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ORIGINAL RESEARCH

Psychometric properties of WHODAS for use in patients with chikungunya in Brazil

Propriedades psicométricas do WHODAS para uso em pessoas com chikungunya no Brasil

Propiedades psicométricas de WHODAS para uso en personas con chikungunya en Brasil

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ABSTRACT | The aim of this study is to validate an assessment tool for functioning and health according to the conceptual proposal of the International Classification of Functioning, Disability and Health (ICF), for its use in post-chikungunya patients. This is a validation study with individuals >17 years old of both sexes. Data collection was performed through interviews, gathering information on functioning (WHODAS), quality of life (WHOQOL-bref) and socio-demographic data. Statistical analysis used the Cronbach alpha coefficient (internal consistency) and Spearman correlation coefficient (convergent validation), means and standard deviations, with significance level of 5%. The sample consisted of 68 individuals. The mean values of scores were: 45.4 (±16.38) for WHODAS and 12.1 (±2.10) for WHOQOL-bref. The Cronbach's alpha of the total value was α=0.93; all WHODAS domains presented values ≥0.75. The total value of WHODAS 2.0 had strong correlation with the physical domain (r=−0.74) and moderate correlation with the psychological (r=−0.68) and social (r=−0.42) domains of the WHOQOL-bref. The results indicate that WHODAS 2.0 is a valid instrument for the measurement of self-perceived functioning alteration in patients affected by chikungunya.

Keywords | Chikungunya Fever; International Classification of Functioning, Disability and Health; Public Health; Physical Therapy Specialty.

RESUMO | O objetivo deste estudo é validar um instrumento de aferição da funcionalidade segundo a proposta conceitual da Classificação Internacional de Funcionalidade, Incapacidade e Saúde, para uso em pessoas pós-chikungunya. Este é um estudo de validação com indivíduos >17 anos, de ambos os sexos, em atendimento para manejo clínico da chikungunya. A coleta de dados foi realizada por meio de entrevistas coletando informações sobre funcionalidade (WHODAS), qualidade de vida (WHOQOL-bref) e sociodemográficas. A análise estatística usou o coeficiente alfa de Cronbach (consistência interna) e coeficiente de correlação de Spearman (validade convergente), médias e desvios-padrão para a determinação do perfil de qualidade de vida, com nível de significância de 5%. A amostra foi composta por 68 indivíduos. Os valores médios das pontuações dos instrumentos foram: 45,4 (±16,38) para o WHODAS e 12,1 (±2,10) para o WHOQOL-bref. O alfa de Cronbach do valor total foi de α=0,93; todos os domínios do WHODAS apresentaram valores acima de 0,75. O valor total do WHODAS 2.0 apresentou forte correlação com o domínio físico (r=−0,74) e moderada correlação com os domínios psicológico (r=−0,68) e social (r=−0,42) do WHOQOL-bref. Os resultados indicam que o WHODAS 2.0 é um instrumento válido para a mensuração da autopercepção de alteração da funcionalidade em pacientes acometidos pela chikungunya, capaz de fornecer dados que podem ajudar a construir um perfil de impacto da doença no perfil de funcionalidade dessa população.

Descritores | Febre de Chikungunya; Classificação Internacional de Funcionalidade, Incapacidade e Saúde; Saúde Pública; Fisioterapia.

