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ORIGINAL RESEARCH

Validation of the Brazilian version of WHODAS 2.0 for individuals with temporomandibular disorders

Validação da versão brasileira do WHODAS 2.0 para indivíduos com disfunção temporomandibular

Validación de la versión brasileña del WHODAS 2.0 para personas con trastornos temporomandibulares

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ABSTRACT | This study aims to validate the Brazilian version of World Health Organization Disability Assessment Schedule (WHODAS 2.0) for individuals with temporomandibular disorders (TMD), assessing its psychometric properties, including internal consistency, construct validity, and discriminant validity. In total, 100 female and male patients with TMD were included. Participants were assessed based on the Research Diagnostic Criteria for TMD (RDC/TMD). For statistical analyses, McDonald's omega coefficient was used to assess internal consistency; Spearman correlation, for construct validity; Kruskal-Wallis test and multiple comparisons (Dunn method), for discriminant validity. The results of internal consistency for the WHODAS 2.0 domains ranged from 0.70 to 0.94. The WHODAS 2.0 showed a moderate and significant correlation with the disability points of the RDC/TMD and with the WHOQOL-BREF domains. In the discriminant validity, significant differences were found in all domains of WHODAS 2.0 between grade 0 and grade III, between grade I and grade III, and between grade II and grade III from the chronic pain grading of the RDC/TMD. The results demonstrate that the instrument is reliable and valid for measuring the functioning of individuals with TMD, presenting acceptable psychometric properties for internal consistency, as well as for construct validity and discriminant validity.

Keywords | Disability Evaluation; International Classification of Functioning, Disability and Health; Temporomandibular Joint Dysfunction Syndrome.

RESUMO | Este estudo metodológico teve como objetivo validar a versão brasileira do *World Health Organization Disability Assessment Schedule* (WHODAS 2.0) para indivíduos com desordem temporomandibular (DTM), avaliando suas propriedades psicométricas, incluindo consistência interna, validade de construto e validade discriminante. Um total de 100 pacientes do sexo feminino e masculino com DTM participaram do estudo e foram avaliados com base no *Research Diagnostic Criteria for TMD* (RDC/TMD). Para as análises estatísticas, o coeficiente ômega de McDonald foi usado para avaliar a consistência interna, a correlação de Spearman para a validade de construto, o teste de Kruskal-Wallis e comparações múltiplas (método de Dunn) para a validade discriminante. Os resultados de consistência interna para os domínios do WHODAS 2.0 variaram de 0,70 a 0,94. O WHODAS 2.0 apresentou correlação moderada e significativa com os pontos de incapacidade do RDC/TMD e com os domínios do WHOQOL-bref. Na validade discriminante, foram encontradas diferenças significativas em todos os domínios do WHODAS 2.0 entre os graus 0 e III, entre os graus I e III, e entre os graus II e III dos graus de dor crônica do RDC/TMD. Os resultados obtidos demonstram que o WHODAS 2.0 é um instrumento confiável e válido para mensurar a funcionalidade em indivíduos com DTM, apresentando propriedades psicométricas aceitáveis para consistência interna, bem como para validade de construto e validade discriminante.

Descritores | Avaliação da Deficiência; Classificação Internacional de Funcionalidade, Incapacidade e Saúde; Síndrome da Disfunção da Articulação Temporomandibular.

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RESUMEN | Este estudio metodológico tuvo como objetivo validar la versión brasileña del Cuestionario para la Evaluación de la Discapacidad de la Organización Mundial de la Salud (WHODAS 2.0) para personas con trastorno temporomandibular (TTM), así como evaluar sus propiedades psicométricas, incluidas la consistencia interna, la validez de constructo y la validez discriminante. Participaron en el estudio un total de 100 pacientes de ambos sexos con TTM, quienes fueron evaluados con base en *Research Diagnostic Criteria for Temporomandibular Disorders* (RDC/TMD). En los análisis estadísticos, se utilizó el coeficiente omega de McDonald para evaluar la consistencia interna; la correlación de Spearman para la validez de constructo; y la prueba de Kruskal-Wallis y comparaciones múltiples (método de Dunn) para la validez discriminante. Los resultados de consistencia interna para los dominios de WHODAS 2.0 variaron de 0,70 a 0,94. El WHODAS 2.0 tuvo una correlación moderada y significativa con los puntos de incapacidad del RDC/TMD y con los dominios del WHOQOL-bref. En la validez discriminante, se encontraron diferencias significativas en todos los dominios de WHODAS 2.0 entre los grados 0 y 3, entre los grados 1 y 3 y entre los grados 2 y 3 de los grados de dolor crónico del RDC/TMD. Los resultados apuntan que el WHODAS 2.0 es fiable y válido para medir la funcionalidad de personas con TTM, presentando propiedades psicométricas aceptables para la consistencia interna, así como para la validez de constructo y la validez discriminante.

