



## Psychometric Properties of Arabic Version of the Modified QuickDASH-9 Scale to Measure the Quality of Recovery after Dorsal Hand Burn Injury

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**Abstract : Purpose:** To test the psychometric properties of the Arabic - Modified QuickDASH -9 scale to measure the quality of recovery after dorsal hand burn injury to ensure better care delivery.

**Methods:** There were two major processes: first was the cross- cultural adaptation process of the Modified QuickDASH-9 scale from English version to Arabic one with respect to Egyptian accent, the second was measuring its psychometric properties which were: the content validity by seeking expert opinions by using Index of content Validity (ICV), internal consistency by measuring Cronbach's alpha and test-retest reliability by asking fifty Patients (22 male + 28 female) with dorsal hand burn injuries, their ages were ranged from 16 to 60 years old to fill the Arabic Modified QuickDASH-9 scale, average two days interval, they were asked to re-fill it again.

**Results:** The mean ICV of the Arabic Modified QuickDASH-9 questionnaire = 0.71, the internal consistency was good (Cronbach's alpha=0.8) and test- retest reliability was good (Pearson correlation coefficient (PCC) = 0.72).

**Conclusion:** The Modified QuickDASH-9 scale is valid and reliable enough to measure the quality of recovery after dorsal hand burn injuries.

**Key Words:** Psychometric Properties, Cross-Cultural Adaptation Process, Validity, Reliability and Disability Arm Shoulder and hand Scale, Dorsal Hand Burn.

### Introduction

The improved short and long term survival rate of individuals with large burn injuries has made rehabilitation for optimal recovery of the patient increasingly important. Burn injury to the hands worsens the prospect of functional recovery and good quality of life in single events, especially when included in larger burns<sup>1</sup>.

Hand burns occur quite commonly, and the outcome of hand burns can significantly impact daily function and overall health-related quality of life. Hand function is one of the most important goals of burn rehabilitation and is a consensually important functional outcome. Hand function measures commonly used for burn patients are classified into three categories: traditional component measures, performance measures and patient-reported outcome measures. Traditional component measures only reflect hand impairments, and may not represent hand function status. Performance measures have not been validated in the burn population and do

not correlate well with patient-reported outcomes. Patient-reported outcome measures have not been rigorously validated in the burn population. Health and functional status questionnaires have been increasingly used to assess the effectiveness of medical treatment or surgery<sup>2, 3, 4</sup>.

The ability to measure outcomes related to function in people with upper limb disorders using a short, yet robust instrument has many practical advantages over long-form instruments. There are many scales for the assessments of upper limb function have been established. One of them is the 30-item Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire (Appendix A.) which is a global scale for assessing the effect of upper limb musculoskeletal disorders from the patient perspective but it is also limited by a high internal consistency suggesting redundancy in its questions, difficulty with reproduction of the four pages it spans, time restraints for the patient and the clinician, and confusion over optional modules. These issues prompted the authors to create modified shorter versions of DASH such as: QuickDASH (Appendix B.), the Manchester-Modified DASH or M2 DASH, the Modified QuickDASH– 9 (Appendix C.)<sup>5,6,7,8,9,10</sup>.

The DASH has been extensively studied, its reliability and validity demonstrated in many different populations, has been translated in multiple languages and its relation to the International Classification of Functioning, Disability and Health (ICF) has been verified. A systematic review used a best evidence synthesis approach to critically appraise the measurement properties using “Consensus-based Standards for the selection of health Measurement Instruments” (COSMIN) checklists] of the QuickDASH and cross-cultural adaptations. The COSMIN is relatively new, robustly developed guide for appraising measurement properties for different instruments and is still being refined<sup>11, 12</sup>.

It is important to measure the psychometric characteristics of all adapted versions of the self - report questionnaires which include: test-retest reliability, different types of validity, the floor and ceiling effects and responsiveness. The measurement properties of the DASH and its versions have been evaluated in multiple studies from multiple centers and across most of the measurement properties. The best evidence synthesis of the QuickDASH suggests that this tool is performing well with strong positive evidence available for reliability (internal consistency and test-retest reliability) and hypothesis testing, and moderate positive evidence for structural validity testing<sup>13,14</sup>.