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RESUMEN | El objetivo de este estudio es validar un instrumento de evaluación del funcionamiento de acuerdo con la propuesta conceptual de la Clasificación Internacional del Funcionamiento de la Discapacidad y de la Salud (CIF), para su uso en personas postchikungunya. Se trata de un estudio de validación con individuos >17 años, de ambos sexos, en atención para el manejo clínico de chikungunya. La recolección de datos se realizó mediante entrevistas, que reunieron informaciones sobre el funcionamiento (WHODAS), la calidad de vida (WHOQOL-bref) y los datos sociodemográficos. El análisis estadístico utilizó el coeficiente alfa de Cronbach (consistencia interna) y el coeficiente de correlación de Spearman (validación convergente), medias y desviaciones estándar para determinar el perfil de la calidad de vida, con un nivel de significación del 5%. La muestra consistió en 68 individuos. Los valores medios de las puntuaciones fueron: 45,4 (±16,38) para WHODAS; y 12,1 (±2,10) para WHOQOL-bref. El alfa de Cronbach del valor total fue α=0,93; Todos los dominios WHODAS presentaron valores superiores a 0,75. El valor total de WHODAS 2.0 tuvo una fuerte correlación con el dominio físico (r=−0,74) y una correlación moderada con los dominios psicológico (r=−0,68) y social (r=−0,42) del WHOQOL-bref. Los resultados indican que WHODAS 2.0 es un instrumento válido para medir la alteración del funcionamiento autopercibido en pacientes afectados por chikungunya, siendo capaz de proporcionar datos que pueden ayudar a construir un perfil de impacto de la enfermedad en el perfil de esta población.

Palabras clave | Fiebre Chikungunya; Clasificación Internacional del Funcionamiento, de la Discapacidad y de la Salud; Salud Pública; Fisioterapia.

INTRODUCTION

Chikungunya (CHIK) is an arbovirus caused by the chikungunya virus (CHIKV), transmitted by the bite of the *Aedes aegypti* and/or *albopictus* mosquitoes. The first reports on CHIK are from 1952 in Tanzania. Since then, major epidemics have been reported in Asia, the Indian Ocean, Europe and the Americas[1]. In Brazil, the first record was in Amapá in 2014[2], initially being more frequent in the North and Northeast regions, expanding to the Midwest and Southeast regions, due to the potential of CHIKV propagation[3].

The term chikungunya comes from the makonde language and refers to the bent position of the body caused by severe joint pain, which is intense and bilateral, promoting fever, fatigue, headache and erythema as the most common symptoms of infection; however, neurological, digestive and emotional problems are also reported[4]. The acute phase lasts from one to two weeks, the time required for the infection to end, but arthralgia may persist for months and even years[5]. The symptoms of CHIK may affect the performance of daily life activities and there is the possibility of persistent joint pain with the potential to prolong limitations, deepening and extending the impact on body function[6,7].

Body function and disability are broad terms used to indicate the positive and negative aspects of the interaction between an individual with some health condition and their contextual and personal factors[8]. Body function is considered the third health indicator that complements morbidity and mortality, and its evaluation is important not only to assist in rehabilitation, but also to monitor the performance of health systems[9]. Thus, the World Health Organization (WHO) has developed the World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0), a generic tool for health and disability assessment that provides the level of functioning in six life domains: cognition, mobility, self-care, interpersonal relationships, life activities and participation[10].

To date, no instrument has been found in the literature to perform a comprehensive assessment of functioning in these individuals as recommended by WHO. Version 2.0 of WHODAS, however, is an alternative to address this need. The purpose of this study is to present WHODAS 2.0 psychometric properties of 36 questions for self-perceived disability assessment in post-CHIK patients.

METHODOLOGY

This is a methodological study that assesses some psychometric properties of the Brazilian version of WHODAS 2.0 for use among post-CHIK patients.

Participants

This study included 68 people diagnosed with CHIK. This health condition has compulsory weekly notification throughout the national territory[11]. Participants were selected from patients referred for clinical pain management in a referral primary health care unit in Fortaleza, CE. Patients with referral, a clinical diagnosis of

chikungunya, and over 17 years of age were eligible. People who were unable to answer the questionnaire were not included in the study. The characteristics of the individuals are described in Table 1. This study respects ethical precepts in research and was approved by a Research Ethics Committee (CAAE 71431317.1.0000.5054).

Data collection

Two trained interviewers collected data from this study through interviews conducted between September 2017 and February 2018, in a health unit's office, as it is a place reserved for conducting interviews, preserving the privacy of respondents.

Variables studied

The study variables were the variation of functioning and quality of life. In addition, categorical (gender, race, marital status, work status) and continuous (age, years of schooling, number of painful joints, time of symptom onset, pain rating scale, and medication use) socio-demographic variables were collected.

