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17-Italian Foot Function Index with numerical rating scale: Development, reliability, and validity of a modified version of the original Foot Function Index

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ABSTRACT

Background: Clinical research quantifies symptoms and signs of pain.
Objective: To develop a brief outcome measure to assess foot and ankle conditions, the psychometric properties of a modified version of the original Foot Function Index (FFI) were examined.
Methods: Eighty-six subjects with musculoskeletal foot and ankle disorders were enrolled. The internal consistency and test–retest reliability were evaluated by using Cronbach's α and intraclass correlation coefficient (ICC). Criterion validity was tested by Pearson's correlation coefficient between 17 items of the Italian FFI (17-IFFI) and the Lower Extremity Functional Scale (LEFS). The responsiveness was calculated using the receiver operating characteristic curve (ROC).
Results: Cronbach's Alpha was 0.95 (95% CI: 0.92, 0.99). The intra-interviewer and inter-interviewer ICC values were, respectively, 0.92 (95% CI: 0.88–10 0.96) and 0.90 (95% CI: 0.89–0.94). Correlations between the 17-IFFI scores and the LEFS scores were −0.564 and −0.456 at the initial and at the end of the treatment, respectively. The ROC analysis revealed an area under the curve of 0.732 (95% CI: 0.61–0.82) for the 17-IFFI and 0.633 (95% CI: 0.52–0.71) for the LEFS score.
Conclusions: The 17-IFFI is a reliable and valid scale and we recommend its application to evaluate the effectiveness of a treatment in patients with musculoskeletal foot and ankle disorders.

1. Introduction

The painful foot and ankle conditions limit the activities of daily living and are the leading cause of immobility and disability [1–3]. They are secondary to traumatic and non-traumatic problems such as metatarsalgia, hallux valgus, abnormal position of toes, ankle sprain and arthritis, and they may also be attributed to improper footwear and/or abnormal biomechanics [4–7]. Foot pain prevalence is 24% for women and 20% for men aged 18–80 years [8].

Many outcome measures have been used to detect changes in a patient's health status in response to an intervention [7]. In Italy several generic measures have been applied to a variety of patients with lower-extremity musculoskeletal conditions, including the 36-Item Short-Form Health Survey (SF-36) [9], the Western Ontario and McMaster Universities (WOMAC) [10], Arthritis Impact Measurement Scales (AIMS2) [11] and Lower Extremity Functional Scale (LEFS) [12].

Foot Function Index [13] is a specific outcome measure of the impact of pathologies on foot and ankle function. At first it was used for patients with rheumatoid arthritis [14] but its reliability and validity were examined in several populations and the results

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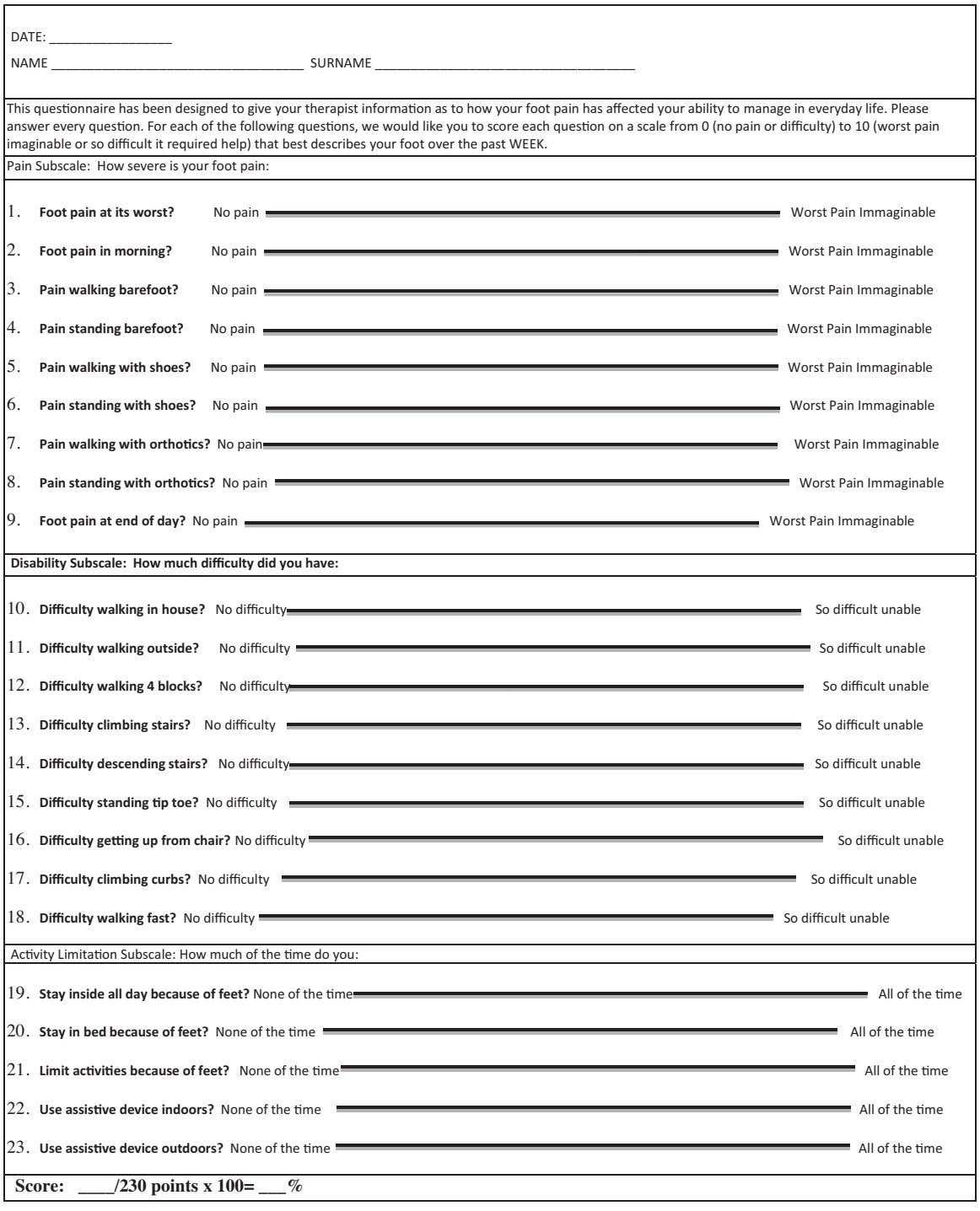