## Material and Methods

### Subjects

The current study was performed on all Patients with dorsal hand burn injuries who were treated in Outpatient Burn Clinic at the Faculty of Physical Therapy –Cairo University, Kasr Al Eni Hospital, Om El-Masreen Hospital, El-Sayed Galal Hospital and Al-Hussien Hospital from 1<sup>st</sup> June 2015 to 20<sup>th</sup> June 2016. Fifty patients (22 male +28 female) undergoing physical therapy treatment were participated in the study.

### Material

Data were collected at the mentioned burn and surgery clinics and hospitals using Arabic version of Modified QuickDASH-9 questionnaire.

The Arabic Modified QuickDASH – 9 is a single page, it consists of nine items extracted from The QuickDASH and DASH scales which concern the patient's upper extremity functions. In **2012**, the researcher translated the English version of the questionnaire into Arabic version according to the international guidelines for the cross – cultural adaptation process of health status scales which were supported by the American Association of Orthopedic Surgeons (AAOS) and the Institute for Work and Health<sup>15</sup>.

In the current study, There were some modifications of the translation that had done to the mentioned questionnaire to face the Egyptian accent and culture (question 1 and 6).

### The Arabic Modified QuickDASH – 9 consists of the following:-

- Brief Instructions that inform the patients about how to complete the Questionnaire.
- The item number (1-6) that ask about the degree of difficulty in performing various physical activities because of arm, shoulder or hand problems.

- The two items (7 and 8) ask about the effect of upper extremities problems in social activities.
- Item number 9 asks about arm, shoulder or hand pain.
- Each item has five response scores, ranging from no difficulty to unable to perform activity (0 – 4) Likert scale. The Arabic Modified QuickDASH – 9 allows for one missing response.
- The Arabic Modified QuickDASH – 9 Score =  $[(\text{sum}) * 1.1] * 5/2$ , a missing response is added as the average of the remaining.

## Procedure

### (1) Adaptation Process

According to the international guidelines for the cross – cultural adaptation process of health status scales which were supported by the American Association of Orthopedic Surgeons (AAOS) and the Institute for Work and Health<sup>15</sup>.

#### Step 1: Forward translation (Initial translation)

The English version of the Modified QuickDASH-9 was translated into Arabic by two bilingual translators whose first language was Arabic (The forward translation process). They asked to give the researcher the overall meaning of each item which shall be easy to be understood at reading level of approximately 15 years of age candidate. The two translators had different profiles and backgrounds. One of the two translators was aware of the concepts being examined in the questionnaire being translated, the researcher called his version T1 and the other did not inform of the concepts and had no medical or clinical background and we called his version T2.

#### Step 2: synthesis of the translation

From the original questionnaire as well as T1 version and T2 version, the researcher produced one common translation T12.

#### Step 3: Backward translation

This Arabic version T12 was translated back to English by other two bilingual translator whose first language was English and they had never seen the original English version (The backward translation process). Both are bilingual in English and Arabic language and had no medical background, they produced two back-translations which called BT1 and BT2.

#### Step 4: Expert review

The researcher united all translated versions of the questionnaire, developed the considerations of the pre-final questionnaire for field testing and reviewed the translated instrument T12 and checked for any modification to achieve conceptual equivalence (ensuring conceptual meaning for the Egyptian people).

#### Step 5: Test of the pre-final version

The pre-final version of the Arabic Modified QuickDASH-9 was administrated individually to five participants, they were physiotherapists whose specialty was burn over, and they were born and raised in Egypt. Each participant was asked about his or her opinion to each item in the questionnaire .Their opinions and views were recorded. If two or more participants stated difficulty with dealing with an item, that item was revised with the expert in linguistics (test for the clarity and understanding of the questionnaire).

#### Step 6: Authentication

The final version of the Arabic Modified QuickDASH -9 was administrated to an authentic Office for translation (General for Translation) 4 Al Batal Ahmed Abdel Aziz st., Al Mohandesen, Giza, Egypt. Tel . No. / 33337062. Fax / 33354642.

