

# Validity And Reliability Of Arabic Version Of Duke Activity Status Index In Evaluating Patients With Breast Cancer Surgeries

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## ABSTRACT

**Background:** Breast cancer is the most common type of cancer among women in developed and developing countries.<sup>1</sup> Many breast cancer survivors will have to cope with treatment-related side effects, even though breast cancer outcomes are improving, and patients are living longer after treatment. There are a variety of side effects that breast cancer patients may experience. Some are temporary and don't significantly impact quality of life, while others might lead to long-term complications and raise the risk of morbidity as well as mortality.<sup>2</sup> The utilization of Duke Activity Status Index questionnaire (DASI) is expected to assist in identifying patients before surgery who are at a higher risk of experiencing complications after the operation. Researchers have pinpointed a DASI score of 34 as a critical marker for identifying patients prone to myocardial injury, heart attack, significant complications, and developing new disabilities following surgery.<sup>11</sup> **Objectives:** To validate translated Arabic version of Duke Status Activity Index for patients undergoing breast cancer surgeries. **Subjects and Methods:** This study was cross sectional analytic study. The subjects of the study were one hundred female patients, their ages ranged from 20 to 50 years old who underwent breast cancer surgeries and started to participate in the current study on 3rd to 6th week post-surgery. The procedure of the study started by translation of the English version of DASI into Arabic (forward and backward translation process). The pre-final version of DASI was reviewed and analysed by 10 experts. To validate the final version of DASI questionnaire, an additional panel of 10 experts with expertise in the topic studied was formed for validation process. Patients were requested to answer all items of the final Arabic version of DASI questionnaire to be tested and retested after one week apart for reliability assessment. **Results:** The Cronbach's  $\alpha$  for internal consistency was 0.71 that means it had acceptable internal consistency, and the questionnaire revealed high test-retest reliability in all items;  $r$  value ranged from 0.70 to 0.979. ICC ranged from 0.795 to 0.991. ICC for the overall score was 0.991, with 95% CI 0.985-0.994. Completing the scale took an average of  $2.32 \pm 0.57$  minutes, with a maximum of 3 minutes and a minimum of 1.5 minutes. **Conclusion:** The Arabic version of DASI proved to be a valid, reliable, and feasible tool to for assessing functional capacity in patients with breast cancer surgeries. **Keywords:** Arabic language; Breast cancer; Duke status activity index; Functional capacity; Reliability; Validity.

## INTRODUCTION

The most common cancer in women and the main cause of cancer-related deaths in women is breast cancer.<sup>3</sup> Global trends toward overweight and obesity, along with declining levels of physical exercise, represent a threat to breast cancer prevention efforts unless alternative strategies are put in place.<sup>4</sup>

Along with being linked to a higher incidence of depression, breast cancer procedures have psychological effects on patients, influencing their self-image, confidence, sexual interactions, and overall quality of life.<sup>5</sup> Also, women are more likely to experience cognitive impairment, diminished strength, impaired mobility, and aerobic ability. Some of the emotional and psychosocial changes individuals may experience includes, anxiety, exhaustion, problems with self-image, and sexuality.<sup>6</sup>

Strength, endurance, as well as power in the muscles make up muscular fitness, which is a part of physical function. Women may encounter significant limitations in the use of their upper limbs after undergoing breast cancer surgery. After the acute phase of surgery recovery is done, patients may still experience functional restrictions, such as a loss of strength and mobility. A decrease in aerobic capacity has been noted, which is most likely due to a confluence of factors including the surgery and therapy itself, a subsequent decrease in physical activity, along with deconditioning.<sup>7</sup>

So, the current study was done to assess the reliability and validity of the translated Arabic version of DASI with patients after breast cancer surgeries as a tool to evaluate functional capacity.

## PATIENTS AND METHODS

### Patients' selection:

In order to prevent type II error, the sample size was calculated. Sample size for ICCs is calculated utilizing the formula conducted by Walter, Eliasziw and Donner (1998). Using the minimum acceptable ICC of 0.75, anticipated ICC of 0.85, significance level 0.05, statistical power 80% and number of repetitions 2, the required sample size is about 100 subjects.