Palabras clave | Evaluación de la Discapacidad; Clasificación Internacional del Funcionamiento, de la Discapacidad y de la Salud; Síndrome de la Disfunción de Articulación Temporomandibular.

INTRODUCTION

Temporomandibular disorder (TMD) is a term that encompasses a series of alterations that can affect the temporomandibular joint (TMJ), masticatory muscles, and associated structures[1]. They are a major public health problem since they are one of the main sources of chronic orofacial pain that interferes with daily activities[2].

Individuals affected by TMD have psychological discomfort, physical disability, and functional limitations of the orofacial system, causing great negative effect on daily activities, affecting their personal and professional lives[2]. Epidemiological studies indicate that more than 25% of the general population has TMD[3] and those aged 20–45 years present the highest incidence, with women being five times more affected than men[4].

Some instruments have already been used to assess the functioning of this population, such as the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD)[5], the Mandibular Function Impairment Questionnaire (MFIQ)[6], and the Craniofacial Pain and Disability Inventory (CF-PDI)[7].

Although used for the assessment of functioning of TMD individuals, those instruments do not consider biopsychosocial aspects, as suggested by the International Classification of Functioning, Disability, and Health (ICF) developed by the World Health Organization (WHO)[8]. In this context, the World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0) would greatly contribute for both clinical and scientific purposes, since it presents a favorable applicability and provides a faster functioning diagnosis, allowing interventions focused on clinical symptoms, and on the patient's functioning improvement[9]. This study evaluates psychometric properties—including internal consistency, construct validity, and discriminant validity—of the Brazilian version of the WHODAS 2.0 for its use in TMD individuals. WHODAS 2.0 is expected to be a valid and reliable instrument for assessing functioning in individuals with TMD.

METHODOLOGY

Participants

The inclusion criteria were: individuals of both sexes, aged 18 years or older, diagnosed with TMD according to the RDC/TMD[10]. Participants who were not diagnosed with TMD by the RDC/TMD or who did not complete the questionnaires were excluded from the study. The sample size consisted of 100 participants[11]. They were recruited from the Prosthesis and Occlusion Clinic from School of Pharmacy, Dentistry, and Nursing, UFC.

Outcome measures

The psychometric properties evaluated were: internal consistency, construct validity, and discriminant validity. Sociodemographic, clinical, functioning, and quality

of life (QoL) characteristics of the participants were also evaluated.

Internal consistency is defined as the degree of intercorrelation between the items within an instrument[11].

Construct validity is defined as the degree to which the scores of an instrument are consistent with a previously defined hypothesis. It can be verified by evaluating the interrelationships of the instrument in comparison to other instruments, assuming that the comparator instrument is a reliable measure of the construct target[12]. To evaluate construct validity, the total value and the WHODAS 2.0 domains were correlated with the RDC/TMD AXIS II measures—the characteristic pain intensity (CPI) and pain-related disability (PRD)—and the total score and domains of the World Health Organization Quality of Life instrument (WHOQOL-BREF).

Discriminant validity ensures that the instrument can detect differences between individuals in the group, when these contrasts occur[13]. The RDC/TMD Grade Chronic Pain Scale (GCPS) were used to separate the groups and to verify the discriminating validity of WHODAS 2.0.

Instruments

Participants were evaluated according to abbreviated version of the WHOQOL-BREF, RDC/TMD (CPI and PRD) and WHODAS 2.0.