Instruments

The World Health Organization Disability Assessment Schedule (WHODAS 2.0) was used to collect functioning variation data. This is a generic instrument developed according to the conceptual framework of the International Classification of Functioning, Disability and Health (ICF) and has already been translated and adapted for the Brazilian population[12].

The version used in this study has 36 questions divided into the following domains: cognition, encompassing communication and comprehension (6 questions); mobility, addressing internal and external movement at home (5 items); self-care, related to hygiene, dressing, eating and living independently (4 questions); interpersonal relationships, which analyses interaction with other people (5 items); life activity, concerning domestic activities, leisure, work and school (8 questions); and participation related to community activities (8 items)[10]. The questionnaire score ranges from 0 (best functioning) to 100 (worst functioning); scores are produced for all six domains plus a total score.

The instrument has been validated for use in various health conditions around the world[13-18] and has excellent psychometric properties, good reliability and item-response characteristics, remaining cross-culturally consistent with other measures of disability and health obtained by validation studies. Confirmatory factor analysis greater than 0.90 for the instrument was verified for all domains[10]. Version 2.0 of WHODAS has already been validated for use in health conditions and diverse countries, such as: chronic diseases in European countries[13] and China[19]; autism in Australia[20]; older people in Poland[21]; severe mental illness in Ethiopia[22]; stroke in Turkey[23]; people with spinal cord injury in Taiwan[24]; people with HIV/AIDS in Brazil[25]; people on hemodialysis treatment in Brazil[26]; among others.

To measure quality of life, the abbreviated version of World Health Organization Quality of Life (WHOQOL) was used. This instrument has questions distributed in the following domains: physical (7 questions); psychological (6 questions); social (3 items); and environmental (8 questions)[27]. Their response options come in the form of a Likert scale ranging from 1 to 5. Also for this instrument, linear scores from 0 to 100 (better quality of life) by domains are produced[28] and have been translated and validated for use in Brazil[29]. It presented satisfactory psychometric properties in internal consistency, discriminant validity, criterion validity, concurrent validity and test-retest reliability[29].

Statistical analysis

The data analysis process is described below according to each validation process. The software used was Stata version 11, and the significance level adopted was 5%.

Reliability

To study the reliability of the instrument, we used internal consistency analysis by calculating Cronbach's alpha coefficient (ranging from 0 to 1), so that the closer the value approaches 1, the better the consistency[30].

Convergent Validity

Respecting the distribution of data verified by the Shapiro-Wilk test, the Spearman correlation coefficient was used to study the convergent validity of WHODAS 2.0. The WHOQOL-bref was chosen to perform this verification because, in addition to assessing quality of life, it is an instrument developed by WHO, which presents a global parameter of the patient's situation, evaluating the physical and psychological domains, relationships,

social issues, and the environment. In addition, there is no specific instrument for assessing functioning and quality of life of CHIK patients.

RESULTS

Profile of the sample studied

The sample consisted predominantly of women (88.2%) aged 57.6 (±12.8) years. Most of the sample was distributed among retired people (26.4%) and paid workers (25%), and 7.3% reported being away from work due to health problems. Participants had a mean level of pain of 7.48 (±1.85), even after a period of at least two months after the onset of the symptoms. In addition, 67.1% of the sample reported that they still use pain relief medications (Table 1).

Table 1. Distribution of the characterization variables in the sample analyzed. Fortaleza/CE, 2018

Categorical variables	n (68)	% (100)
Sex		
Male	8	11.76
Female	60	88.24
Race[1]		
White	27	40.30
Black	6	8.96
Brown	29	43.28
Yellow	3	4.48
Indigenous	2	2.98
Marital status		
Single	15	22.07
Married	29	42.65
Separated	8	11.76
Divorced	6	8.82
Widowed	8	11.76
Living together	2	2.94
Work status		
Paid work	17	25
Self-employed	12	17.65
Student	1	1.47
Housewife	10	14.71
Retired	18	26.47
Unemployed due to health problems	5	7.35
Unemployed for other reasons	4	5.88
Others	1	1.47
Drug use	45	67.16

(continues)

Table 1. Continuation

Continuous variables	Mean	Standard Deviation
Age (years)	57.60	12.80
Years of study	11.50	6.68
Time of symptom onset (months)	6.88	4.33
Number of painful joints	15.98	10.14
Pain Rate Scale (PRS)	7.48	1.85

[1]One loss.

