Original Article

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Physiotherapy Section

Development and Content Validation of a Novel Iliotibial Band Friction Syndrome Index Questionnaire: A Cross-sectional Study

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ABSTRACT

Introduction: The Iliotibial Band Friction Syndrome (ITBFS) diagnosis is based on clinical reasoning. Ober's test and the Noble compression test are examples of diagnostic techniques, but there is no specific diagnostic standard assessment questionnaire for ITBFS. Neither the original nor the modified Ober's test appears to accurately measure ITB tightness. To the best of our understanding there is no tool available to diagnose the patients with ITBFS.

Aim: To develop and validate an index tool for ITBFS.

Materials and Methods: The present cross-sectional content validation study was conducted at Maharishi Markandeshwar Super Speciality Hospital, Mullana, Ambala, Haryana, India, from August 2025 to December 2025. The study was conducted in two sequential phases to ensure a systematic and scientifically rigorous approach: Phase I: Questionnaire development and Phase II: Content validity assessment. Based on the findings from the literature, an initial pool of items was generated. The generated items were reviewed through focused discussions with two experts in musculoskeletal and sports physiotherapy. A panel of seven physiotherapy experts participated in the validation process. The Scale Content Validity Index (S-CVI) {S-CVI/UA (Universal agreement) and S-CVI/A(Average)} was also computed to determine the overall content validity of the questionnaire.

Results: The developed tool possesses excellent content validity, supported by strong agreement among expert panelists with item-level content validity that was greater than 0.8 for every tool item. The S-CVI/A of the created Iliotibial Band Friction Syndrome Index (ITBFSI) tool was 0.985. Additionally, the S-CVI/UA value of 0.9 further supports strong universal agreement across the included items.

Conclusion: ITBFSI is a valid tool which can help to diagnose the patients with ITBFS.

Keywords: Content validity, Myofascial restriction, Pain

INTRODUCTION

The Iliotibial Band Tract or IT Band (ITB) is a longitudinal fibrous sheath that runs along the lateral thigh and serves as an important structure involved in lower extremity motion [1]. The ITB is also sometimes known as Maissiat's band. The ITB spans from the lower extremity on its lateral aspect before inserting on Gerdy's tubercle on the proximal/lateral tibia [2]. The ITB is a multidimensional structure that is dynamic, which spans from the lumbar spine to the lateral knee. ITB is avascular, thick, regular connective tissue made up of type 1 collagen fibres [3].

ITBFS is a common overuse injury among runners, cyclists, and physically active individuals that leads to lateral knee pain and functional limitations [4,5]. Several outcome measures are commonly used to assess knee pain and function in patients with ITBFS, including the Visual Analogue Scale (VAS), Numeric Pain Rating Scale (NPRS), Knee Injury and Osteoarthritis Outcome Score (KOOS), International Knee Documentation Committee Subjective Knee Form (IKDC), and Lysholm Knee Scoring Scale [6]. The main shortcoming of these outcome measures is their lack of condition-specific sensitivity. They do not assess important aspects of ITBFS such as lateral knee pain during repetitive knee flexion, symptoms during running or cycling, tenderness over the lateral femoral epicondyle, and sport-related functional limitations. While these tools measure pain and general knee function, they were primarily developed for broader knee conditions such as ligament injuries, meniscal pathology, or osteoarthritis.

Due to this lack of condition-specific sensitivity, there is a need to develop a dedicated assessment tool such as the ITBFSI, which can more accurately evaluate ITBFS-related symptoms and functional impairments. The present study addresses the lack of a condition-specific assessment tool for ITBFS. The novelty of this study lies in the development and content validation of the ITBFSI, a questionnaire specifically designed to assess ITBFS-related symptoms and functional limitations. By incorporating expert evaluation for content validity, this tool aimed to provide a standardised, reliable, and clinically relevant method for assessing ITBFS.

MATERIALS AND METHODS

This cross-sectional methodological study was conducted to develop and validate the ITBFSI questionnaire. The study was carried out at Maharishi Markandeshwar Super Speciality Hospital, Mullana, Ambala, Haryana, India, from August 2025 to December 2025. Ethical approval was obtained from the Student Project Committee (SPC-PA-07) prior to the commencement of the study. The study was conducted in two sequential phases to ensure a systematic and scientifically rigorous approach:

- **Phase I:** Questionnaire development
- **Phase II:** Content validity assessment

Phase I: Tool development

Phase I focused on the systematic development of the ITBFSI through a structured, stepwise process.

