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Development of a new version of the Bristol Stool Form Scale: translation, content validity, face validity, and reliability of the Persian version

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ABSTRACT

Objectives The Bristol Stool Form Scale (BSFS) is the most widely used scale for stool form assessment. This study aimed to translate the BSFS into the Persian version and determine its content validity, face validity, and reliability.

Design Following permission, a forward–backward translation procedure was applied to translate the scale from English into Persian. A cross-sectional study was conducted on a sample of 210 participants from the general and gastrointestinal clinics of a teaching hospital affiliated with the Tehran University of Medical Sciences, Tehran, Iran, from January 2020 to August 2020. The samples were selected using convenience sampling. A group of 10 experts and 10 adults assessed content and face validity, respectively. The kappa index evaluated the reliability of the instruments.

Results Participants' mean (±SD) age was 37.62 (±8.87) years. Most of the participants (65.7%) were women. The highest percentage of concordance was 100% for stool type 7, and stool type 5 had the lowest concordance percentage (78.1%). The overall kappa index was 0.79.

Conclusion The Persian version of the BSFS is a valid and reliable measure for assessing stool form, and now it can be used in research and clinical practice.

INTRODUCTION

One of the important evaluations in gastrointestinal (GI) disorders that help physicians to gather information and determine a treatment plan is stool form.[1 2] Stool form is indicative of intestinal transit alteration. Based on the evidence, stool form is more reliable than stool frequency for predicting transit time and makes it possible to differentiate normal from delayed transit.[3]

Bristol Stool Form Scale (BSFS) is one of the most widely used scales to assess stool form,[4] bowel habits, and predict intestinal transit[3] that developed and psychometric about two decades ago in Bristol, England.[4] The usefulness of this scale for evaluating patients with GI diseases, irritable bowel syndrome, evaluating stool consistency changes with medication, and recognising its appearance defects in the community has also been shown.[5–7]

The BSFS is an ordinal scale of stool types ranging from the hardest (type 1) to the softest (type 7) that is widely used in practice and clinical research to measure stool form.[8] Types 1 and 2 are considered abnormally hard stools (and in conjunction with other symptoms indicative of constipation). In contrast, types 6 and 7 are considered abnormally loose/liquid stools (and other symptoms indicative of diarrhoea). Types 3–5 are considered the most 'normal' stool form.[9 10] In this scale, to ensure that patients can accurately describe their stool patterns, all stool forms are given with textual definitions related to them.[11]

The BSFS is widely used worldwide in clinical and research settings.[8] The US Food and Drug Administration suggests applying the

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Stool form is an important indicator for diagnosis and planning treatment for people with gastrointestinal disorders.
⇒ The Bristol Stool Form Scale (BSFS) is one of the well-known instruments for assessing stool form.
⇒ There is limited data on the psychometric properties of this scale.