Average sample score for each domain

Analyzing the findings, it was found that the sample mean for WHODAS 2.0 was 45.4 (±16.38) and 12.1 (±2.10) for WHOQOL-bref, with the domains mobility, participation and self-care of WHODAS 2.0 being the ones reported as having a higher level of disability. Regarding WHOQOL-bref, the most compromised domain was the physical one (Table 2).

Table 2. Mean score and standard deviation of the sample for each of the WHODAS 2.0 domains and total mean score. Fortaleza/CE, 2018

Continuous variables	Mean	Standard Deviation
WHODAS/Domains		
Cognition	39.63	20.91
Mobility	62.31	23.70
Self-care	41.17	24.34
Interpersonal Relationships	19.36	22.96
Life activities	32.87	10.71
Participation	57.16	19.56
Total	45.44	16.38
WHOQOL/Domains		
Physical	9.32	2.40
Psychological	12.29	3.15
Social relationships	13.36	3.12
Environment	12.16	2.10

The Cronbach's alpha of the total value was α=0.93. According to the analysis done separately for each domain, all of them presented values above 0.75 (Table 3), with life activity (α=0.89), mobility (α=0.82) and interpersonal relationship (α=0.82) having the highest values. These findings indicate that WHODAS 2.0 has a good internal consistency for the population with CHIK.

Table 3. Distribution of Cronbach's alpha coefficient according to WHODAS 2.0 domain. Fortaleza/CE, 2018

WHODAS 2.0 – Domains	Cronbach's α
Cognition	0.79
Mobility	0.82
Self-care	0.76
Interpersonal Relationships	0.82
Life activities	0.89
Participation	0.77
Total	0.93

The result of the linear correlation analysis between the instruments is presented in Table 4. The total value of WHODAS 2.0 showed a strong correlation with the physical domain (r=–0.74) and a moderate correlation with the psychological (r=–0.68) and social (r=–0.42) domains of WHOQOL-bref, demonstrating that there is convergence between the previously mentioned domains of WHOQOL-bref and WHODAS 2.0. The remaining values are described in the following table.

Table 4. Distribution of correlation coefficients between WHODAS 2.0 and WHOQOL domains. Fortaleza/CE, 2018

Instrument/Domains	WHODAS 2.0						
	Cognition	Mobility	Self-care	Interpersonal Relationships	Life activities	Participation	Total
WHOQOL-bref							
Physical	−0.63*	−0.52*	−0.46*	−0.45*	−0.63*	−0.69*	−0.74*
Psychological	−0.66*	−0.21	−0.28	−0.63*	−0.61*	−0.63*	−0.68*
Social	−0.30	−0.21	−0.16	−0.64*	−0.20	−0.51*	−0.42*
Environmental	−0.33*	−0.02	−0.06	−0.21	−0.19	−0.26	−0.24

*p < 0.05 in accordance with Spearman's correlation.

DISCUSSION

Currently, there are plenty of tools used to assess the functioning of a variety of health conditions, but only WHODAS 2.0 is consistent with the ICF conceptual framework. The Brazilian version of WHODAS 2.0 showed satisfactory psychometric properties, which allows for the use of the tool to assess functioning in CHIK patients.

It is worth noting that CHIK impacts the functioning and quality of life of patients, as already reported by other studies[6,7,31]. Among the domains of WHODAS 2.0, mobility had the most impact. This finding corroborates the symptoms of CHIK, which causes disabling polyarthralgia, fatigue and pain, and thus impaired locomotion[4].

In addition, the WHODAS 2.0 domains participation and self-care showed high impact values, completing the multidimensional picture of functioning impairment that CHIK symptoms may cause. This finding confirms other studies in which participants reported difficulties with dressing, cooking, getting out of bed, taking a bath, leaving home, in addition to impairment in psycho-social factors[6,31].

