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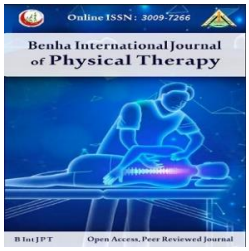

Original research

Validity and reliability of Arabic version of Fullerton advanced balance scale in post mastectomy lymphedema

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Abstract

Background: Patients with lymphedema are susceptible to a loss of balance. The Fullerton Advanced Balance Scale assesses the multiple dimensions of balance in these patients. The FABS was translated and validated in several languages, but there are no published reports in Arabic. **Purpose:** To find out the validity and reliability of the translated version of FABS among the Arab population in Egypt. **Methods:** The study was conducted in two main steps, as follows: Step 1: The FABS underwent translation from English to Arabic (examining both forward as well as backward translations). The final version underwent rigorous evaluation by experts to assess its face and content correctness, as well as its authentication. Step 2: The assessment of its psychometric properties was conducted on 107 females with lymphedema. Their ages were between 30 and 60 years old. Feasibility was assessed by measuring the time spent filling out the scale. Internal consistency and test-retest reliability were also used to assess the reliability. Patients were asked to complete the scale once every week on average, and they were also asked to re-fill it to ensure test-retest reliability. **Results:** FABS had excellent face validity, with a clarity scale score of 94% and a mean proportion of clear responses of 94%. Additionally, the mean proportion of relevant responses was found to be 98%. Furthermore, the scale demonstrated excellent content validity, reaching a value of 0.98. It exhibited a Cronbach's alpha coefficient of 0.81, suggesting a high degree of internal consistency and good test-retest reliability across all items. The ICC varied from 0.816 to 0.979. The overall score ICC was 0.977, with a 95% confidence interval spanning from 0.965 to 0.985. **Conclusion:** The FABS Arabic version is simple to use, reliable, and a valid tool for the identification of balance deficits among patients with lymphedema.

Keywords: Arabic, FABS, Feasibility, Lymphedema, Reliability, Validity.

Introduction

Lymphedema is a medical disorder when there is an abnormal buildup of lymphatic fluid in the space between cells due to a disruption in the normal outflow of the lymphatic system. Lymphedema can be categorized as primary, or it can be secondary[1]. Post-mastectomy lymphedema is a long-lasting and worsening condition that disrupts the equilibrium of fluid exchange in the interstitial tissues. It primarily

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occurs as a result of surgical removal of lymph nodes in the armpit, as well as radiation therapy and chemotherapy[2].

Lymphedema associated with breast cancer is found in a range of 7-77% of patients who have had axillary lymph node dissection (ALND) because their lymph veins have been cut, as shown in certain studies. Sentinel lymph node biopsy (SLNB) substantially decreases this risk to a range of 3-7%3. Upper-limb lymphedema disrupts postural balance and increases the risk of falling due to changes in weight distribution, limb asymmetry resulting from lymphedema, impaired directional control, a shift of the center of gravity towards the lymphedematous side, as well as increased postural sway[4] .

Assessing balance performance is crucial for initiating effective treatment. Balance assessments should include the capacity to accurately measure many aspects of postural instability[5]. The FAB scale comprises 10 items that assess both stationary and moving postural control, sensory reception along with integration, as well as feedforward and feedback postural control[6].

Unlike the Berg balance scale, the FAB scale includes the assessment of dynamic postural control, including the ability to react and maintain balance in response to a disturbance, as well as the examination of walking performance. Moreover, the FAB scale includes an additional task that is performed while walking. These characteristics are recognized as indicators of difficulties maintaining equilibrium while doing everyday tasks[7].

The FAB scale is more concise in addition demands a shorter duration for administration in comparison to both the Mini-Balance Evaluation Systems Test as well as the Berg Balance Scale8. One valid and dependable instrument that may be utilized to assess the balance of patients with lymphedema as a result of breast cancer treatment, both prior to and following therapy, is the FAB scale[5].

Detecting disturbances in balance as well as evaluating the effectiveness of a particular intervention in addressing balance deficiencies might aid in designing the treatment strategy. Currently, there are multiple scales utilized to assess balance in patients. The FAB scale is a newly developed assessment tool that is specifically tailored for assessing balance across various aspects[6].

