

ORIGINAL ARTICLE

Normative Data for Lower Extremity Functional Scale in Young Adult Healthy Population

AYESHA AROOJ¹, SANA HAFEEZ², SAIMA RIAZ³, SIDRA MUNIR⁴, REHAN RAMZAN KHAN⁵, TAUSIF AAMIR⁶

¹Lecturer, Gomal University, Dera Ismail Khan, Pakistan

^{2,3}Assistant Professor, Riphah College of Rehabilitation and Allied Health Sciences, Riphah International University, Lahore, Pakistan.

⁴Physiotherapist, Physiologic Physiotherapy Center, Lahore, Pakistan.

⁵Assistant Professor, Multan College of Physiotherapy, Multan Medical & Dental College, Multan, Pakistan.

⁶Physiotherapist, Shifa International Hospital, Islamabad, Pakistan.

Correspondence to: Dr. Sana Hafeez, Email: drsana140@gmail.com, Cell: 0331- 4545667

ABSTRACT

Objective: To determine the prescriptive/ normative data for the Lower Extremity Functional Scale in young adult healthy Population.

Methodology: Descriptive cross-sectional study was conducted on 1500 participants of normal healthy population. Health of the Participants was assessed by using the SGA-Subjective Global Assessment form. The study comprised of a brief set of questions in which age [as a constant variable and categorized into 3 groups (20-30, 31-40, and 41-50 years)] and sex of the individuals were noted. Next, they were given the lower extremity functional scale (LEFS) questionnaire. The LEFS have twenty queries in four groups. For each query, 0 to 4 points can be obtained, so 80 points can be received in total-demonstrating optimum lower extremity function (Binkley et al. 1999). Data was analyzed by SPSS 21.

Results: Result showed that mean outcome/ score for their LEFS for the entire human population was 74.12 (out of 80). Men and Women had mean scores (57.31 and 77.88 respectively). Women scores high as compared to men, as the scores decreases with increasing age.

Conclusion: Result showed that Lower extremity functional scale scores vary according to the age and also the gender of the participants. Lower extremity functional score decreases with increasing age. Women have relatively higher scores than men.

Key words: Lower Extremity Functional scale

INTRODUCTION

Functional skills refers towards an individual's capability to execute tasks of daily living as well as activities that are necessary to deal with personalized as well as environmental requirements. The functional evaluation is implemented to collect epidemiological data from particular population groups as well as to accumulate information about the overall level of functionality so that we can enable the utmost effective treatment procedure. (1)

There exist a variety of evaluation scales, such as certain forms for a specified orthopedic conditions or for one particular single joint. These types of tools generally observe the range of movements, functional capabilities and/or limitations as well as symptoms. The Lower Extremity Functional Scale (LEFS) (2) might be specified set of questions that evaluates the functional capability of an individual along with lower extremity orthopedic conditions. Hart et al documented that functional position, which was evaluated by using LEFS scale, signifies the "activity dimension" of the Global Health Organization's International Categorization of Functioning, Disability, and Health.(3)

Lower Extremity Functional Scale (LEFS) was one of the region-specific procedures and established for lower extremity musculoskeletal conditions. The lower extremity functional scale (LEFS) is a renowned and authenticated tool for estimation of lower extremity function, which was announced in 1999 by Binkley et al.(2) is a valid, effective as well as responsive tool applied to a clients with a great range of lower extremity conditions of orthopedic origin.(4, 5)

On this tool, contestants report the trouble in performing twenty exercises of the lower limb on a 5-point scale (0-"extraordinary trouble or incapable to accomplish movement," 4-"no trouble"). The answers are added up to report an outcome going from 0 to 80, with 0 demonstrates elevated degree of action limitation and 80 demonstrates low degree of action limitation. (3) Furthermore, the level of trouble of the 20 component and their reactions (i.e., 0–4) have been observed, (3) and this chain of components (i.e., from least problematic to most problematic) gives recommendations for actions that can be utilized to advance patients in their rehabilitation. (6)

The score contains 20 queries, which are categorized into four sets. This kind of groups includes tasks with expanding physical requirements. Queries on tasks are detailed differ from walking in middle of the rooms to running upon rough ground. It sometime won't quantify the client's initial characteristics, rate on going progression and quantify results throughout diversity of situations, such as: orthopedic problems, hip discomfort, Knee discomfort, Ankle discomfort, and foot problems. The LEFS can be used for computing lower region characteristics in an extensive variety of problems as well as helpful in providing therapy (Backes et al. 2015, Mahler et al. 2016, Rehman et al. 2016, Telles et al. 2016) (7).