WHAT THIS STUDY ADDS

⇒ There is no Persian version of the BSFS. This study translated and evaluated the psychometric properties of the scale in Persian.
⇒ The study findings provide further evidence that the BSFS is a valid measure for assessing stool consistency.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ The BSFS is a reliable and valid scale for assessing stool form and now can be used in research and clinical practice to assess the stool form.
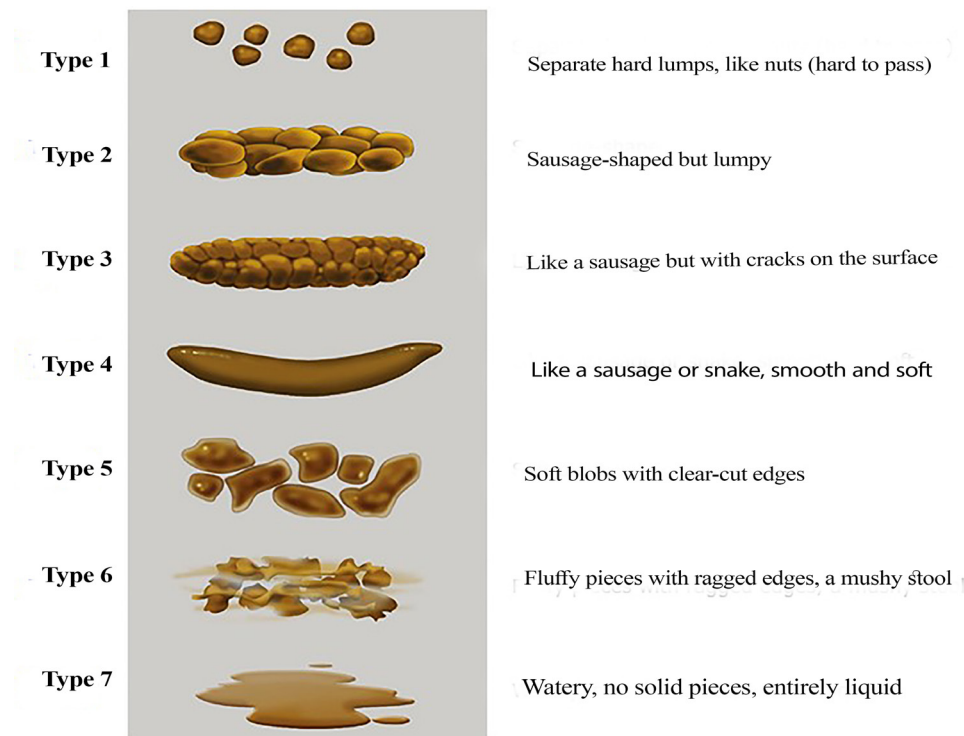
Figure 1 The seven types of stools and their images.

BSFS for assessing patients with abnormal defecation as the primary stage of trials of diarrhea-predominant inflammatory bowel disease (Irritable Bowel Syndrome with Diarrhea, IBS-D).[12] Evidence showed that BSFS had been used in various studies to estimate gut transit time.[5] [13–15] Also, the Rome Foundation recommends using BSFS to assess the form of stool in people with irritable bowel syndrome.[16]

Studies have shown that BSFS has been translated into several languages.[17–19] Also, it has been used in adults with diarrhea-predominant irritable bowel syndrome[8] and children.[19] [20] However, there is limited data on the psychometric properties of this scale. According to our knowledge, the psychometrics of this scale was not conducted in Persian. Regarding the importance of assessing the stool form in various bowel diseases and the lack of a Persian version of the BSFS, it was decided to translate and validate the Persian version of the BSFS.

METHODS AND MATERIALS
The questionnaire
The BSFS is a descriptive and visual scale including seven types of stools with images and their respective definitions. The participants were given seven definitions and seven images and asked to match each definition to its suitable images (figure 1). It takes 2–3 min to be completed.

Translation
Following permission, a forward–backward translation procedure was applied to translate the scale from English into Persian.[21–23] Two independent physicians with good English knowledge translated the items into Persian. Then a consolidated forward version was produced. Subsequently, it was back translated to English by another two bilingual health professionals who were blinded to the original English version. Then a consolidated back translation was provided and checked for differences with the original scale. At last, the Persian version was provided.

The psychometric evaluation
Design and participants
This was a cross-sectional study. The sample size was 10 participants per item[1] [24] [25] for each group giving a total sample size of 210 participants, including 70 patients (with irritable bowel syndrome), 70 physicians, and 70 nurses from the general and GI clinics of a teaching hospital affiliated to Tehran University of Medical Sciences, Tehran, Iran, from January 2020 to August 2020. The samples were selected using convenience sampling. Consent was obtained from all participants who agreed to participate. We included participants 18 years and older and able to read and understand the scale. No other restrictions were implemented.

Content validity
An expert panel judged the translated version of the scale. The panel consisted of 10 specialists from different disciplines, including gastroenterologists, physicians, psychometrics, epidemiologist, and health educator. After careful review and cultural adaptation by experts, a few changes were made. Subsequently, the provisional version was provided.