The WHODAS 2.0 is a generic functioning assessment questionnaire[14] composed of 36 questions encompassing six life domains: Cognition (6 items), Mobility (5 items), Self-care (4 items); Getting along (5 items), Life activities (8 items), and Participation (8 items). Each question has five alternatives as possible answers, ranging from 1 (no difficulty) to 5 (extreme difficulty or cannot do). The domains and general scores are computed, ranging from 0 to 100, with higher scores reflecting worse levels of functioning[15,16].

To validate the WHODAS 2.0 for TMD individuals, the participants were evaluated using the Brazilian version of the RDC/TMD Axis II; which is characterized by a biaxial approach, allowing a reliable measurement of the physical findings in Axis I and the assessment of psychosocial status in Axis II. The Axis II consisted of 31 items, divided into socio-demographic, socio economic, psychological (depression subscales and nonspecific physical symptoms—pain items included, and pain items excluded), psychosocial (graded chronic pain scale—pain intensity and disability); patient-related signs and symptoms; and the limitation scale on mandibular function (The GCPS classifies pain-related impairment based on five degrees of severity (no pain=0, low=I, II; high=III, IV)[17].

The WHOQOL-BREF is an abbreviated version of the World Health Organization Quality of Life (WHOQOL-100) instrument and has 26 items covering four QoL domains: physical (7 items), psychological (6 items), social (3 items), and environmental (8 items), with two others general questions regarding health and QoL. These scores are represented along a linear scale from 0 to 100, in which a higher score reflects a better QoL. The WHOQOL-BREF has been previously translated into and validated for the Brazilian Portuguese[18].

Statistical methods

All statistical analyses are described below and were conducted using the program SPSS 22.0, with 5% statistical significance level. To describe sociodemographic, clinical, functioning, and QoL characteristics of the study participants, descriptive measures were used. The normality of the data was analyzed using the Kolmogorov-Smirnov test.

For the analysis of internal consistency, the McDonald's omega coefficient was used; and the internal consistency was positively classified when McDonald's ω was between 0.70 and 0.95[19,20]. Spearman's correlation test between the WHODAS 2.0—domains and total scores—and the RDC/TMD and the WHOQOL-BREF questionnaires were used to assess the construct validity. The correlations were considered strong when the value was ≥0.7, moderate when it was 0.4 to 0.7, and weak when it was <0.4[21]. The discriminant validity was assessed using the Kruskal-Wallis test and multiple comparisons (Dunn's method) to determine which groups of GCPS were different[22].

RESULTS

A total 115 volunteers were evaluated according to the RDC/TMD and after the exclusion criteria, only 100 were diagnosed with TMD and were considered for analysis (Figure 1). Table 1 shows sociodemographic, clinical, functioning, and QoL characteristics.

