

Functional evaluation of hemiplegic patients post-stroke using the Disabilities of the Arm, Shoulder And Hand - DASH questionnaire

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ABSTRACT

Hemiplegia after a stroke results in movement limitations of the upper and lower limbs, hindering the functional capacity of the individual to perform daily activities. **Objective:** To verify whether the Disability of the Arm, Shoulder, and Hand questionnaire (DASH) is an appropriate instrument to evaluate patients with hemiplegia due to a stroke. **Methods:** One hundred patients with hemiplegia due to stroke in treatment at the Occupational Therapy service of IMREA HC FMUSP were interviewed using the DASH instrument. **Results:** The DASH showed to be a valid and reproducible questionnaire because it evaluates the difficulties in performing the basic and instrumental activities of daily living regarding the motor limitations of hemiplegic patients. **Conclusion:** The questionnaire provided patient information on their opinion and personal satisfaction regarding their own physical condition and degree of independence for daily activities.

Keywords: Stroke, Upper Extremity, Surveys and Questionnaires, Occupational Therapy

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INTRODUCTION

A stroke is characterized by the installation of a localized neurological deficit, sudden and non-convulsive, resulting from a brain injury, secondary to a vascular and non-traumatic mechanism.¹

The most common sequelae from a stroke is hemiplegia, which is a paralysis of the muscles in one side of the body, contralateral to the side of the injury. It can present variations depending on the distribution or degree of spasticity.²

In a stroke, the higher centers are damaged, leaving the fine, discriminating, and precise hand movements partially or completely compromised. The patient presents difficulties moving his elbow, wrist, or fingers selectively, and may also be incapable of combining varied movements.³

One of the concerns with hemiplegic patients is about shoulder pain. According to Horn,⁴ 2003, approximately three quarters of the patients suffer with shoulder pain during the first year after the stroke and, for about 20% of them, the pain appears in the first and second weeks after a prolonged hospitalization.

The scenario is characterized by shoulder pain and progressive loss of the joint's range of motion, possibly due to misaligned shoulder mechanisms, incorrect movement, immobility, or inappropriate handling and positioning of the affected arm.⁴ One of the most disconcerting complications in the hemiplegic shoulder is the subluxation of the glenohumeral joint. It occurs in the flaccid stage, generally persisting into the spastic stage and even during recovery from the stroke.⁵

One of the main objectives in the rehabilitation of a stroke patient is to reduce disabilities through intervention to reach the highest level of functional independence, to minimize incapacitation, to reintegrate the patient to his house, family, and community, and to re-establish a meaningful and gratifying life.⁶

Assistance focusing only on treatment and healing of the disease based on the medical model is now oriented towards revealing how the disease affects the individual on the functional and social levels.⁷

The model proposed by the World Health Organization (WHO) adopts two classification systems to describe and compare the state of health of the population: the International Classification of Diseases (ICD), which provides the etiological structure to classify the disease and the International Classification of Functioning, Disability and Health (ICF), which classifies human functioning and disability.⁸

The combination of the information obtained by the two classifications forms a broader image of the impact of the disease on the life of the individual or populations, helping to establish rehabilitation goals. In addition, it is used to monitor the causes of death and diseases, and the distribution of aggravations related to health.^{7,8}

In systematizing the practice - based on the bio-psycho-social model proposed by the WHO and on the changes in the field of rehabilitation - evaluating the functional consequences of the disease in the individual's performance becomes important in the survey of information that sustains the interventions and quantifies their clinical reaches.⁷

Currently, health professionals are being questioned as to their conducts, efficiency, and the quality of therapeutic practices they offer their clients, as a consequence of the new work tool being used by the medical team, "Evidence-Based Medicine," meaning the integration of clinical ability with the best scientific evidence available; that is, to do what is correct, in the correct manner.