### (2) Content Validity

It is the extent to which a measure is a complete representation of the concept of interest. Content validity is more often concern with self-report or observational tools than with Bio-physiological one<sup>16</sup>. In the process of content validity, experts were asked to complete all questions in the Arabic Index of Content Validity (ICV) of the questionnaire by circling the number that represented their opinion of each one. Each expert will

rate each item as either 1 (agree), 0 (undetermined), or -1 (disagree). The Index of Content Validity (ICV) for each item will be calculated using the summation of scores from each expert divided by the number of experts.

### (3) Reliability

Test-retest reliability was analyzed by using Pearson Correlation Coefficient (PCC) and Internal Consistency was measured by using Cronbach Alpha Coefficient. 50 patients in Burn Clinic in Faculty of Physical Therapy – Cairo University and in the previous mentioned hospitals with dorsal hand burn injury were asked to fill the scale. With average time 2 days interval, they were asked to re-fill the scale again. It was assumed that their conditions were stabled.

## Results

### Subjects descriptions

As shown in table 1 the characteristics of 50 subjects with dorsal hand burn injuries who participated in this study. Age is expressed as Average  $\pm$  Standard Deviation (SD) with the range in parenthesis, and categorical variables are expressed as a number with the percentage in parenthesis.

**Table (1)** Demographic and clinical characteristics of the sample

Characteristics	Results
Age	33.44 $\pm$ 11.35(16-60)
Gender	M: n=22 F: n=28
Unilateral Or Bilateral Injury	U:n=23 B:n=27

Note: M: Male, F: Female, U: Unilateral, B: Bilateral.

### Content Validity

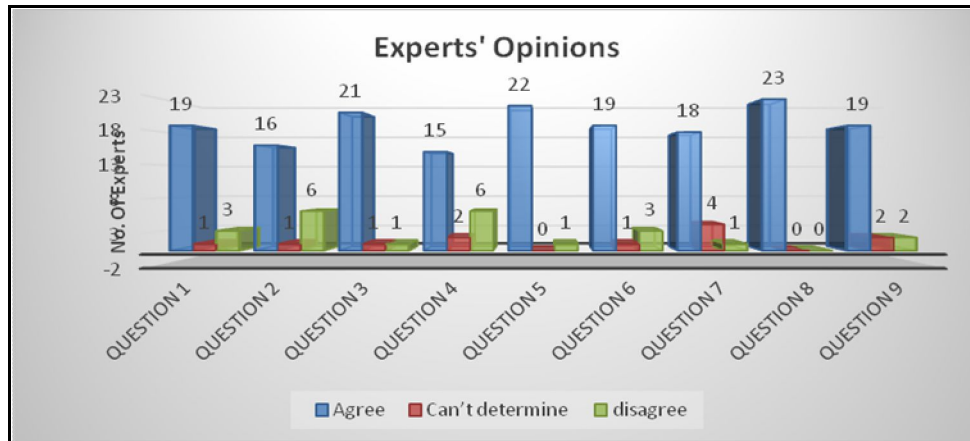
#### (1) The Arabic Modified QuickDASH-9 scale

According to the experts' opinions (9 Academic Lecturers at Burn and Surgery Department +14 physical therapy hand burn specialists = 23 experts), the Index of Content Validity (ICV) of all nine items Table (2) and Figure (1). All questions were relevant (Their ICVs ranged from 0.7 to 1) except question number 2 and question number 4 which referred to doing heavy household chores and washing patient's back respectively were irrelevant because they had ICV = 0.4. The mean ICV = 0.71 Table (3), So the content validity of Arabic Modified QuickDASH- 9 scale was good according to experts' opinions and the fact that items of the scale had previously been included in English version.