Step 1: Problem identification and conceptualisation

A need was identified for a condition-specific, standardised assessment questionnaire for ITBFS, as existing literature lacked a comprehensive instrument for its evaluation.

Step 2: Literature exploration: An extensive literature review was conducted using electronic databases including PubMed/MEDLINE, Scopus, and the Physiotherapy Evidence Database (PEDro). The objective was to identify key clinical features, commonly assessed parameters, and gaps in existing evaluation methods related to ITBFS. The review highlighted important domains such as pain characteristics, aggravating factors, activity-related pain, snapping sensation, tenderness, functional Leg Length Discrepancy (LLD), gait abnormalities, Ober's test findings, myofascial restrictions, and treadmill-based assessments [7-12].

Step 3: Item generation: Based on the findings from the literature, an initial pool of items was generated. These items were designed to comprehensively capture the clinical presentation and functional limitations associated with ITBFS.

Step 4: Expert review and item refinement: The generated items were reviewed through focused discussions with two experts in musculoskeletal and sports physiotherapy. Their feedback was incorporated to refine item wording, eliminate redundancy, and ensure clinical relevance.

Step 5: Domain categorisation: The refined items were systematically grouped into relevant domains based on conceptual similarity and clinical importance, ensuring a structured representation of the condition [8,9].

Step 6: Qualitative content assessment and draft formation: The categorised items underwent qualitative content assessment for clarity, relevance, and comprehensiveness. Based on expert feedback, necessary modifications were made, and a preliminary draft of the ITBFSI was developed.

Phase II: Content validity (quantitative assessment): Phase II involved the quantitative evaluation of content validity using the Delphi technique.

Expert panel: A panel of seven physiotherapy experts participated in the validation process. All experts had more than three years of clinical and/or academic experience, held postgraduate qualifications, and provided informed consent. Physiotherapists who took more than seven days to respond not included in the study.

The experts were asked to rate each item using a four-point Likert scale, where 1=not relevant, 2=somewhat relevant, 3=quite relevant, and 4=highly relevant. The relevance was entered either as one (for a relevance score of 3 or 4) and 0 (if the relevance scoring was 1 or 2). Based on the expert ratings, the Item Content Validity Index (I-CVI) was calculated for each item by determining the proportion of experts who rated the item as 3 or 4 (relevant). Items with higher I-CVI values (generally ≥0.78 when 6-10 experts are involved) were considered acceptable for inclusion in the final tool. Items receiving lower scores were reviewed, modified, or removed based on expert feedback. The S-CVI {S-CVI (Universal agreement) and S-CVI (Average)} was also computed to determine the overall content validity of the questionnaire. The S-CVI/UA was calculated by dividing the number of items that achieved universal agreement among experts by the total number of items in the scale, as described by Lynn MR and supported by Denise Polit and Cheryl Beck [13].

Finalisation of the tool: Based on the quantitative analysis and expert consensus obtained through the Delphi process, the final version of the tool was established and named the ITBFSI [Table/Fig-1].

STATISTICAL ANALYSIS

Analysis of the data consisted of tabulating the results of a comprehensive literature search and in-person interviews, and removing any duplicates that were detected. Each produced item was checked and reported in accordance with I-CVI nomenclature. At the conclusion of each Delphi survey, S-CVI was used to reveal the