The values of the internal consistency coefficients attest to the good reliability of the instrument in all domains and the total, with values above the recommended (0.7)[32]. The data are consistent with other articles that study the internal consistency of WHODAS 2.0 for different musculoskeletal and rheumatic conditions[13-18]. Baron et al.[15] evaluated the reliability of WHODAS 2.0 for individuals with early rheumatoid arthritis, dividing this population between those who study or work and those who do not. Both groups presented satisfactory Cronbach's alpha values, 0.96 and 0.93 respectively.

The correlation between WHODAS 2.0 and WHOQOL-bref for external validation analysis is based on the relationship between functioning and quality of life. The first is an instrument derived from the ICF conceptual model and measures the degree of disability[10], and the second measures the individual's perception of their position in life[27]. Both have communicating and converging dimensions, as shown by the values that express the degree of moderate correlation between them.

Studies comparing WHODAS 2.0 with instruments that measure health-related quality of life or well-being also showed evidence of correlation[13-18]. Garin et al.[13] assessed the external validity of WHODAS 2.0 for patients with different chronic conditions from seven centers in Europe, correlated it with an instrument that assesses quality of life (Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36)) and found moderate correlations in all analyses. In addition, research using WHODAS 2.0 and WHOQOL-bref also showed values consistent with this study[33].

The correlation between domains showed that the WHOQOL-bref physical domain with WHODAS

2.0 participation had the highest value (0.69), followed by the WHOQOL-bref psychological domain with WHODAS 2.0 cognition (0.66), and the social domain of WHOQOL-bref with WHODAS 2.0 interpersonal relationship (0.64). The WHOQOL-bref environmental domain showed low correlation with all WHODAS 2.0 domains. A study by Castro et al.[26] performed WHODAS 2.0 validation for the Brazilian population on hemodialysis using WHOQOL-bref, found a moderate correlation between the total value of the two instruments. The correlations per domains with the highest value (0.67) were the physical one from WHOQl-bref with WHODAS 2.0 life activity, and WHOQOL-bref physical with WHODAS 2.0 mobility (0.62).

The low number of participants was considered a limitation of this study, which likely occurred due to the decrease of CHIK cases in the city of Fortaleza in the year of analysis. In addition, the determination of only one site for the study hindered the recruitment of patients. However, it is worth mentioning that the limitation of sample size should not necessarily be understood as an impediment to the publication, use and discussion of the results shown in this study. The limitation is recognized, but other articles have already been published with a sample smaller than one hundred subjects. For instance, there are validation studies for the application of WHODAS in people with spinal cord injury (sample of 63 subjects)[34]; hemodialysis-dependent (sample of 51 subjects)[26]; patients with schizophrenia (sample of 54 subjects)[35]; and also subjects with head trauma (sample of 79 people)[36]. As such, we understand that even with a sample smaller than 100 people, this study has scientific value, as well as others published before this one.

However, it is noteworthy that this article is not only about the validation of an instrument for assessing the variation of functioning among patients with CHIK. By providing such an instrument with tested and consistent psychometric properties, the possibility of a new approach to the impact of CHIK on people's life activities opens up. In addition, by numerically quantifying functioning, one can gain better insight into the need for health care. Two people with the same health condition (CHIK) may have different functioning profiles and require differentiated health care, thus enabling the beneficial use of WHODAS 2.0 for health professionals, patients and health services.

The results show that WHODAS 2.0 has good behavior in the evaluated psychometric properties (reliability and external validity). Consequently, it becomes a valid and applicable instrument for measuring self-perception of disability in patients with CHIK, thus being a reliable tool. Its use can help build a profile of health condition impact on functioning, obtained from an instrument based on the concepts of ICF.

The WHODAS 2.0 stands out for being an instrument translated into Portuguese, grounded on the concepts of ICF that can achieve a multidimensional approach in patients with CHIK. Moreover, as it is used in different countries, it is possible to compare it to different populations.

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