Clinical practice involves scientific updating, which, through a systematic critical evaluation, allows the identification of the best clinical and diagnostic conducts. After this identification, the new evidence should be incorporated so that the benefit may reach the patients, thus preventing health professionals from becoming insufficient in their basic function, which is to provide and maintain the health of patients.⁹

Occupational performance is described in Occupational Therapy literature as an occupational function or competence, suggesting the evaluation of how an individual potentially uses his performance and his areas of skills. The evaluation and measurement of functioning in patients in their general activities serves to classify how an individual performs his functions in his daily life, to demonstrate in these evaluations the search for an object capable of being observed.¹⁰

Choosing a specific evaluation instrument depends on its purpose and on the population being studied, since until now there is not one single instrument that can evaluate all the situations.¹¹

Studies are still scarce that compare the content and physiometric quality of the instruments that evaluate the functional state of the shoulder. As a consequence, there is scarce evidence to help select a suitable measuring instrument of the functional state.¹²

A specific evaluation instrument that encompasses the entire upper extremity is the

Disability of the Arm, Shoulder, and Hand (DASH), which was prepared to measure physical dysfunctions and symptoms in an heterogeneous population. This includes males and females, people with light, moderate, or severe dysfunctions, and a great variety of diseases that afflict the upper extremity. The DASH is a questionnaire composed of 30 questions prepared to measure physical function and symptoms, presenting two items for physical function, six for symptoms, and three for social. There are also two modules with four optional items: one for sports practioners and another for workers.¹³

OBJECTIVE

To verify the Disability of the Arm, Shoulder and Hand (DASH) questionnaire's capacity to evaluate the daily difficulties of hemiplegic patients post-stroke.

METHOD

The study was made with hemiplegic patients post-stroke at the IMREA HC FMUSP - Physical Medicine and Rehabilitation Institute. The development of the study and the participation of the patients met the recommendations from Resolution No. 466/2012.

The patients chosen to participate in this study underwent conventional occupational therapy sessions that lasted one hour, twice a week. There were a total of 100 patients chosen in accordance with the following criteria:

Inclusion criteria:

1. They had either hemiplegia or hemiparesis after a hemorrhagic or ischemic stroke.
2. They were being treated at the IMREA HC FMUSP Occupational Therapy service.

The present study had 100 patients: males (n = 54) and females (n = 46), with ages ranging from 21 to 88 years (average 57 years), with right side hemiplegia (n = 57) and left side hemiplegia (n = 43), right-hand dominance (n = 87) and left-hand dominance (n = 13).

Description of the Instrument

The DASH contains 30 self-applied questions and two optional modules: one for sports and musical activities and another for work activities. The items give the degree of difficulty in performing activities, the intensity of pain, weakness, rigidity, and paresthesia; the compromising of social activities; the

difficulty to sleep, and psychological impairment, all of this with reference to the week prior to the questionnaire. The questionnaire uses a 5-point scoring system whose total is the sum of the first 30 questions, from which 30 is subtracted and the result divided by 1.2. For the optional modules, 4 is subtracted from the total score and the result is divided by 0.16. The DASH is a self-applied instrument and its application time varies from 10 to 16.5 minutes.^{7,14}

Statistical Analysis

A descriptive analysis of the variables was made to characterize the sample: age, sex, schooling, marital status, dominant side, and diagnosis. Central tendency (average) and variability (standard deviation) measurements were used.

The unpaired *T*-test was used for the statistical analysis of this work. The Pearson's coefficient was used to verify the correlation between the quantitative variables per group. The significance level for the tests was 5%.

RESULTS

No significant differences were found when comparing the average DASH results between patients with ischemic and hemorrhagic strokes using the unpaired *T*-test ($p = 0.165$). The group that suffered ischemic and hemorrhagic strokes was not considered for not having statistical significance ($n = 7$).

Through the Pearson correlation test for AGE x DASH SCORE, a coefficient of $r = 0.26$ and a significance of 0.004 were found, which showed a small effect correlation of the patients' DASH variation, which may be explained by age differences.

The unpaired *T*-test was used to verify whether correlation or influence of hand dominance existed in the DASH results, but no significant result was found ($p = 0.292$).

To verify whether the patients who had hemiplegia on their dominant side were more affected functionally, they were divided into two groups: group 1 ($n = 52$) with dominant side equal to hemiplegic side, e.g. right dominant side and right hemiplegia, and group 2 ($n = 48$) with dominant side different from hemiplegic side, e.g. left dominant side and right hemiplegia. According to the *T*-test, there were no significant differences ($p = 0.29$).

Considering right- and left-brain hemisphere differences in relation to cognition and motor function, the functionality of patients with right hemiplegia (injury to the left hemisphere) and left hemiplegia (injury to the right

hemisphere) was compared and no significant differences were found ($p = 0.70$).

Knowing about the neurophysiological differences between ischemic and hemorrhagic strokes, the consequences to functional performance were investigated. Through the unpaired *T*-test, no significant differences ($p = 0.17$) were found for functionality in relation to the diagnosis.

