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ASSESSMENT OF PHYSICAL IMPAIRMENTS IN LEPROSY PATIENTS: A COMPARISON BETWEEN THE WORLD HEALTH ORGANIZATION (WHO) DISABILITY GRADE AND THE EYE-HAND-FOOT SCORE

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SUMMARY

This cross-sectional study assessed the grade of physical impairments in 61 individuals with leprosy receiving multidrug therapy (MDT) under the Brazilian Unified Health System (SUS), and residing in Campina Grande, Paraíba State, Brazil. Impairments were assessed using the disability grade (DG) standardized by the WHO, and the EHF score (Eye-Hand-Foot sum of impairment scores). Impairments were detected in 25 (41%) of the subjects. A total of 14 (23%) patients scored DG 1, while 11 (18%) were assigned DG 2. The EHF score ranged from 1 to 10 points in the group of patients with physical impairments, with a mean score of 3.6 points. The majority of individuals with impairments were affected in at least two sites. We conclude that the EHF score showed overlapping impairments in the segments examined and may be more appropriate than the DG classification system for describing the degree of physical impairment of leprosy patients.

KEYWORDS: Leprosy; Disability evaluation; Disabled health.

INTRODUCTION

The data available on physical impairments resulting from leprosy varies considerably, although the World Health Organization (WHO) estimates indicate that approximately 25% of those with leprosy have impairments³⁸. In 2004, an estimated two to three million people were disabled by leprosy worldwide³⁷. Trends in prevalence and case detection vary from country to country. The prevalence of people with DG 2 decreases much slower than leprosy incidence and case detection. In 2020 it is estimated that about one million people will be affected by leprosy and living with disability grading 2¹⁸.

Studies carried out in Brazil have shown that coverage of new cases assessed for disability was on average 88% in 2008³². The percentage of patients presenting grades 1 and 2 of disability were, respectively, 5.7% and 18.1% amongst 43,642 new cases of leprosy in 2006⁴. The proportion of DG 2 among new cases varies widely between different regions of the world and reaches rates from 1% to 21%³⁵.

Other Brazilian studies on the prevalence of impairments at diagnosis have reported 7.7% up to 47.8%^{8,14,15,16,17,21,31}, while international research in Nigeria²² and Ethiopia²⁵ found rates of 19% and 55%, respectively. However, government data from both African countries only report DG 2. In Larkana-Pakistan, deformities and disabilities were noted in 55% of cases²⁷.

In 1960, the WHO recommended the use of a scale to classify physical impairments in individuals with leprosy, namely the “disability grading” (DG)^{2,3,41}. Working versions of the scale³ were later proposed^{39,40} and the version in use today was recommended by the WHO in 1997³⁸. Another study recommends that the “WHO Disability Grading” (DG) be renamed as the “WHO Impairment Grading” (IG) to address the new perspective that the International Classification of Functioning, Disability and Health (ICF) suggested²⁰. Under this scale, grades are attributed to each eye, hand and foot, where the highest value attributed to these points represents the “maximum disability grade” of the individual and is used as an indicator of the severity of impairment³⁹. The scale currently adopted by the WHO is simplified into three grades^{3,37} (DG 0 - no disability caused by leprosy in eyes, hands and feet. DG 1 - Eye problem caused by leprosy, but vision is not severely affected (equals 6/60 or better; fingers can be counted at six meters apart); loss of sensibility in hands or feet (not feeling 2g monofil). DG 2 - Eyes: lagophthalmos and/or ectropion; trichiasis; visual impairment (fingers not counted at 6m). Hands and feet: with visible damage i.e. claw hands, foot drop, reabsorption of fingers or toes, wounds)³⁸. Today, the DG is employed as an epidemiological indicator to assess leprosy programmes, determine early/late diagnosis^{33,36} and monitor patient follow-up in the health care centre over the course of treatment^{4,36}.

The vast majority of impairments occur due to failures of the leprosy programmes in terms of rapid diagnosis and treatment. Since most

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impairments only develop late in the course of the disease⁹, presence of DG 2 at diagnosis indicates late diagnosis²⁸.

In 1971, a method was proposed to evaluate three different types of *Disability Index* to describe physical disabilities at the time of the diagnosis. This method had considered disability grade index achieved from the arithmetic mean of the added values of the different disability grades¹. It is important to note that the WHO disability grade was considered the best method for evaluating physical disabilities at the time of the diagnosis if compared to the absolute disabilities frequency and disability grade²⁹.

An alternative scale called the *Hand-Foot impairment score (HF impairment score)*¹², was proposed in 1994 and employs the sum of impairment grades in hands and feet to monitor physical impairments in patients during the course of multidrug therapy (MDT) and over a five-year period after cure.

Previous studies^{6,10,19,24,30} have also employed the *Eye-Hand-Foot impairment score (EHF score)*, which uses the sum of impairment grades assigned individually to each segment examined and encompasses eyes as well as hands and feet, yielding a total score which ranges from 0 (zero) to a maximum of 12 points. The EHF tool is an indicator of severity and development of impairment and allows changes in the stages of impairment to be monitored in individuals or groups. Grades should be recorded at least twice, at diagnosis and again at release from treatment³⁰.