A total of one hundred female patients, who had breast cancer surgeries, from 3 to 6 weeks postoperative, patients were selected from Centre of oncology and nuclear medicine, Cairo University and Dar Elsalam Cancer hospital, Ministry of Health between October 2023 to April 2024. Patients who fulfilled the following criteria were involved in the study: 1) Patients underwent breast cancer surgeries. 2) Post operative patients from 3 to 6 weeks. 3) Female married patients age above 18. 4) Arabic is the first language of all participants. 5) All participants will be able to comprehend the questions easily. Those who met any of the following criteria were not allowed to participate: 1) Patients with mental problems. 2) Individuals experiencing impairments with speech, vision, or hearing. 3) Patients who did not complete the questionnaire in its entirety. 4) A patient who refused to cooperate in completing the questionnaire. 5) Lymphedema.

### Translation procedure:

The English version of DASI was translated into Arabic by bilingual translators to give an overall meaning to each item (forward translation process). To ensure that the back translation from the original form of the questionnaire was accurate, additional bilingual translators were brought in to back

translate the generated Arabic version into English. The pre-final version of DASI was reviewed individually to 10 experts with knowledge in dealing with BCS patients who were polled for their thoughts on every question in the questionnaire. Their thoughts and views were documented.

#### **Validation process:**

A panel of 10 experts with expertise in the topic studied was formed to review the final version of DASI questionnaire. Before giving a score on every single item in the given Content Validation Form, the experts were asked to critically analyze the domain and all of its components. To make the items more relevant to the topic in question, we asked the experts for comments, either orally or in writing. The item specific Index of Content Validity was determined by dividing the total expert scores by the total number of experts.

#### **Reliability process:**

The Researcher explained the items of the questionnaire to the participants, who were asked to answer the questionnaire with yes/no for each item. Each survey question was allocated a score based on the response "Yes," while a response of "No" was given a score of zero. After one week apart, the participants were asked to re-answer the questionnaire for test-retest reliability analysis.

#### **Ethical consent:**

#### **Individuals' characteristics**

100 female patients underwent breast cancer surgeries took-part in this study. Their mean  $\pm$  SD age, weight, height as well as BMI were

With the number P.T.REC/012/004683, the Ethical Committee of Cairo University's Faculty of Physical Therapy gave its approval to this research. With the number N-77-2024, the Research Ethics Committee of Cairo University's Faculty of Medicine gave its approval to this research. Each participant in the study gave their consent before taking part in the study.

#### **Statistical analysis:**

For quantitative data, descriptive statistics were applied using means and standard deviations. For qualitative data, frequency as well as percentage were used. Face validity was assessed using the Clarity Index. To assess the content validity, we utilized the Index of content validity (CVI), the Scale Content Validity Index (S-CVI), as well as the Expert Proportion of Relevance (EPR). The reliability of the internal consistency was measured using Cronbach's alpha. The intraclass correlation coefficient (ICC) along with Spearman rank correlation coefficient (SRC) were used to determine test-retest reliability. Estimating the average time required to complete the questionnaire and the missing item index are two ways to evaluate its feasibility. A significance criterion of  $p < 0.05$  was established for all statistical tests. We used SPSS 25 for Windows (IBM SPSS, Chicago, IL, USA) to complete all of our statistical research.

$38.78 \pm 8.14$  years,  $73.76 \pm 9.10$  kg,  $158.76 \pm 6.63$  cm and  $29.24 \pm 2.90$  kg/m<sup>2</sup> respectively. The mean  $\pm$  SD time since surgery was  $4.45 \pm 1.06$  weeks. (Table 1).

**Table 1. General characteristics of the subjects.**

	$\bar{X} \pm SD$	Minimum	Maximum
<b>Age (years)</b>	38.78 $\pm$ 8.14	21.00	50.00
<b>Weight(kg)</b>	73.76 $\pm$ 9.10	53.00	96.00
<b>Height (cm)</b>	158.76 $\pm$ 6.63	150.00	178.00
<b>BMI (kg/m<sup>2</sup>)</b>	29.24 $\pm$ 2.90	22.59	35.11
<b>Time since surgery (weeks)</b>	4.45 $\pm$ 1.06	3.00	6.00

### Face validity

10 experts took-part in this study to investigate the validity of Arabic version of DASI scale. The number of specialists with doctoral degrees was 4, and the number with master's degrees was 6. The expert panel for validity had a mean  $\pm$  standard deviation of 15.2  $\pm$  3.79 years of experience, ranging from 10 to 20 years.

The mean score on the Arabic form of the DASI scale for clarity was 88.23%, which is considered excellent. Arabic versions of the DASI clarity indexes varied from 90% to 100%.