A quantitative analysis of the questions was made to find which activities presented more ease or more difficulty to perform. In increasing order of difficulty, the DASH questions answered by the patients are shown in Table 1.

The activities with the most difficulty for the patients were surveyed, that is, the questions with the highest average scores were: recreational activities in which they moved their arm freely (4.61); recreational activities which demanded some force or impact through their arm, shoulder, or hand (4.62); change a lightbulb overhead (4.69); and write (4.75).

Considering that a stroke causes an impact on both occupational and leisure activities, it was seen from the total of the sample, that 53 patients practiced work activities, while 35 patients practiced sports and/or played an instrument.

Optional module 1 consists of four questions about the impact caused on the arm, shoulder, or hand when the patient plays an instrument, practices a sport, or both. Of the 100 patients interviewed, only 35 answered this module.

The activities mentioned by those patients were: dancing (1), diving (1), table tennis (1), exercising (2), percussion (2), volleyball (2), walking (3), swimming (3), playing the guitar (4), playing the piano (8), and playing soccer (8).

Optional module 2 consists of four questions about the impact of physical limitations on the arm, shoulder, or hand when working, including household chores. Of the 100 patients interviewed, 53 answered this module.

In module 2 the work activity corresponds to work itself and also to household chores if that is the main daily activity of the patient. The activities mentioned by the patients were: architecture (1), making jewelry (1), washing the bathroom (1), washing clothes (1), ironing clothes (1), drying dishes (1), sweeping the house (1), physiotherapist (1), administrative assistant (2), making the bed (2), putting clothes away (2), gardening (2), knitting (2), cleaning furniture (3), computing (5); washing dishes (13), and cooking (14).

DISCUSSION

The periodic re-evaluation of the patient during the treatment serves to verify the efficacy of the treatment. The same procedures from the initial evaluation should be used so that they include the same forms or scripts (test or evidence). This allows the therapist to determine the real changes that occurred over the course of treatment.¹⁵

However, the great importance of using quantitative evaluation instruments to measure the degree of functionality of the patient during the treatment is undeniable. Nevertheless, the need and importance of qualitative evaluation is also clear in analyzing the performance of the individual in his activities.

Coelho¹² made a systematic review of the content and of the psychometric quality of instruments evaluating the functional state of the shoulder; 19 instruments and their content were analyzed. The psychometric quality of the instruments was evaluated using a checking list. It was demonstrated that the DASH questionnaire is among those with the best psychometric properties and it has the highest number of reliability studies.

Orfale¹⁴ reported also that the study was divided into two stages: the first was the translation into Portuguese and the cultural adaptation; the second was evaluating the reproducibility of the DASH for the Brazilian population. Sixty-five patients with rheumatoid arthritis were interviewed. To test the reproducibility, three DASH applications were conducted by two researchers. The Spearman correlation coefficients and intraclass for the intrarater evaluation were of 0.731 and 0.937 and 0.90 to 0.96. They are therefore statistically significant and highly reproducible.

The psychometric properties of the instrument reported in various studies showed internal consistency values measured by the Cronbach alpha coefficient varying from 0.90 to 0.96, and test-retest reliability between 0.89 and 0.90.⁸

Through the ICF, the WHO prepared the terrain for a broad understanding of the Research on Human Functioning and Rehabilitation that integrates the biomedical perspective on disability with the social model of disability. The term "human functioning" indicates the inter-relation between the structures and functions of the body, the individual activity, and the participation in society within a human experience related to health.^{16,17,18}

Among the 30 questions that compose the DASH, a quantitative analysis of the questions in which the patients showed less difficulty