1. Pain	Grades
• No pain	0
• Pain is felt after running but does not restrict distance or speed.	1
• Pain is felt on knee bending	2
• Pain experienced is severe which prevent running	3
2. Aggravating factors of pain	**Grades**
• No pain during activities (normal / no aggravating factor)	0
• Running uphill	1
• Squatting >30° knee flexion	2
• Running downhill or descending stairs	3
3. Pain during recreational activities	**Grades**
• No pain	0
• Pain comes on after running	1
• Pain persists on running for a while but does not restrict to cover the required distance	2
• Pain is so severe which restricts running	3
4. Snapping sensation	**Grades**
• Nil	0
• Occasionally on lateral femoral epicondyle	1
• Frequently, on lateral femoral epicondyle	2
• Audible snapping sensation, on lateral femoral epicondyle	3
5. Tenderness (2 to 3 cm superior to joint line)	**Grades**
• Absent	0
• Mild	1
• Patient winces	2
• Patient winces and withdraws	3
6. Functional Leg Length Discrepancies (LLD)	**Grades**
• No limb length discrepancy	0
• No disability cause <3 cm	1
• >3 cm but less than 5 cm	2
• >5 cm	3
7. Assessment of gait	**Grades**
• Normal gait pattern	0
• Asymmetry in pelvic rotation	1
• Dropping of pelvis	2
• Trendelenburg gait	3
8. Ober's test	**Grades**
• During passive hip adduction no pain and tightness felt throughout the range.	0
• During passive hip adduction pain felt at the end ranges, but patient allows to do the movement	1
• During passive hip adduction pain felt at half range of motion with tightness (tensor fascia lata) which restricts the further movement	2
• Affected lower limb will remains in abduction and patient does not allow to perform movement	3
9. Myofascial restriction	**Grades**
• No active trigger point	0
• Trigger point in rectus femoris	1
• Trigger point in vastus lateralis	2
• Trigger point bicep femoris+ vastus lateralis+tensor fascia lata + gluteus minimus	3
10. Treadmill test	**Grades**
• Pain erupts 20 min on lateral femoral condyle	0
• Pain erupts <20 min on lateral femoral condyle	1
• Pain erupts <15 min on lateral femoral condyle	2
• Pain erupts <10 min on lateral femoral condyle epicondyle	3

[Table/Fig-1]: Showing items and domains of Iliotibial Band Friction Syndrome Index (ITBFSI).

overall validation of the suggested scale with the desired item pool. S-CVI was calculated using both the universal agreement technique and the average approach. In the process of content validation, Lynn MR advised an S-CVI of 0.95 for 6-10 experts, and an S-CVI/UA of 0.8 was regarded as outstanding content validity [13].

RESULTS

The development and content validation of the ITBFSI were validated by an expert panel of seven [Table/Fig-2]. Each of these tools had a 100% response rate in the preliminary round. The list of items generated by the experts in the first round was used for content validity testing. Content validation of the ITBFSI was conducted using the Delphi method with seven expert physiotherapists, achieving a 100% response rate. All experts met the predefined eligibility criteria. An initial pool of items was refined to 10 domains following expert review and qualitative assessment. Item-level content validity was excellent, with nine items achieving an I-CVI of 1.00 and one item an I-CVI of 0.857, exceeding the acceptable threshold of 0.78. The S-CVI/Ave was 0.985, indicating outstanding overall content validity. The S-CVI/UA was 0.9, demonstrating strong expert agreement.

	E1	E2	E3	E4	E5	E6	E7	Expert in agreement	I-CVI	UA
Items										
Q1	1	1	1	1	1	1	1	7	1	1
Q2	1	1	1	1	1	1	1	7	1	1
Q3	1	1	1	1	1	1	1	7	1	1
Q4	1	1	1	1	1	1	1	7	1	1
Q5	1	1	1	1	1	1	1	7	1	1
Q6	1	1	1	1	1	1	1	7	1	1
Q7	1	1	1	1	1	1	1	7	1	1
Q8	1	1	1	1	1	0	1	6	0.857	0
Q9	1	1	1	1	1	1	1	7	1	1
Q10	1	1	1	1	1	1	1	7	1	1
								S-CVI/Ave	0.985	

[Table/Fig-2]: Relevance rating of 10 items in tool by seven experts for content of the item and quality of item.
I-CVI: Item-content validity index; UA: Universal agreement;S-CVI: Scale content validity index; S-CVI/UA = items with unanimous agreement ÷ total items. S-CVI/Ave = mean of all I-CVI values

DISCUSSION

The present study aimed to develop and establish the content validity of a novel, condition-specific assessment questionnaire- the ITBFSI for evaluating patients with iliotibial band friction syndrome. The findings of this study demonstrated that the developed tool possesses excellent content validity, supported by strong agreement among expert panelists. The primary strength of the present study lies in the rigorous establishment of content validity for the newly developed ITBFSI tool. Content validity was systematically evaluated using a Delphi approach with a panel of seven experts, ensuring that each item was critically appraised for relevance and clarity. The findings demonstrated excellent content validity, with I-CVI values ranging from 0.857 to 1.00, indicating that all items met or exceeded the recommended threshold of 0.78. Notably, nine out of ten items achieved perfect agreement among experts (I-CVI=1.00), reflecting a high level of consensus regarding their clinical relevance. At the scale level, the S-CVI/Ave was 0.985, which is considered indicative of outstanding content validity according to established guidelines. Additionally, the S-CVI/UA value of 0.9 further supports strong universal agreement across the included items.