The FAB scale has shown high test-retest reliability (0.96) along with intra-rater reliability (0.92–1.00) in addition to inter-rater reliability (0.91–0.95)[7]. The FAB scale is a simple as well as efficient assessment tool; it can be conveniently conducted in a limited area, often it takes about ten to twelve minutes to finish. The scoring system employs an ordinal 5-point scale that ranges from 0 to 4, with a possible 40-point total[8].

The majority of the existing tools used to assess a patient's balance are published in the English language. Nonetheless, it is imperative to translate these tools into different languages in order to assist therapists as well as different healthcare professionals who are not proficient in English to successfully employ these tools while ensuring their validity as well as reliability. In order to ensure the accuracy and consistency of the FAB scale, it is crucial to translate it into Arabic. Although most Arabic-speaking physical and occupational therapists have a fundamental grasp of written English, translating the assessment instrument into Arabic will establish a standardized language and enhance its validity and reliability. This research set out to assess the Arabic FAB scale's validity as well as reliability in a group of Egyptian patients who speak Arabic and have post-mastectomy lymphedema in Egypt.

Methods

Study participants and recruitment criteria:

The adaptation and translation of Scale were finished in accordance with the established standards. The study was conducted from March 2023 to October 2023. A convenient sample of 107 females with lymphedema. Conducted the FAB scale assessment and then repeated it after 7 days to assess its test-retest reliability. All of the participants were recruited from Cairo University's Faculty of Physical Therapy's outpatient clinic and the Cancer Treatment Center in Ismaili, Egypt. The following were the inclusion requirements: Patients diagnosed with unilateral upper limb lymphedema. (Post-mastectomy). age between 30 and 60 years. Every patient possessed the ability to read and write

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Arabic, understood items on the scale, and followed the instructions during the assessment. Patients with mental problems, with communication, vision, and hearing disorders, and who weren't cooperative, were excluded from recruitment.

Design of study:

This prospective observational research aims to assess the translated FAB scale's face and content validity, feasibility, internal consistency, as well as test-retest reliability.

Before the study, participants were required to submit written agreements after being fully informed, and ethical approval was obtained from the institutional review board of the Faculty of Physical Therapy at Cairo University (with the reference number P.T.REC/012/004501).

Procedures:

The FAB scale was translated with the author's consent. After that, the FAB scale, originally written in English, was translated into Arabic according to the forward-backward translation principles established by Sousa[9]. The original scale was initially translated into two Arabic variants, followed by the development of a preliminary translated version. This version was then backwardly translated into two English versions, leading to the development of a pre-final version. The prefinal version was tested by professionals, and then the last form was done among patients to test its reliability and feasibility. Ten experts were tasked with assessing the scale's clarity by evaluating the instructions, items, as well as response format (face validity). They were also requested for their recommendations for improving clarity using a dichotomous question (clear-unclear) for calculating the clarity index of the scale. Following this, a separate set of 10 experts were given a scale to use in determining whether or not each item on the instrument had content equivalent (content-related validity or relevance) using the provided scale. 1 = not relevant; 2 = unable to assess relevance; 3 = relevant but requires minimal alteration; 4 = extremely relevant and succinct. Following the successful completion of expert face as well as content validity tests the research team took all the comments from the two expert panels and modified the prefinal version to the most clearly and equivalent formula; it was known as the last version. The assessment was done with patients to fill out the final form of the scale in order to assess feasibility by measuring the time it takes to respond to the scale and assessing the internal consistency reliability using Cronbach's coefficient, then the patients were assessed to fill out the scale again after one week to calculate test-retest reliability via mean scores and the interclass correlation coefficient.

Data Analysis

For numerical data, descriptive statistics were applied using means & standard deviations. For categorical data, percentages and frequencies were used. The face validity was assessed using the Clarity Index along with the Expert Proportion of the Clearance. The content validity was evaluated utilizing the expert proportion of relevance, the index of content validity (CVI), as well as scale content validity indices (S-CVI). Cronbach's alpha was utilized to determine the reliability of the internal consistency. When assessing test-retest reliability, the intraclass correlation coefficient (ICC) was utilized. The feasibility assessment involves determining the average time required to complete the questionnaire and the missing item index. A significance criterion of $p < 0.05$ was determined for all statistical tests. The statistical analysis was performed using version 25 of the Statistical Package for Social Studies (SPSS) for Windows, which was developed by IBM SPSS in Chicago, IL, USA.