Table 1 Demographic characteristics of the participants

Variable	Physicians (n=70) No. (%)	Nurses (n=70) No. (%)	Patients (n=70) No. (%)	Total (n=210) No. (%)
Age (years)				
18–24	0 (0.0)	4 (5.7)	5 (7.1)	9 (4.3)
25–34	20 (28.2)	32 (45.7)	23 (32.9)	75 (35.7)
35–44	43 (61.4)	18 (25.7)	20 (28.6)	81 (38.6)
45≤	7 (10.0)	16 (22.9)	22 (31.4)	45 (21.4)
Gender				
Male	34 (48.6)	7 (10.0)	31 (44.3)	72 (34.3)
Female	36 (51.4)	63 (90.0)	39 (55.7)	138 (65.7)
Education level				
Secondary	0 (0.0)	0 (0.0)	43 (61.4)	43 (20.5)
Higher	70 (100.0)	70 (100.0)	27 (38.6)	167 (79.5)

Face validity

The provisional version was pilot tested and administered to a sample of ten participants (four patients, three physicians, and three nurses) to detect possible problems. They were asked if they had any difficulties in understanding the items or responding to the scale. In addition, the patients' interpretation of all items was checked.

Reliability

External reliability was performed using the Fleiss' kappa. Fleiss' kappa is applicable when ratings by more than two observers are available for either binary or ordinal data.[26] The kappa statistic can take values from −1 to 1. Values between 0.61–0.80, 0.81–0.99, and 1.00 were considered substantial agreement, near-perfect agreement, and perfect agreement, respectively.[26] P value less than 0.05 was considered statistically significant.

RESULTS
Participants

A total of 210 participants, including 70 patients, 70 physicians, and 70 nurses, were entered into the study. Most participants (65.7%) were women. The mean age of participants was 37.62±8.87 years. Table 1 presents the demographic characteristics of the participants.

Validity

The sale was reviewed by experts and no words changed, indicating that the translation of the scale was satisfactory. However, they observed only minor spelling or typographical errors. Such errors were corrected as applied. Similarly, patients received the scale very well and none of them had difficulties in understanding the items or responding to the BSFS questionnaire. The Persian version of BSFS is shown in figure 2.

Descriptive findings

The overall concordance or matching results (definition and image) are shown in table 2.

The concordance between types of stools among the study groups is presented in table 3. The highest percentage of concordance was 100% for stool type 7, while stool type 5 had the lowest concordance percentage (78.1%). The details of the results are shown in table 3.

Reliability

The overall kappa index was 0.79. The summary of the agreement for this index in each of the groups is presented in table 4.

DISCUSSION

The present study aimed to translate the original version of the BSFS into Persian and determine its validity and reliability to be used in assessing stool form in various bowel diseases.

The results showed that some respondents rated the image of type 2 as type 3 and vice versa. Also, the image of type 5 was rated by some as type 6 and vice versa. These results showed that recognising the boundaries of normal versus constipation or diarrhoea is difficult. Other studies have also reported similar results.[27 28] Also, similar to the Spanish version,[1] we found stool type 5 was particularly difficult to differentiate from type 1. Therefore, though the BSFS helps patients determine the specific type of stool, distinguishing between some types of stools is problematic.

The current study showed that the highest and lowest concordance between definitions and images of the type of stool was in type 7 and type 5, respectively. The results obtained from the Spanish version also showed that the highest and lowest concordance percentages were related to type 7 and type 5, respectively.[1] Further investigations are needed to find alternative solutions and simplifications in this case.

The result obtained from this study showed that the BSFS has very high concordance when used by physicians to assess individual stool types. The other validation

The Bristol Stool Form Scale (BSFS)

گونه‌ایرانی

۱. قطعات سفت مجزا، مانند آجیل (به سختی دفع می شود)

۲. تکه های به هم چسبیده، به شکل سوسیس

۳.به شکل سوسیس، ولی با ترک هایی روی سطح

۴. به شکل سوسیس یا مار نرم و صاف

۵. توده های کوچک و نرم، با لبه های مشخص

۶.توده های کرک مانند، با لبه های بریده بریده، وارفته

۷. آبکی، بدون هیچ توده جامد(کاملا مایع)

Figure 2 The Persian version of the BSFS.

versions reported similar results.[1 27] Since the BSFS was developed to be used irrespective of educational level, it may be inferred that this difference between the groups is related to their knowledge about health.[2] So, familiarity with the scale and education in its use may partly address these issues.

