1 represents "rarely," 2 "sometimes," 3 "often," and 4 "almost always." Items with a loading factor value of less than 0.361 are considered invalid and, therefore, require revision to re-evaluate the structure by rephrasing the questions without changing their meaning.

Fatigue measured by the MFIS instrument among patients with Diabetes Mellitus, stroke, and CHF was used to test the validity of the Indonesian version of the instrument, which had not previously been adapted into Indonesian.

The next step is psychometric analysis, including validity and reliability tests. Validity was assessed using the Pearson Product Moment test, and reliability was measured using Cronbach's alpha test. The Cronbach's alpha reliability scale is as follows: <0.200–0.399 is very low, <0.400–0.599 is moderate, 0.600–0.799 is high, and 0.800–1.000 is very high.

Ethical Considerations

The ethical approval number from the Institutional Review Board (IRB) is 1665/F9-UMJ/XI/2023, with special terms number 90975 from Mapi Research Trust.

RESULTS

Characteristics of Respondents

The average age of respondents falls within the pre-elderly range (ages 45-59), with the youngest respondent being 40 years old and the oldest 68 years old. Based on age group classifications from the Ministry of Health, the sample was largely dominated by pre-elderly individuals, totaling 102 people (48.6%). In terms of gender, the majority of respondents were female (70%), while males comprised 30%. Regarding health conditions, 50.5% of respondents had diabetes mellitus, 15.7% had congestive heart failure (CHF), and 33.8% had experienced a stroke. Concerning employment, the largest group consisted of unemployed respondents or homemakers (50%). Educationally, the majority were high school graduates (44.3%), followed closely by those with a diploma or bachelor's degree (43.8%).

No	Karakteristik Responden	Frekuensi	Persen (%)
1	Rata – rata usia : pralansia, dengan usia termuda 40 tahun dan usia tertua 68 Tahun		
	Usia Responden	33	15,7
	• Dewasa (19-45 tahun)	102	48,6
	• Pralansia (45-59 tahun)	75	35,7
	• Lansia > 60 tahun		
2	Jenis Kelamin		
	• Laki-laki	63	30
	• Perempuan	147	70
3	Penyakit		
	• Diabetes Melitus	106	50,5
	• *Congestive Heart Failure*	33	15,7
	• Stroke	71	33,8
4	Pekerjaaan		
	• TNI	12	5,7
	• Pensiunan	39	18,6
	• Wiraswasta	35	16,7
	• Karyawan	19	9
	• Tidak Bekerja /Ibu Rumah Tangga	105	50
5	Pendidikan		
	• SD	14	6,7
	• SMP	11	5,2
	• SMA	93	44,3
	• Diploma/Sarjana	92	43,8

In the first validity test (n=30), it was found that questions 4, 7, and 21 had loading factor values of less than 0.361, indicating that they were not valid. Therefore, it was necessary to revise the structural test for these items (questions 4, 7, and 21) by rephrasing the questions without changing their original meaning.

No	Keterangan	*Loading Factor*	Valid/Tidak Valid
1	Pertanyaan 1	0,379	Valid
2	Pertanyaan 2	0,383	Valid
3	Pertanyaan 3	0,368	Valid
4	Pertanyaan 4	0,153	Tidak Valid
5	Pertanyaan 5	0,392	Valid
6	Pertanyaan 6	0,412	Valid
7	Pertanyaan 7	0,349	Tidak Valid
8	Pertanyaan 8	0,364	Valid
9	Pertanyaan 9	0,490	Valid
10	Pertanyaan 10	0,568	Valid
11	Pertanyaan 11	0,374	Valid
12	Pertanyaan 12	0,511	Valid
13	Pertanyaan 13	0,518	Valid
14	Pertanyaan 14	0,725	Valid
15	Pertanyaan 15	0,689	Valid
16	Pertanyaan 16	0,395	Valid
17	Pertanyaan 17	0,689	Valid
18	Pertanyaan 18	0,662	Valid
19	Pertanyaan 19	0,538	Valid
20	Pertanyaan 20	0,473	Valid
21	Pertanyaan 21	0,223	Tidak Valid