Results

Subject characteristics

One hundred and seven females who had post-mastectomy lymphedema were involved in the research. Their mean ± SD age was 43.85 ± 7.07 years, with a sixty-year maximum and a thirty-year minimum. The mean ± SD time since surgery and the onset of lymphedema were 2.75 ± 0.38 and 1.91 ± 0.25 respectively. (Table 1)

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Table 1. General characteristics of the subjects.

	$\bar{X}$ ±SD	Min	Max
Age (years)	43.85 ± 7.07	30	60
Weight(kg)	75.07 ± 9.27	53	96
Height (cm)	159.29 ± 6.54	150	178
BMI (kg/m²)	29.54 ± 2.80	22.59	34.38
Time since surgery (yrs)	2.75 ± 0.38	2	3
Onset of lymphedema (yrs)	1.91 ± 0.25	1	2
	N	**%**	
Hand dominance			
Right-handed	90	84	
Left-handed	17	16	

Face validity analysis:

To assess the face validity of the Arabic version of the FAB scale, ten specialists collaborated in this research. The mean ± SD experience years of the expert panel for face validity was 12.5 ± 4.02 years, ranging from a min. of 8 years to a max. of 20 years.

The mean clarity index of the Arabic version of the FAB scale was 94%, indicating an excellent level of clarity. The Arabic version of the FAB scale demonstrated a clarity index ranging from 80% to 100%. The mean proportion of clearance by experts was 94%, which is considered excellent. The proportion of clearance, as determined by experts, varied between 80% and 100%.

Table 2. Item index of clarity of the Arabic version of FAB scale:

	No. of experts that agree	Item index of clarity (%)
Item 1	9	90
Item 2	9	90
Item 3	10	100
Item 4	8	80
Item 5	10	100
Item 6	10	100
Item 7	9	90
Item 8	10	100
Item 9	9	90
Item 10	10	100
Mean	**9.4**	**94**

Content validity analysis

Ten experts took part in this study to examine the content validity of the Arabic version of FABS. The mean ± standard deviation of experience years of the expert panel for content validity was 13.8 ± 2.94 years, ranging from a min. of 10 years to a max. of 20 years.

The Arabic version of FABS exhibited excellent content validity, with a scale CVI (S-CVI) of 0.98 as well as a universal agreement (UA) of 0.8. The mean expert proportion of relevance was 98%, indicating an excellent level of accuracy. Out of the eight experts, all of them had a 100% proportion of relevance, while two experts had a proportion of relevance of 90%.

Table 3. Item index of content validity of the final version of the Arabic version of FABS:

	No. of experts that agree	I-CVI	UA
Item 1	10	1	1
Item 2	10	1	1
Item 3	10	1	1
Item 4	10	1	1
Item 5	9	0.9	0
Item 6	10	1	1
Item 7	10	1	1
Item 8	9	0.9	0
Item 9	10	1	1
Item 10	10	1	1
S-CVI	**S-CVI**	**0.98**	**0.8**

Feasibility analysis

The scale required an average time of 9.42 ± 1.46 minutes to be completed, with a maximum time of 12 minutes and a minimum time of 7 minutes. None of the items were missing. The frequency as well as the percentage of time required to finish the scale, measured in minutes, are presented in table 4.

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

Time (min)	Frequency	Percent
7	11	10.3
8	22	20.6
9	22	20.6
10	23	21.5
11	21	19.6
12	8	7.5
7	11	10.3
Average	**9.42 ± 1.46**	

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Reliability analysis

Internal consistency of the Arabic version of FABS:

The Cronbach's alpha coefficient for the Arabic version of FBAS was 0.81, indicating a high level of internal consistency.