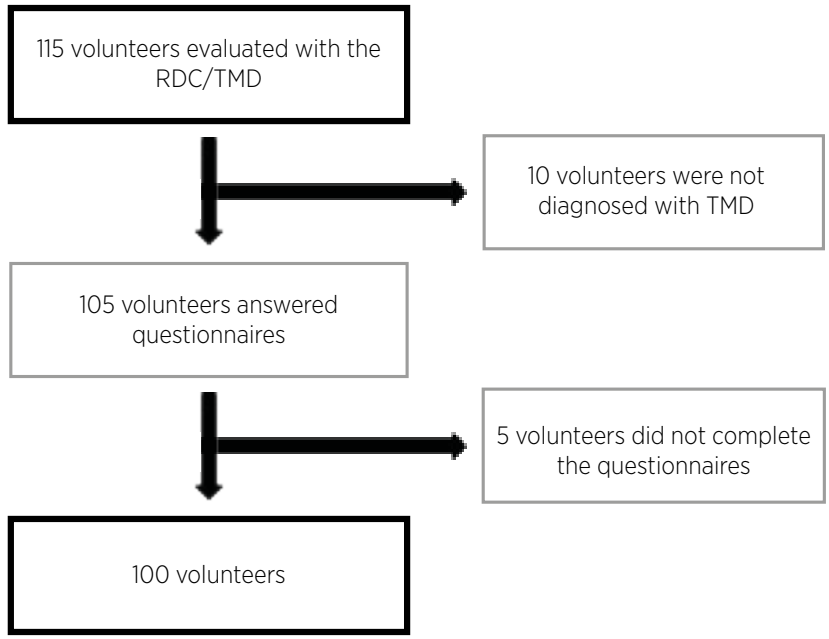

Figure 1. Flowchart of evaluated volunteers

Table 1. Description of the study sample

Characteristic	n (100)	% (100.0)
Gender		
Male	22	22.0
Female	78	78.0
Marital status		
Never married	55	55.0
Married	28	28.0
Separated	3	3.0
Divorced	4	4.0
Widowed	1	1.0
Cohabiting	9	9.0
Work status		
Paid work	37	37.0
Self-employed	15	15.0
Student	38	38.0
Housewife	4	4.0
Other	6	6.0
RDC/TMD		
Diagnosis right side		
Group I: Myofascial pain	81	81.0
Group II: Disc displacement	29	29.0
Group III: Arthralgia, arthritis, arthrosis	33	33.0
1 diagnosis	53	53.0
2 diagnoses	42	42.0
3 diagnoses	2	2.0
None	3	3.0
Diagnosis left side		
Group I: Myofascial pain	81	81.0

Table 1. Continuation

Characteristic	n (100)	% (100.0)
Group II: Disc displacement	24	24.0
Group III: Arthralgia, arthritis, arthrosis	29	29.0
1 diagnosis	58	58.0
2 diagnoses	35	35.0
3 diagnoses	2	2.0
None	5	5.0
Grade chronic pain scale		
Grade 0	11	11.0
Grade I	33	33.0
Grade II	39	39.0
Grade III	16	16.0
Grade IV	1	1.0
	Mean	**Standard deviation**
Age (years)	33.68	±13.52
Years of formal study	20.14	±6.67
Pain intensity	18.60	±28.35
Disability points	0.95	±1.34
WHODAS 2.0		
Cognition	24.05	±16.94
Mobility	10.81	±14.45
Self-care	9.20	±11.94
Getting along	13.50	±17.55
Life activities	25.25	±21.40
Participation	24.87	±20.60
Total	20.17	±14.32
WHOQOL-BREF		
Physical	13.87	±2.74
Psychological	14.18	±2.61
Social	14.85	±3.04
Environmental	13.48	±2.34
Quality of life self-assessment	13.50	±2.66
Total	13.90	±2.23

As described in Table 2, the reliability of the instrument was assessed by analyzing the internal consistency.

Table 2. Distribution of the McDonald's omega according to WHODAS domains

WHODAS 2.0 domain	McDonald's ω
Cognition	0.77*
Mobility	0.79*
Self-care	0.70*
Getting along	0.78*
Life activities	0.94*
Participation	0.87*
Total	0.94*

*0.70≤ω≤0.95.

Construct validity was observed by correlating the total value and the WHODAS 2.0 domains with the RDC/TMD AXIS II measures—CPI and PRD—and the total score and WHOQOL-BREF domains. Table 3 shows the correlation values as well as the levels of statistical significance.

Discriminant validity was assessed by comparing the total score and WHODAS 2.0 domains in the different degrees of chronic pain that the RDC/TMD classifies individuals with temporomandibular disorders with the WHOQOL domains (Table 4).

Table 3. Distribution of the coefficient correlation of the WHODAS domains with the RDC/TMD and WHOQOL-BREF domains

Instrument/ Domain	WHODAS 2.0 domains						
	Cognition	Mobility	Self-care	Getting along	Life activities	Participation	Total
RDC/TMD							
Characteristic pain intensity	0.104	0.123	−0.027	0.098	0.019	0.133	0.104
Pain-related disability	0.382**	0.411**	0.329**	0.481**	0.600**	0.615**	0.684**
WHOQOL-BREF							
Physical	−0.547**	−0.427**	−0.454**	−0.484**	−0.430**	−0.665**	−0.682**
Psychological	−0.436**	−0.343**	−0.337**	−0.222*	−0.248*	−0.370**	−0.421**
Social	−0.353**	−0.257**	−0.304**	−0.331**	−0.231**	−0.419**	−0.423**
Environmental	−0.410**	−0.283**	−0.309**	−0.221**	−0.091	−0.362**	−0.318**
Quality of life self-assessment	−0.376**	−0.302**	−0.332**	−0.181	−0.212*	−0.413**	−0.399**
Total	−0.516**	−0.382**	−0.422**	−0.361**	−0.281**	−0.538**	−0.536**

*p≤0.05; **p≤0.01.