No	Sebelum Direvisi	Setelah Direvisi
4	saya ceroboh dan tidak terkontrol	Saya ceroboh dan tidak terkoordinasi
7	Saya kurang termotivasi untuk melakukan apa pun yang membutuhkan upaya fisik.	Saya kurang bersemangat untuk melakukan kegiatan yang membutuhkan usaha fisik
21	Saya perlu istirahat lebih sering atau untuk waktu yang lebih lama	Saya butuh istirahat lebih banyak dan lebih lama

No	Keterangan	Loading Factor	Valid/Tidak Valid
1	Pertanyaan 1	0,405	Valid
2	Pertanyaan 2	0,383	Valid
3	Pertanyaan 3	0,434	Valid
4	Pertanyaan 4	0,450	Valid
5	Pertanyaan 5	0,380	Valid
6	Pertanyaan 6	0,373	Valid
7	Pertanyaan 7	0,380	Valid
8	Pertanyaan 8	0,375	Valid
9	Pertanyaan 9	0,479	Valid
10	Pertanyaan 10	0,574	Valid
11	Pertanyaan 11	0,418	Valid
12	Pertanyaan 12	0,514	Valid
13	Pertanyaan 13	0,497	Valid
14	Pertanyaan 14	0,740	Valid
15	Pertanyaan 15	0,686	Valid
16	Pertanyaan 16	0,406	Valid
17	Pertanyaan 17	0,625	Valid
18	Pertanyaan 18	0,662	Valid
19	Pertanyaan 19	0,526	Valid
20	Pertanyaan 20	0,452	Valid
21	Pertanyaan 21	0,381	Valid

Results of the Reliability Test (n=30)

The Cronbach's Alpha coefficient value was 0.838 for the 21 items in the MFIS instrument, indicating that the instrument has high reliability.

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded[a]	0	.0
	Total	30	100.0

a. *Listwise deletion based on all variables in the procedure.*

No	Keterangan	*Loading Factor*	Valid/Tidak Valid
1	Pertanyaan 1	0,379	Valid
2	Pertanyaan 2	0,383	Valid
3	Pertanyaan 3	0,368	Valid
4	Pertanyaan 4	0,153	Tidak Valid
5	Pertanyaan 5	0,392	Valid
6	Pertanyaan 6	0,412	Valid
7	Pertanyaan 7	0,349	Tidak Valid
8	Pertanyaan 8	0,364	Valid
9	Pertanyaan 9	0,490	Valid
10	Pertanyaan 10	0,568	Valid
11	Pertanyaan 11	0,374	Valid
12	Pertanyaan 12	0,511	Valid
13	Pertanyaan 13	0,518	Valid
14	Pertanyaan 14	0,725	Valid
15	Pertanyaan 15	0,689	Valid
16	Pertanyaan 16	0,395	Valid
17	Pertanyaan 17	0,689	Valid
18	Pertanyaan 18	0,662	Valid
19	Pertanyaan 19	0,538	Valid
20	Pertanyaan 20	0,473	Valid
21	Pertanyaan 21	0,223	Tidak Valid

The validity test of the Indonesian version of the MFIS instrument on 210 respondents revealed that all questions, from number 1 to 21, had a loading factor value greater than 0.135 (according to the r table, df-1) with (n=210). Therefore, it can be concluded that all MFIS items are valid and exhibit a high correlation.

Results of the Pearson Product Moment Validity Test (n=210)

Case Processing Summary		*N*	*%*
Cases	**Valid**	**210**	100.0
	Excluded	0	.0
	Total	210	100.0