Test-retest reliability of the Arabic version of FABS:

The Arabic version of the FAB scale demonstrated strong test-retest reliability for all items, with ICC values that ranged from 0.816 to 0.979. The ICC for the overall score was 0.977, with a 95% confidence interval (CI) ranging from 0.965 to 0.985 is presented in (Table 5)

Table 5; Test-retest reliability of Arabic version of FABS:

FAB	ICC	(95% CI)		P value
		Lower bound	Upper bound	
Item 1	0.941	0.913	0.960	0.001
Item 2	0.979	0.969	0.986	0.001
Item 3	0.816	0.731	0.874	0.001
Item 4	0.965	0.948	0.976	0.001
Item 5	0.963	0.946	0.975	0.001
Item 6	0.975	0.961	0.984	0.001
Item 7	0.871	0.810	0.912	0.001
Item 8	0.954	0.928	0.970	0.001
Item 9	0.94٠	0.911	0.959	0.001
Item 10	0.949	0.926	0.966	0.001
Total score	0.977	0.965	0.985	0.001

ICC, Inter class correlation coefficient value; CI, Confidence Interval; P value, Probability value

Discussion

Clinicians require simple, precise, reliable, as well as responsive to changes to identify patients' balance. validity and reliability also to ensure that the measurements are accurate[10].

The Arabic version of the FAB scale demonstrates high face validity, as indicated by a clarity index of 94%, which is considered excellent. The Arabic version of the FAB scale demonstrated a clarity index ranging from 80% to 100%. The average proportion of clearance by experts was 94%, which is considered excellent. The clearance had an expert proportion ranging from 80% to 100% and showed excellent content validity, with a scale CVI (S-CVI) of 0.98 and a universal agreement (UA) of 0.8. The mean expert proportion of relevance was 98%, indicating an excellent level of accuracy. Out of the eight experts, all of them had a 100% proportion of relevance, whereas two experts had a slightly lower rate of 90%.

The current study aligns with Polit and Beck's assertion that a scale can be considered to have excellent content validity if its items have item-level content validity indexes (I-CVI) that meet specific criteria. These criteria include an I-CVI of 1.00 when assessed by 3 to 5 experts, with a minimum I-CVI of.78 when assessed by six to ten experts. A high-quality content validity scale, according to the research, should have an I-CVI of 0.78 or higher as well as an S-CVI/UA of 0.9 or higher[10].

The internal consistency demonstrated a high level of reliability, as shown by a Cronbach's alpha coefficient of 0.81. A Cronbach alpha between the range of 0.7 as well as 0.9 is considered to have good internal consistency, as defined by George and Mallery[11].

The Arabic version of the FAB scale demonstrated good test-retest reliability for all items, with ICC values that ranged from 0.816 to 0.979. The ICC for the overall score was 0.977, with a 95% confidence interval (CI) ranging from 0.965 to 0.985. The correlation between the two distinct measurements can be accurately determined using the ICC, with a value above 0.80 being deemed excellent[12].

The Iranian version of the FAB scale has good to excellent test-retest reliability (ICC= 0.98). Internal consistency was acceptable (Cronbach α=0.83-0.84)[16]. The test-retest reliability of the German version of the FAB scale, as measured by the total score, was found to be 0.965. Additionally, the reliability for individual items ranges from 0.86 to 0.88. The FAB scale's German version had a Cronbach's alpha coefficient of 0.988[17].

The Arabic version of the Fullerton Advanced Balance Scale demonstrates high feasibility as all patients completed the scale items, accounting for 100% participation. On average, it took 9.42 ± 1.46 minutes to complete, with a maximum completion time of 12 minutes and a minimum of 7 minutes. It needed 9 minutes or less

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to be completed in about 61.8% of all patients, less than 12 minutes in about 92.5% of all patients, and 12 minutes in about 7.5% of all patients. There were no missing items. According to Hernandez and Rose[6]the Fullerton advanced balance scale is simple as well as rapid to use, it can be done in a small space also; it takes about ten to twelve minutes to finish.

Conclusion

The current research translated the FAB scale into Arabic and found that it was just as reliable and valid as the original English version. International investigations utilizing the FAB scale for lymphedema patients' balance are made easier by the validated FAB scale.

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Conflict of interest

According to the authors they have no conflicting agendas.

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