Table 1. DASH questions

DASH questions	Average	Standard Deviation
How much difficulty have you had sleeping because of the pain in your arm, shoulder, or hand?	1.45	0.92
Tingling (pins and needles) in your arm, shoulder, or hand	1.51	0.99
To what extent has your arm, shoulder, or hand pain interfered with your normal social activities with family, friends, neighbors, or colleagues?	2.02	1.27
Weakness in the arm, shoulder, or hand	2.13	1.22
Pain in the arm, shoulder, or hand	2.2	1.1
Pain in the arm, shoulder, or hand when you performed any specific activity	2.2	1.09
Sexual activities	2.62	1.74
Getting from one place to another	2.7	1.26
Put on a pullover sweater	2.78	1.47
I feel less capable, less confident, or less useful because of my arm, shoulder, or hand problem.	3.13	1.12
Were you limited in your work or other regular daily activities as a result of your arm, shoulder, or hand problem?	3.34	1.17
Stiffness in your arm, shoulder, or hand	3.4	1.06
Carry a shopping bag or briefcase	3.58	1.37
Push open a heavy door	3.72	1.53
Recreational activities which require little effort (e.g., cardplaying, knitting, etc.)	3.95	1.42
Wash or blow dry your hair	4.16	1.33
Garden or yard work	4.19	1.24
Place an object on a shelf above your head	4.2	1.22
Make a bed	4.22	1.3
Prepare a meal	4.27	1.09
Turn a key	4.37	1.22
Do heavy household chores	4.38	1.18
Carry a heavy object (over 10 lbs)	4.41	1.14
Open a tight or new jar	4.43	1.03
Use a knife to cut food	4.55	1.06
Wash your back	4.56	1.00
Recreational activities in which you move your arm freely (e.g., playing frisbee, badminton, etc.)	4.61	0.99
Recreational activities that demand some force or impact through your arm, shoulder or hand (e.g., golf, hammering, tennis, etc.)	4.62	0.91
Change a lightbulb overhead	4.69	0.90
Write	4.75	0.80

was analyzed-these were the questions with the lowest scores: how much difficulty have you had sleeping because of the pain in your arm, shoulder, or hand (1.42); tingling (pins and needles) in the arm, shoulder, or hand (1.51); to what extent has your arm, shoulder, or hand pain interfered with your normal social activities with family, or friends (2.02); weakness in arm, shoulder, or hand (2.20); pain in arm, shoulder, or hand when performing specific activities (2.20).

Limited independence in the Basic Activities of Daily Living and in the rehabilitation process of the patients post-stroke were identified as the biggest limiting factors. This

disorder is characterized as a visuospatial neglect where the patient presents with a deficient analysis and exploration of the space. The most relevant symptoms are: neglecting the hemiplegic side, not answering to visual stimuli, ignoring one side when dressing and shaving, not looking to the hemiplegic side, not paying attention to people or events, not reading, writing, or drawing on the neglected side of the page. Not all these manifestations are present in the same patient.¹⁹

Although the functional recovery of control over the upper limb is a realistic goal for some patients, many will not recover enough control to integrate the upper limb into their

basic Activities of Daily Living (ADLs) and into mobility tasks. The patients who will not recover enough control require broad training in, with techniques and the prescription of appropriate assistive resources.²⁰

Most studies on functional post-stroke results have focused on the level of independence performing the ADLs. These are results that can be obtained during the rehabilitation program periods. Few studies have tracked the capacity of the patients to resume their previous roles or to develop new meaningful roles in their lives.⁴

The optional module 1 that is part of the DASH evaluates the capacity of the patient to practice sports and/or to play an instrument. Out of the 35 patients interviewed who practiced those activities before the stroke, only three (n = 3) were still able to practice those hobbies.

The optional module 2 for work activities investigates the difficulties the patients have to execute and perform their work in a broad context, from paid work to the practice of household chores. It verifies the degree of personal satisfaction they have in relation to the work they produce.

Fifty-three (n = 53) patients answered the optional module 2, and they reported not having any difficulty in doing their usual work due to arm, shoulder, or hand pain mentioned in question 2. Only 12 patients reported that pain hindered their usual work and 41 patients reported not having any pain.

Overcoming a stroke depends on the acceptance of one's new condition-that is, of being an individual with sequelae and being emotionally weakened. That acceptance depends on maintaining a positive social identity, one that relates first to the outlook of roles where "disease" means the "degradation" of some roles and the overcoming, therefore, means the achievement of new roles.²¹

CONCLUSION

The DASH questionnaire can be considered suitable to evaluate the degree of functioning of the upper limb and the impact of disease in the occupational roles of post-stroke hemiplegics. However, it should be used as a supplement to the descriptive evaluation protocol at the beginning of the treatment to prepare the therapeutic plan with the main aspects to be worked on, considering also the contextual and environmental factors in which the patient is inserted.

Being a quantitative evaluation, it allows the periodic measurement of the patient's therapeutic evolution, providing a comparison between the initial and final clinical presentation and the observation of changes in motor aspects during the rehabilitation process. It is especially important in showing the degree of personal satisfaction, independence, and autonomy during the execution of the activities of daily living.

Considering that the studies found in the bibliographical survey referred to works in the areas of Orthopedics and Rheumatology, the need is obvious for more studies to deepen the questions concerning the use of the DASH questionnaire with neurological patients.

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