DATE: _____

NAME _____ SURNAME _____

This questionnaire has been designed to give your therapist information as to how your foot pain has affected your ability to manage in everyday life. Please answer every question. For each of the following questions, we would like you to score each question on a scale from 0 (no pain or difficulty) to 10 (worst pain imaginable or so difficult it required help) that best describes your foot over the past WEEK.

Pain Subscale: How severe is your foot pain:

1. **Foot pain at its worst?** No pain — Worst Pain Immaginable
2. **Foot pain in morning?** No pain — Worst Pain Immaginable
3. **Pain walking barefoot?** No pain — Worst Pain Immaginable
4. **Pain standing barefoot?** No pain — Worst Pain Immaginable
5. **Pain walking with shoes?** No pain — Worst Pain Immaginable
6. **Pain standing with shoes?** No pain — Worst Pain Immaginable
7. **Pain walking with orthotics?** No pain — Worst Pain Immaginable
8. **Pain standing with orthotics?** No pain — Worst Pain Immaginable
9. **Foot pain at end of day?** No pain — Worst Pain Immaginable

Disability Subscale: How much difficulty did you have:

10. **Difficulty walking in house?** No difficulty — So difficult unable
11. **Difficulty walking outside?** No difficulty — So difficult unable
12. **Difficulty walking 4 blocks?** No difficulty — So difficult unable
13. **Difficulty climbing stairs?** No difficulty — So difficult unable
14. **Difficulty descending stairs?** No difficulty — So difficult unable
15. **Difficulty standing tip toe?** No difficulty — So difficult unable
16. **Difficulty getting up from chair?** No difficulty — So difficult unable
17. **Difficulty climbing curbs?** No difficulty — So difficult unable
18. **Difficulty walking fast?** No difficulty — So difficult unable

Activity Limitation Subscale: How much of the time do you:

19. **Stay inside all day because of feet?** None of the time — All of the time
20. **Stay in bed because of feet?** None of the time — All of the time
21. **Limit activities because of feet?** None of the time — All of the time
22. **Use assistive device indoors?** None of the time — All of the time
23. **Use assistive device outdoors?** None of the time — All of the time

Score: ____/230 points x 100= ___%

Fig. 1. English version of Foot Function Index.

were satisfactory [15,16]. It consists of 23 items divided into three subscales: pain (9 items), disability (9 items), and activity limitation (5 items). The items are rated on a Visual Analogue Scale (VAS) consisting of horizontal line (10 cm). The poles are labeled "no pain" and "worst pain imaginable" (pain), "no difficulty" and "so difficult unable" (disability), and "none of the time" and "all of the time" (limitations). The patient is asked to mark the horizontal line at the spot that best corresponds to the effect of the foot complaints. Scores are added and divided by the maximum total possible (90 for both pain and disability subscale and 50 for activity limitation subscale). If a subject indicates as not applicable an item score, it is excluded from the total score. Decimal points were eliminated by multiplying the score by 100 (Fig. 1).

This scale has been translated and validated into several different languages [17,18], and most recently in Italian too [19]. Although the Italian version of the FFI showed satisfactory psychometric properties in patients with foot and ankle diseases, we adapted the original version of FFI as the basis for the creation of a new 17 Italian FFI, since the Italian FFI has not yet been widely used in clinical outcome research.

To address the need for a brief outcome measure to assess foot and ankle musculoskeletal conditions, the psychometric properties