**Table (2)** Experts' opinions according to ICV of the Arabic version of Modified QuickDASH-9 scale.

Question Number	N. of Experts who agree (1)	N. of Experts who can't determine (0)	N. of Experts who disagree (-1)	ICV
(1)	19	1	3	0.7
(2)	16	1	6	0.4
(3)	21	1	1	0.9
(4)	15	2	6	0.4
(5)	22	0	1	0.9
(6)	19	1	3	0.7
(7)	18	4	1	0.7
(8)	23	0	0	1
(9)	19	2	2	0.7

Note: Scores: 1 = agreed, 0 = undetermined, and -1 = disagreed, ICV (Index of Content Validity) = Summation of the scores from each expert divided by the number of experts (n = 23).



Figure(2) demonstrates experts' opinions of Arabic Modified QuickDASH-9 Scale.

Table (3) Simple statistics of ICV

N of questions	9
Mean	0.7111
S.D.	0.20883
Min.	0.4
Max.	1

### Scoring the Modified QuickDASH-9

Traditionally, item responses were estimated and converted to scores according to the following formula: Modified QuickDASH-9 SCORE = [(Sum of Scores) x 1.1] x 5/2, a missing response was added as the average of the remaining. Scores were reported on a 100-point scale, higher scores indicated more disability level.

### Internal Consistency

The internal consistency of the Arabic Modified QuickDASH-9 was assessed by using Cronbach alpha coefficient. The alpha coefficient for the nine items was good(alpha = 0.8).

### Test-Retest Reliability

Scale test- retest reliability was assessed by using Pearson Correlation Coefficient (PCC).The average period between the 1<sup>st</sup> and the 2<sup>nd</sup> tests was two days. There was a good direct relationship between 1st score and 2nd one. The PCC was good (0.721) with p value = 0.000 Table (4) and Figure (2).

Table (4) demonstrates a good direct relationship between 1<sup>st</sup> score and 2<sup>nd</sup> score.

	1 <sup>st</sup> Score
2 <sup>nd</sup> Score	
Pearson Correlation	0.721
Sig. (2 -tailed)	0.000
N	50



**Figure (2) illustrates a good direct relationship between two scores.**

## Discussion

Due to the increase in multicultural research projects, the need to adapt the health status measures for use in other than the original language has also developed rapidly. Most health status self-administrated questionnaires were created in the English speaking countries, but even within the English countries, the researchers have to consider the immigration population in studies of health especially when their exclusion could lead to a systematic bias in studies of health care utilization or quality of life<sup>15</sup>.

In the process of cross-cultural adaptation, there were some modifications of the translation that had done to the mentioned questionnaire to face the Egyptian accent and culture (Question 6 which referred to the recreational activities), the researcher selected the video games and table tennis activities that suitable to Egyptians.

In the process of content validity, the mean ICV = 0.71 according to experts' opinions, so the modified QuickDASH-9 questionnaire is valid in dorsal hand burn disability measurement. The highest ICV value was in question number 8 which represented the work activities and the lowest one was in question number 2 and 4 which referred to doing heavy household chores and washing patient's back respectively.

The ICV of question number 6 which referred to the recreational activities = 0.7 which was good, but in the process of test-retest reliability, it was a missing response in 52% of all participants so the researcher suggested that to change the context of the question and replaced it by another item extracted from the original 30-Item DASH (**Appendix A.**) that suitable for Egyptians' culture.

In the process of reliability, the current study has established that the Arabic Modified QuickDASH-9 scale was reliable with good test-retest reliability as there was good direct correlation between 1st score and the 2nd one. It was evaluated by calculating Pearson Correlation Coefficient ( $r = 0.721$ ). The average interval between both measures was two days. Comparing with the original English Modified QuickDASH-9, the Arabic version showed good correlation coefficient but not strong as in English one, In English version, they used ICC to assess test-retest reliability and they found that ( $r = 0.92$ ).

The internal consistency of the Arabic Modified QuickDASH-9 was lower than that of the original English one. It was evaluated by calculating Cronbach alpha coefficient ( $\alpha = 0.8$ ) indicating good internal consistency while in original English one ( $\alpha = 0.93$ ) indicating high internal consistency<sup>10</sup>.

## Conclusion

The Arabic Modified QuickDASH-9 scale is valid and reliable enough to measure the quality of recovery after dorsal hand burn injury.

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