Table 4. Distribution of the means of the WHODAS scores according to the RDC/TMD grades

RDC/TMD: Grade Chronic Pain Scale	WHODAS 2.0 domains						
	Cognition	Mobility	Self-care	Getting along	Life activities	Participation	Total
Grade 0	45.27[c,d]	32.14[a,c,d]	46.64[c]	46.32[c,d]	33.23[c,d]	37.59[c,d]	34.73[c,d]
Grade I	43.48[f,g]	50.17[f]	50.64[f]	44.26[f,g]	43.29[f,g]	38.02[e,f,g]	40.53[f,g]
Grade II	48.67[h,i]	46.87[h]	43.00[h]	43.97[h,i]	48.73[h,i]	52.96[h]	48.81[h,i]
Grade III	70.06	69.97	70.31	79.13	80.25	76.06	83.00
Grade IV	98.00	93.50	64.00	99.00	71.50	99.50	99.00

a: Grade 0 × Grade I; b: Grade 0 × Grade II; c: Grade 0 × Grade III; d: Grade 0 × Grade IV; e: Grade I × Grade II; f: Grade I × Grade III; g: Grade I × Grade IV; h: Grade II × Grade III; i: Grade II × Grade IV; j: Grade III × Grade IV.

DISCUSSION

Our study aimed to prove that WHODAS 2.0 is a reliable and valid instrument for measuring the functioning of patients with TMD, with acceptable psychometric properties.

Internal consistency

The coefficients for all domains and the overall score were consistent with the international[22,23] and national literature[8,24]. The values we found meet the condition of acceptable reliability for research purposes.

Construct validity

The results of this study demonstrate moderate and positive correlations of the PRD of the RDC/TMD with almost all domains of WHODAS 2.0, except for the domains of Cognition and Self-care.

PRD are calculated based on answers to four RDC/TMD questions, considering the last six months. On the other hand, WHODAS evaluates the last 30 days, thus, causing the instruments to differ in relation to the evaluated period. This may be the reason for the moderate correlation between the instruments.

The WHOQOL-BREF domains also showed a moderate and significant correlation with the WHODAS 2.0. The Physical domain of WHOQOL-BREF showed correlation with all domains of the instrument in the process of validation, as already published[8].

The Psychological domain of the WHOQOL-BREF showed a moderate correlation with the Cognition domain of WHODAS 2.0, in agreement with another study[24], as well as the Social domain presented correlation with the Participation domain of WHODAS 2.0. This can be explained by the fact that the instruments evaluate close and related constructs.

Discriminant validity

The RDC/TMD GCPS were used to verify the discriminating validity of the WHODAS 2.0. The instrument was able to consistently discriminate patients with low disability and those with high disability. Significant differences were found in all

WHODAS 2.0 domains between grade 0 and grade III, between grade I and grade III, and between grade II and grade III. Most comparisons were significant.

The importance of an instrument with good discriminating validity is the ability to categorize the subjects. In the case of the WHODAS 2.0, its ability to show the different levels of functioning for the same group can assist in organizing the work flow for these individuals, highlighting the priority of those who have a greater functional commitment, and improving the quality of the services provided.

Limitations

The mains limitation of our is the lack of homogeneity of the population in relation to the level of pain-related impairment, since individuals with both high intensity (Grade III or IV) and low intensity (Grade I or II) were included, which directly interferes with the functioning profile of this population.

CONCLUSION

The WHODAS 2.0 is a reliable and valid instrument for measuring the functioning of TMD patients, since it presents acceptable psychometric properties for internal consistency, as well as for construct validity and discriminant validity.

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