Few studies have compared the two systems of impairment assessment^{13,19,30}, and no such studies have yet been conducted, in Northeastern Brazil, concerning disability evaluation using EHF-score versus WHO disability grading. Given the possible applicability of the EHF score as a tool for assessing impairment within leprosy programmes, several authors have pointed to the need for further studies evaluating its performance and validity^{6,19,30}. This study sought to analyze the extent of impairment in leprosy patients based on the system of disability grading (DG) as well as the sum of the Eye-Hand-Foot impairment score (EHF score).

MATERIAL AND METHODS

Campina Grande is located in Paraíba State, Northeastern Brazil. In 2005 it had an estimated population of 376,132 inhabitants¹¹. In 2004 145 new cases of leprosy²⁶ were diagnosed. A cross-sectional study was carried out in a sample comprising 61 volunteers with leprosy who were invited to take part in the study.

The study was conducted from November 2003 to January 2005.

The inclusion criteria were: residence in the municipality of Campina Grande-Paraíba State-Brazil, receiving public health-care assistance under the Brazilian Unified Health System (SUS), and taking MDT for active leprosy, irrespective of gender, clinical form or age. Six patients who presented any associated health problems whose sequelae could affect the peripheral nervous system or result in similar impairments to those of leprosy were excluded. Two subjects refused to participate.

Patients were examined at the health service or their homes. The impairments were measured using the DG - the tool standardized by the WHO³⁸, and by the EHF score - Eye-Hand-Foot impairment score³⁰.

To exclude inter-observer variation, all physical-functional assessments were conducted by a single experienced investigator (M.T.R.).

The data were analyzed using the Epi Info™ software version 3.3, with distribution of frequencies and averages, applying the Mann-Whitney test with a significance level of 5%.

The project was approved by the Research Ethics Committee of the State University of Paraíba, under number 164/03. All participants, or their respective legal guardians, signed the informed written consent term.

RESULTS

We included 61 patients, 32 (52.5%) females and 29 (47.5%) males. The mean age was 41 years and median 43 years (range: 8-85 years).

Based on the working classification (leprosy group)³⁸, 26 cases (42.6%) showed paucibacillary leprosy (PB) and 35 (57.4%) with multibacillary leprosy (MB).

A total of 25 (41%) leprosy patients showed impairments. Assessment of impairment using the DG scale, classified 36 of the subjects as DG 0 (59%), 14 (23%) patients as DG 1 and 11 (18%) as DG 2. Among impairment patients, EHF scores ranged from 1 to 10 points (Table 1).

Table 2 shows a higher mean EHF score count in the DG 2 patient subgroup than the DG 1 patient subgroup.

Of the patients classified as DG 1, 10 (71.4%) had up to two segments involved, whereas of those assigned DG 2, 8 (72.7%) had three or more impaired segments.

Of the 25 patients with impairments, 13 (52%) had an EHF score of 1 to 2 and impairments in up to two segments. Among those with EHF

Table 1
Number of patients with impairment by WHO DG and EHF score (n = 25)

WHO disability grading	EHF Score												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
Grade 1	2	8	2	2	–	–	–	–	–	–	–	–	14
Grade 2	–	3	–	–	3	2	1	1	–	1	–	–	11
Total	2	11	2	2	3	2	1	1	–	1	–	–	25

Table 2
Mean (SD), median EHF score by IG 1 and IG 2 subgroups.

WHO disability grading	EHF Score	
	Mean and Standard Deviation	Median
DG 1 (n = 14)	2.28 ± 0.91	2*
DG 2 (n = 11)	5.27 ± 2.57	5
Total (n = 25)	3.6 ± 2.34	2

* Mann-Whitney, *U*: 9.227, *p* = 0.0024

scores greater than or equal to 3, nine (36%) had more than four affected segments (Table 3).

DISCUSSION

Given that both methods of measuring impairment combine impairments of different severities and sites into a single measure, they are concordant as severity increases, i.e. the greater the DG, the greater the EHF score. Consequently, the mean EHF total score in the DG 2 patient subgroup was greater than in the DG 1 patient subgroup. Similar to data from MEIMA *et al.*¹⁹, all patients with EHF scores greater than or equal to five were found to have involvement of at least one extremity or eye with DG 2.

The overlapping of impairments in the same individual, although occurring in both methods, seemed more evident in the scale of the EHF score. In the present study, while the DG predominantly classified patients with impairments in up to four segments as DG 1, the EHF score for the same group ranged from 1 to 8. Similarly, the DG classified patients with one to six impaired segments as grade 2, where the same group scored between 3 and 10 points on the EHF scale.

This is the case because the EHF score accounts for alteration in different areas and therefore provides more in-depth information on the degree of impairments in a given individual, a finding previously reported in an earlier study⁷.