### Content validity:

The Arabic version of DASI demonstrated excellent CVI, the scale CVI (S-CVI) was 0.88. The item CVI (I-CVI) ranged from 0.7 to 1. Five items had 1 I-CVI, three items had 0.9 I-CVI and 4 items had 0.7 I-CVI. (Table 2).

The mean expert proportion of relevance was 87.5%, which is excellent. There were four experts whose proportion of relevance was 100%, five whose proportion was 75 to 92%, and one whose proportion was 66.67%.

**Table 2. Item index of content validity of the final Arabic version of DASI:**

	No. of experts that agree (relevant responses)	I-CVI
<b>Item 1</b>	10	1
<b>Item 2</b>	7	0.7
<b>Item 3</b>	9	0.9
<b>Item 4</b>	7	0.7
<b>Item 5</b>	9	0.9
<b>Item 6</b>	9	0.9
<b>Item 7</b>	7	0.7

Item 8	10	1
Item 9	10	1
Item 10	7	0.7
Item 11	10	1
Item 12	10	1
S-CVI	S-CVI	0.88

## Reliability

### **- Internal consistency of the Arabic version of DASI:**

The Arabic version of DASI has a satisfactory level of internal consistency, as shown by Cronbach's alpha, which was 0.71.

### **- Test-retest reliability of the Arabic version of DASI:**

With an r-value ranging from 0.70 to 0.979, the Arabic version of the DASI scale demonstrated excellent test-retest reliability across all items. The ICC values were between 0.795 and 0.991. The overall score had an ICC of 0.991 (95% CI: 0.985-0.994). (table 3)

**Table 3. Test-retest reliability of Arabic version of DASI:**

DASI	r	ICC	(95% CI)		P value
			Lower bound	Upper bound	
Item 1	0.704	0.798	0.701	0.864	0.001
Item 2	0.7	0.795	0.696	0.862	0.001
Item 3	0.893	0.927	0.891	0.951	0.001
Item 4	0.881	0.936	0.906	0.957	0.001
Item 5	0.976	0.988	0.982	0.992	0.001
Item 6	0.942	0.969	0.954	0.979	0.001
Item 7	0.979	0.989	0.984	0.993	0.001
Item 8	0.964	0.982	0.973	0.988	0.001
Item 9	0.812	0.887	0.832	0.924	0.001

<b>Item 10</b>	0.879	0.932	0.899	0.954	0.001
<b>Item 11</b>	0.96	0.98	0.970	0.986	0.001
<b>Item 12</b>	0.93	0.964	0.946	0.976	0.001
<b>Total score</b>	0.974	0.991	0.985	0.994	0.001

r, Spearman rank correlation coefficient; ICC, Intraclass correlation coefficient value; CI, Confidence Interval; P value, Probability value.

### - Feasibility:

Completing the scale took a mean of  $2.32 \pm 0.57$  minutes, with a maximum of 3 minutes and a minimum of 1.5 minutes. All items were present. Table 4 displays the frequency as well as percentage of minutes needed to finish the scale.

**Table 4. Frequency distribution of time needed to fill the questioner in minutes:**

<b>Time (min)</b>	<b>Frequency</b>	<b>Percent</b>
1.5	23	23
2	21	21
2.5	26	26
3	30	30
<b>Average</b>	<b><math>2.32 \pm 0.57</math></b>	

## DISCUSSION

Physical inactivity is the fourth most important risk factor of overall death by the WHO, not least due to its effect on cardiovascular disease and its strong association with different forms of cancer, including breast cancer. Breast cancer is the most common type of cancer among women in developed and developing countries. Therefore, in the pursuit of increased health, increased physical activity in the population is of great importance. Increased physical activity after breast cancer diagnosis has been associated with decreased breast cancer-specific and overall mortality. The length of postoperative recovery is of

immense importance both for the patient's well-being and for the costs of society.<sup>8</sup>

Some of the physical changes that might occur over time include alterations to the body's structure, persistent pain, phantom breast pain, lymphedema, as well as axillary web syndrome.<sup>7</sup>

The DASI was developed aiming at correcting failures presented by other instruments such as the New York Heart Association Scale (NYHA) and the Canadian Cardiovascular Society (SCCS). It is a 12-item questionnaire that assesses daily activities such as personal care, ambulation, household tasks, sexual function, and recreation with respective metabolic costs.<sup>9</sup>

This study was carried-out for translation and validation the Arabic version of DASI questionnaire to aid in the assessment of functional capacity with patients undergoing breast cancer surgeries.