The diagnosis of ITBFS is commonly based on clinical examination tests rather than standardised diagnostic instruments. Several physical examination tests such as the Ober's test, Noble compression test, and Renne test are frequently used in clinical practice to identify ITBFS [14,15]. The Ober's test is one of the most commonly used clinical tests for evaluating iliotibial band tightness. Anatomical investigations have demonstrated that the Ober test may not accurately reflect iliotibial band tightness and may instead be influenced by other structures such as the gluteus medius, gluteus minimus, and hip joint capsule [16,17]. Furthermore, the absence of standardised pelvic stabilisation and measurement criteria reduces the reliability and clinical interpretation of the test [18]. Similarly, the Noble compression test is another commonly used provocation test for ITBFS, where pain is reproduced over the lateral femoral epicondyle at approximately 30° of knee flexion [19,20]. Despite its widespread clinical application, high-quality studies evaluating its sensitivity and specificity are limited, and its diagnostic validity has not been clearly established [21,22]. In addition, the Renne test, which reproduces lateral knee pain during weight-bearing knee flexion, is also used clinically but lacks strong evidence regarding its reliability and diagnostic accuracy. Another limitation of the currently available assessment methods is that they evaluate isolated clinical signs rather than the multidimensional presentation of ITBFS. Iliotibial band syndrome is a complex condition involving multiple factors including pain characteristics, functional limitations, gait abnormalities, myofascial restrictions, and biomechanical impairments [23,24]. Therefore, relying on a single clinical test may lead to variability in diagnosis and reduced clinical accuracy [25,26]. To address these limitations, the present study developed the ITBFSI, which integrates multiple clinical domains including pain, aggravating factors, recreational activity pain, snapping sensation, tenderness, LLD, gait assessment, Ober's test, myofascial restriction, and treadmill test. Unlike existing single-test diagnostic methods, the ITBFSI tool provides a comprehensive evaluation framework that combines both subjective symptoms and objective clinical findings [27,28].

Compared with existing diagnostic approaches that rely mainly on isolated clinical tests with limited evidence of validity, the ITBFSI provides a structured and validated multidimensional assessment instrument for identifying individuals with iliotibial band friction syndrome. The Index tool has 10 domains i.e., pain, aggravating factors of pain, pain during recreational activities, snapping sensation, tenderness (2 to 3 cm superior to joint line), functional LLD, assessment of gait, Obers test, myofascial restriction, treadmill test. These were the criteria on the basis of which diagnosis was easier and patients were directed to return to their respective sports activities at the earliest opportunity. In literature there are no such studies which helps to identify and diagnose ITBFS. Jogging with a stiff-legged gait while holding the knee in full extension (0° of flexion), below the impingement zone, can help ITBFS sufferers avoid pain, is the most well-known clinical symptomatology linked with the iliotibial band [29]. In runners, the band's distal edge presses against the lateral epicondyle of the femur with ITBFS. The athlete is more prone to developing ITBFS when running downhill or at a slower pace since these activities lead the knee to be less flexed during foot contact [29]. This scale can help the future physiotherapist to diagnose individuals easily so that they can go to their respective sports activity as soon as possible.

Limitation(s)

The limitation of the study was that the reliability and feasibility was not assessed here. In future the cut-off of the scale can be established, on the basis of which the individual may be categorised into mild, moderate and severe groups.

CONCLUSION(S)

The findings demonstrated excellent content validity, with I-CVI values ranging from 0.857 to 1.00. These results confirm that the ITBFSI tool comprehensively captures the essential domains of ITBFS and is both representative and clinically meaningful. The questionnaire effectively captures the major dimensions of pain, functional restriction, and activity related symptoms unique to ITBFS, according to expert evaluation which showed satisfactory

content validation indices across all items and domains. Therefore, the developed tool can be considered a valid instrument in terms of content, suitable for use in both clinical assessment and future research.

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