The greater detail offered by the EHF score makes it more suited for assessing development of impairments over the course of treatment. Moreover, previous studies have pointed to higher sensitivity of the EHF

score for registering changes in impairment than the maximum WHO disability grade^{6,7,30}.

A limitation attributed to the EHF score is that a change in impairment can be “masked” if variations in grades assigned to different components occur in opposite directions, thereby canceling each other out while leaving total score unchanged^{28,30}. However, this phenomenon may also occur when using the maximum WHO disability grade³⁰. In a cohort study following 433 patients during treatment, the masking effect on EHF scores was a rare occurrence¹⁹.

A study investigating inter-observer reliability showed the EHF score to be slightly better than the DG²⁰. Nevertheless, in light of the similar reliability of both methods, the author advocated the use of the DG by virtue of its simplicity and ease of application.

However, the EHF score is merely the sum of the highest grades of impairment in each segment, and therefore the clinical methodology of assessing impairments is the same under both methods, the only difference being in the way impairments are classified. The simplicity of the 3-level DG scale is, though, more favorable as it enables simplifying records and monitoring systems. Nonetheless, from a clinical standpoint and for the purposes of monitoring patient conditions over the long term, the total sum of impairments of the EHF conveys more precise information than the conventional DG^{12,30}.

This study presents some limitations related to the number of participants and individuals with impairments by leprosy. Therefore, the findings cannot be generalized. Despite these limitations, this study revealed that the elevated prevalence of impairment is in agreement with some data in the leprosy literature^{8,21,25,27}. These findings suggest a delay in the diagnosis as an indicator of the operational difficulties of the programme^{23,28,33,36}; highlight the need for monitoring of these subjects after treatment completion; organizing and developing activities related to the leprosy control activities carried out by Primary Health Care Services

CONCLUSIONS

The EHF score ranged from 1 to 10 points in the patient group with impairments, giving a mean score of 3.6 and median of 2 points. The majority of individuals presenting impairments were affected in at least

Table 3
Number of affected sites in cases with impairments by DG and EHF score (n = 25).

Sites (n)	WHO DG			EHF Score												
	1	2	Total	1	2	3	4	5	6	7	8	9	10	11	12	Total
1 Site.	2	3	5	2	3	–	–	–	–	–	–	–	–	–	–	5
2 Sites.	8	–	8	–	8	–	–	–	–	–	–	–	–	–	–	8
3 Sites.	2	1	3	–	–	2	–	1	–	–	–	–	–	–	–	3
4 Sites.	2	4	6	–	–	–	2	2	1	–	1	–	–	–	–	6
5 Sites.	–	2	2	–	–	–	–	–	1	1	–	–	–	–	–	2
6 Sites.	–	1	1	–	–	–	–	–	–	–	–	–	1	–	–	1
Total	14	11	25	2	11	2	2	3	2	1	1	–	1	–	–	25

two sites. EHF score showed overlapping impairments in the segments examined and proved more suited than the DG classification system for describing the degree of physical impairment of patients.

Our findings corroborate the use of the EHF score for follow-up of patients with impairments, and suggest that the term “Escore OMP - Escore Olhos, Mãos e Pés” (Eye-hand-foot Score) should be adopted by the Leprosy Control Programme in Brazil.

RESUMO

Avaliação de incapacidades físicas em pessoas com hanseníase: comparação entre o grau de incapacidade e o *Eye-Hand-Foot Score*

Este estudo transversal avaliou a extensão das incapacidades físicas em 61 pessoas com hanseníase, em uso de poliquimioterapia (PQT), assistidos pelo Sistema Único de Saúde do Brasil, residentes em Campina Grande, Paraíba, Brasil. As incapacidades foram avaliadas por meio do grau de incapacidade (GI) preconizado pela OMS e pelo cálculo da soma das incapacidades – *Eye-Hand-Foot impairment score (EHF score)*; incapacidades foram diagnosticadas em 41% dos sujeitos. Os GI 1 e 2 foram atribuídos, respectivamente, para 23% e 18% deles. No grupo de pacientes com incapacidades físicas o *EHF score* variou de 1 a 10 pontos e exibiu a média igual a 3,6 pontos. A maioria das pessoas com incapacidades possuía, pelo menos, duas partes do corpo afetadas. O *EHF score* evidenciou sobreposição de comprometimentos nos segmentos examinados e se mostrou mais apropriado que o sistema de classificação do GI para descrever a extensão das incapacidades físicas dos pacientes.

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AUTHORS' CONTRIBUTIONS

Raposo MT coordinated the conception, design, acquisition, analysis and interpretation of data and, writing of the final manuscript.

Caminha AVQ contributed to design, acquisition, analysis and interpretation of data and has been involved in drafting the manuscript.

Medeiros JLA contributed to design, analysis and interpretation of data and has been involved in drafting the manuscript.

Heukelbach J and Sánchez-González MA have been involved in drafting the manuscript.

Nemes MIB contributed to analysis and interpretation of data and has been involved in drafting the manuscript.

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The authors declare independence from funders.

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