This study was performed on 100 female patients who underwent breast cancer surgeries. Their ages ranged from 20 to 50 years. This study was carried out in Centre of Oncology and Nuclear Medicine in Faculty of Medicine, Cairo University and in Dar Elsalam Cancer Hospital, Ministry of Health.

Getting a questionnaire translated into another language remains a challenging task. Once the original questionnaire has been translated, it must be tested for reliability and validity in a sufficient sample and evaluated for psychometric features in the population of interest.

The original DASI questionnaire measures FC continuously and quantitatively. The original questionnaire divided physical activity into four categories: self-care and walking, usual housework, sexual activity, and leisure activities. The questions on this self-administered survey only allow for a yes/no response. For each survey item, a weighted score was assigned to the "Yes" answer and a zero value to the "No" answer. 10 According to the results, patients having surgery are at increased risk for myocardial damage, myocardial infarction, moderate-to-severe problems, and new impairment if their DASI score is 34 or above.<sup>11</sup>

There were no problems with translating or understanding questions 1, 2, 3, 4, and 5 of the questionnaires, which dealt with personal care and ambulation. Home tasks with varying degrees of difficulty and increasing metabolic rate (MET) exertion were the focus of questions 6, 7, and 8 of the

questionnaires. Since our target population does not typically engage in activities like "raking leaves" or "pushing a power mower," we were unable to locate a suitable alternative for Questionnaire item 9. Even though almost all of the participants reported having no difficulty replying, we found item 10 of the questionnaire to be culturally appropriate and challenging. Our target audience may not be able to engage in leisure activities described in items 11 and 12 of the questionnaires at this time due to their complexity and difficulty.

To ensure that the translated questionnaire accurately measured the same construct in its new context, reliability and validity tests were conducted after translation. For a measurement to be considered reliable, it must agree with the measured value when taken at different times using the same or comparable procedures. When evaluating a construct of interest, internal consistency shows how well-related the items are. The number of items in the questionnaire and their variation determine Cronbach's  $\alpha$ , which is used for estimation.<sup>10</sup>

Optimal internal consistency is indicated by a value of 1, while no relatedness is shown by a Cronbach's  $\alpha$  value of 0. Items ask the same thing in multiple ways if the value is greater than 0.9, while a value greater than 0.7 indicates acceptable or adequate internal consistency. The value of  $\alpha$  that we obtained was 0.71, which demonstrates sufficient variation among the items and is deemed acceptable in our target group.<sup>10</sup>

To ensure that respondents' responses were consistent, the test-retest reliability was tested by giving the same questionnaire to the same group of individuals twice. For such questionnaires, the test-retest reliability, which evaluates consistent features using the coefficient of

stability (Pearson's  $r$ ), is relevant. The test-retest was administered at week intervals to allow the memory to fade when recalling the previous answer; however, the gap should not be so extensive that other circumstances could influence the last response.<sup>10</sup> The test-retest reliability of our Arabic version of the DASI was strong across the board, with  $r$  values ranging from 0.70 to 0.979.

The degree to which a research instrument checks the feasibility of the translated construct while accurately measuring every aspect of that construct is known as content validity.<sup>12</sup> The following criteria were used by the expert committee to evaluate the content validity:

The amount of time needed to complete the questionnaire.

On average, the scale took  $2.32 \pm 0.57$  minutes to finish, with a range of 3 minutes to 1.5 minutes. All items were present.

Face validity, or the extent to which individuals can comprehend and fill out the questionnaire on their own.

The average score on the Arabic form of the DASI scale for clarity was 88.23%, which is considered excellent. Arabic versions of the DASI clarity indexes varied from 90% to 100%.

Govil et al, 2020 validated the Hindi version of the DASI questionnaire and concluded that the translated questionnaire in Hindi language is reliable, valid, and showed psychometric as well as conceptual equivalence in the Hindi-speaking patients with cardiovascular diseases to assess their functional capacity. Also, The Portuguese version of DASI was adapted for Brazilian culture and appeared to be a valid, reliable, quick, and easy instrument to assess the functional ability of individuals with CVD.

Limitation

This study was limited by (1) Personal and individual differences between the patients. (2) The daily living activities, which might affect the results of the study (3) Economic, social, and cultural level variations.

## CONCLUSION

The Arabic version of DASI proved to be a valid, reliable, and feasible tool to be used with Arabic speaking patients and post breast cancer surgeries to aid in assessing functional capacity.

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Conflict of interest:

There was no conflict of interest.

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