No	Keterangan	r-tabel	*Loading Factor*	Valid/Tidak Valid
1	Pertanyaan 1	0, 135	0,476	Valid
2	Pertanyaan 2	0, 135	0,422	Valid
3	Pertanyaan 3	0, 135	0,513	Valid
4	Pertanyaan 4	0, 135	0,475	Valid
5	Pertanyaan 5	0, 135	0,498	Valid
6	Pertanyaan 6	0, 135	0,297	Valid
7	Pertanyaan 7	0, 135	0,492	Valid
8	Pertanyaan 8	0, 135	0,485	Valid
9	Pertanyaan 9	0, 135	0,554	Valid
10	Pertanyaan 10	0, 135	0,637	Valid
11	Pertanyaan 11	0, 135	0,546	Valid
12	Pertanyaan 12	0, 135	0,554	Valid
13	Pertanyaan 13	0, 135	0,641	Valid
14	Pertanyaan 14	0, 135	0,642	Valid
15	Pertanyaan 15	0, 135	0,615	Valid
16	Pertanyaan 16	0, 135	0,383	Valid
17	Pertanyaan 17	0, 135	0,589	Valid
18	Pertanyaan 18	0, 135	0,662	Valid
19	Pertanyaan 19	0, 135	0,649	Valid
20	Pertanyaan 20	0, 135	0,509	Valid
21	Pertanyaan 21	0, 135	0,482	Valid

Results of the Reliability Test (n=210 respondents)

The Case Processing Summary results show that the row "Cases Valid" indicates that the number of respondents is 210, with a percentage of 100%. This means that all 210 respondents are valid, and none are categorized as Excluded. To determine whether the data calculations are trustworthy and consistent, or reliable, you can refer to the Reliability Statistics table.

Results of the MFIS instrument reliability test.

Case Processing Summary		*N*	*%*
Cases	**Valid**	**210**	100.0
	Excluded	0	.0
	Total	210	100.0

Uji Reability	Cronbach's alpha	Keterangan
Instrument MFIS	0,869	Reliabel

Case Processing Summary		*N*	*%*
Cases	**Valid**	**210**	100.0
	Excluded	0	.0
	Total	210	100.0

Based on the output of the Case Processing Summary, it can be seen that the Cronbach's Alpha coefficient is 0.869 for the 21 items in the MFIS instrument with 210 respondents. It can be concluded that the MFIS instrument has high reliability. This is in line with the study by Dewi & Sudaryanto (2020), which states that reliability testing of a research instrument is used to determine whether a questionnaire used for data collection can be considered reliable. In reliability testing using Cronbach's Alpha analysis, if the Cronbach's Alpha value is greater than 0.60, it can be concluded that the variable is reliable or consistent in measuring.

DISCUSSION

Univariate

The average age of the respondents falls within the pre-elderly age group, with the youngest being 40 years old and the oldest being 68 years old. Looking at the characteristics of the respondents in this study, the majority are in the pre-elderly and elderly age groups, as these age groups experience gradual loss of physical and psychological abilities. This is consistent with the study by Åkerstedt et al. (2018), which showed that aging has a positive effect on fatigue. In terms of gender, women, particularly housewives, are more dominant than men. This is due to biological factors, including menstruation

and pregnancy, as well as social contexts (e.g., caring for children), which can lead to increased fatigue in women compared to men (Wylie et al., 2022). Fatigue in women is sometimes associated with hormonal changes during perimenopause, which is linked to the pre-elderly age group in this study.

This study took samples from patients diagnosed with Diabetes Mellitus, Congestive Heart Failure (CHF), and Stroke, with a minimum diagnosis of 6 weeks. Among Diabetes Mellitus patients, those who often experience fatigue are those with type 1 or type 2 diabetes. This is related to inflammation, body mass index, insulin treatment, and depression associated with the disease (Kalra & Sahay, 2018). The pathophysiology of fatigue is closely related to Diabetes Mellitus, as it involves biochemical and ionic changes in the muscles, which impact the electrical properties and contractility of these organs. Depleted substrates, high hydrogen ion levels, and the presence of inorganic phosphates and potassium are involved in the pathogenesis of fatigue. However, evidence shows that calcium ion availability in the mitochondrial sarcoplasmic reticulum, associated with a reduction in ATP synthesis, may lead to fatigue (Kalra & Sahay, 2018).

According to the American Heart Association (AHA), Congestive Heart Failure (CHF) is also associated with fatigue, occurring when the heart is unable to pump enough blood to meet the body's needs. As a result, blood is redirected from less vital organs and muscles to the heart and brain (Uzochukwu Ibe, 2023). The most common symptoms of CHF are shortness of breath and fatigue, which is another common symptom. CHF patients experience fatigue because they have difficulty carrying out daily activities and may experience shortness of breath during physical activity and weakness in the legs while walking, also due to the side effects of heart medications such as beta blockers (Uzochukwu Ibe, 2023).