The findings revealed considerable agreement between definitions and images of the types of stools and the study groups. The overall kappa index indicated that the agreement between definitions and images about the type of stool is statistically valuable. However, the kappa index was higher in health providers than in patients, which may be related to their knowledge about the area of health. The overall kappa index in Polish[27] and Spanish[1] versions were 0.75 and 0.708, respectively, while the present study was 0.79, which revealed that the overall kappa index is satisfactory.

The BSFS is a self-reported scale that can also be completed through an interview (face-to-face interviews). In a Romanian version, all participants were invited to

Table 2 Correspondence between definitions and images in all the groups

	Images 1	Images 2	Images 3	Images 4	Images 5	Images 6	Images 7	Total
Texts 1	194	0	1	0	14	1	0	210
Texts 2	1	187	18	0	3	1	0	210
Texts 3	1	19	187	2	0	1	0	210
Texts 4	0	0	0	209	1	0	0	210
Texts 5	9	2	1	0	164	34	0	210
Texts 6	5	2	2	1	29	171	0	210
Texts 7	0	0	0	0	0	0	210	210
Total	210	210	209	212	211	208	210	1470

Table 3 Concordance between definitions and images in relation to subject's studies and type of stool

Type of stool	Physicians (n=70) No. (%)	Nurses (n=70) No. (%)	Patients (n=70) No. (%)	Total (n=210) No. (%)
Type 1	64 (91.4)	70 (100.0)	60 (85.7)	194 (92.4)
Type 2	68 (97.1)	60 (85.7)	59 (84.3)	187 (89.0)
Type 3	67 (95.7)	62 (88.6)	58 (82.9)	187 (89.0)
Type 4	70 (100.0)	70 (100)	69 (98.6)	209 (99.5)
Type 5	64 (91.4)	56 (80.0)	44 (62.9)	164 (78.1)
Type 6	67 (95.7)	55 (78.6)	49 (70.0)	171 (81.4)
Type 7	70 (100.0)	70 (100.0)	70 (100.0)	210 (100.0)

Table 4 The Fleiss's kappa index for each group

	Kappa (95% CI)	P
Doctors	0.91 (0.904 to 0.914)	<0.0001
Nurses	0.81 (0.804 to 0.815)	<0.0001
Patients	0.69 (0.684 to 0.694)	<0.0001
All	0.79 (0.792 to 0.796)	<0.0001

match one randomly selected spoken text (in Romanian) defining one of the seven types of stools with one of the seven images,[29] while, in our study, seven definitions and seven images were given to the participants at once and wanted them to match images of the seven stool types with each description.

The strength and limitations

Although we used self-reported data for this study, there were no missing data, and the problem of illiterate individuals was not encountered. This study used a sample from the urban capital; one might argue that it does not necessarily represent the entire country. In general, this is true, but since Tehran has become a multicultural metropolitan area, it has been suggested that a sample from the population in Tehran at least could be regarded as a representative sample of the urban population in Iran.

The study did not provide evidence on the construct validity of the Persian version of the BSFS; due to the specific format of the questionnaire, and thus limited psychometric evaluation was performed. However, the findings provided sufficient evidence for the validation of the Persian version of the BSFS and showed that it could be used as a reliable and valid instrument for descriptive stool consistency. Also, we recommend that future studies use clinometric properties for the questionnaire.

CONCLUSION

Overall, the concordance between definitions and images and the overall kappa index were satisfactory. Therefore, the findings suggest that the Persian version of the BSFS is a reliable and valid scale for assessing stool form assessment. Thus, now it can be used in research and clinical practice.

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