Fatigue in stroke patients, particularly post-stroke patients, ranges from mild to severe, and the intensity of fatigue seems unrelated to the severity or type of stroke (Tyrrell & Smithard, 2018). Physical factors such as muscle weakness and emotional changes like depression, low self-esteem, and anxiety due to their illness are the main contributors to fatigue in post-stroke patients.

Bivariate

In the validity test of the MFIS (Modified Fatigue Impact Scale) instrument in the Indonesian version, administered to 210

respondents with 21 items, 10 respondents for each question, it was found that all the items had a high correlation. The instrument was tested using the item-total correlation technique with Pearson's Product Moment in SPSS. The MFIS instrument, a psychometric assessment tool, is designed to measure constructs relevant to individuals or target populations. The purpose of the MFIS instrument is to provide researchers with information by collecting subjective data, which can then be analyzed quantitatively and interpreted to assess the impact of fatigue on patients with chronic, progressive, and degenerative diseases (Lopes et al., 2020).

The MFIS instrument has been cross-culturally tested in countries such as Belgium, Italy, Slovenia, and Spain, and has been validated as an accurate tool for identifying the impact of fatigue (Kos et al., 2019). In this study, the MFIS instrument was adapted culturally through back translation and expert panel review, which aligns with research by Schiehser (2013 in Lopes et al., 2020), where MFIS was culturally adapted from English to Portuguese by translators and three healthcare professionals. In this study, the MFIS instrument was adapted for the Indonesian culture and language, and the results show that it has high construct validity and reliability.

Research instruments must undergo validity testing to determine whether the tool measures what it is intended to measure. According to Ghozali (2009), validity testing is used to measure the validity of a questionnaire. A questionnaire is said to be valid if the questions can reveal what the questionnaire intends to measure. A questionnaire is considered reliable if a respondent's answers are consistent or stable over time. Reliability refers to the degree of stability, consistency, predictability, and accuracy of a test. A measurement with high reliability is one that produces dependable data.

Limitations of the Study

1. The researcher did not include an item related to the stage/ severity of the disease that could influence fatigue.
2. A limitation during data collection was that the researcher was assisted by a research assistant, a nurse working in the clinic, in gathering the data

CONCLUSION

Based on the results of the study, the following conclusions can be drawn:

1. The respondent characteristics in this study showed that the most dominant

age group was the pre-elderly group (48.6%), with the youngest respondent being 40 years old and the oldest 68 years old. The most dominant gender was female (70%), and the most dominant occupation was housewife (50%). As for the disease characteristics, the majority of respondents had Diabetes Mellitus (50.5%).

2. In the validity test of the Indonesian version of the MFIS instrument on 210 respondents, it was found that all questions from 1 to 21 had a loading factor greater than 0.135 (based on the r-table, df-1) with (n=210), indicating that all MFIS items were valid and highly correlated.
3. The output of the Case Processing Summary showed that the Cronbach's Alpha coefficient value was 0.869 for the 21 items, which can be concluded that the MFIS instrument has high reliability.

SUGGESTIONS

For Educational Institutions

This study is expected to provide insights for educational institutions, enabling them to further develop the MFIS instrument in future research.

For Patients and Families.

This study can serve as valuable input for patients and their families regarding the fatigue experienced by family members with chronic illnesses. It highlights the family's role in caregiving, acting as motivators, educators, facilitators, initiators, caregivers, coordinators, and mediators.

For Healthcare Professionals

This research can guide nurses in identifying fatigue using the MFIS instrument, allowing them to intervene and address fatigue issues, thereby reducing and managing fatigue in patients with chronic diseases.

For Future Researchers

This instrument can be used to identify fatigue in chronic, progressive, degenerative diseases, as well as in the central nervous system, enabling interventions based on the patient's condition. The use of the validated and reliable Indonesian version of the MFIS instrument can be employed in future studies to assess fatigue levels in chronic patients beyond diabetes mellitus, CHF, and stroke.

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