The aim of current study was to provide Normative data for the lower extremity functional scale as LEFS was formulated in a group of patients who had a variety of musculoskeletal conditions, as well as no prescriptive information for the healthy population is obtainable. Therefore, we incorporate the standardizing information for

the lower extremity function scale in young adult healthy population in Pakistan.

METHODOLOGY

A sample of 1500 healthy participants was taken in the present study with equal distribution of male and female. Study was Descriptive Cross-sectional and data was collected from Teaching Staff, Nursing Staff and also from banks. The ethical committee of Riphah International University, Lahore, approved the study. Convenient sampling was the technique used to collect the data. Both male and female with age range of 20-50 years were included. Healthy subjects as measured on Subjective Global Assessment Form (SGA). This global form assesses the nutritional status of individuals based on structures of the history and physical inspection. After assessment the rating was done. SGA rates the participants into three categories i.e.

- A- Well-nourished: No deficit in nutrient/food intake; < 5% weight loss
- B- Mildly/moderately malnourished: Definite decline in food/nutrient intake; 5%- 10% weight loss without stabilization or gain
- C- Severely malnourished: Severe deficiency in food/nutrient intake; >5% weight loss which is ongoing. Participants were excluded having history of any lower extremity surgery, any deformity of lower limb i.e. Club Foot, Pes planus, Pes cavus, knock-knee etc. history of any lower limb fracture and Participant with history of any inflammatory condition i.e. Arthritis. Data was analyzed using IBM SPSS.

RESULTS

Table 1 shows there were 750(50.0%) males and 750(50.0 %) females with mean of 1.5 and S.D .5. Age of participants with mean value 34.7 and S.D 8.864. Table 2 shows the Lower Extremity Functional Scale in relation to Gender.

Table-I: Descriptive statistics of Participants

		N	MEAN	S.D
Age of Participants (Years)	Male	1500	34.7	8.86
		750 (50.0%)	34.7	8.86
Gender of Participants	Female	750 (50.0%)		
	Male	1500	1.5	.5
	Female	750 (50.0%)	1.5	.5

Among 1500 participants, mean age of both male and female participants of the study was 34.7±8.864 years. In this study minimum age was 20 years and maximum age of the participants was 50 years.

Among 1500 participants, mean Gender of both male and female participants of the study was 1.5±.5years. In this study minimum number of participants was 1 as we label (1= Male) and maximum number of participants was 2 as we label (2= Females).

Table-II: Lower Extremity functional Scale in relation to Gender

	Lower Extremity Functional Scale	
	Male (n=750)	Female (n=750)
Mean	57.311	77.883
SD	8.208	9.291
Min	13	35
Max	80	80

The mean of Lower Extremity functional scale in Male Participants included appeared to be 57.311±8.208. Minimum score Lower Extremity Functional scale in Male remained 13 and Maximum Score of Lower Extremity Functional scale was 80.

The mean of Lower Extremity functional scale in Female Participants included appeared to be 77.883±9.291. Minimum score of Lower Extremity Functional scale in Female remained 35 and Maximum score of Lower Extremity Functional scale was 80.

Formula: By using this formula, we are able to calculate the predicted score of individuals.

LEFS(M) = Constant + Factor (Age) + Factor(BMI) = 78.093+ -.375() +.137()
LEFS(F) = Constant + Factor (Age) + Factor (BMI) = 87.809 + -.232()+ -.543()

DISCUSSION

In current Study results showed that LEFS score vary according to age and gender; i.e. as the age increase lower extremity function decreases. Mean outcome/score for their LEFS for the entire human population was 74.124 (out of 80). Men and Women had mean scores (57.311 and 77.883 respectively). Women scores high as compare to men, as the scores decreases with increasing age. The Lower Extremity Functional Scale decreases with age peaking in subjects from 46-50 years. Age group between 20-25 years scored maximum at LEFS as compared to the other groups which are ranged from 26-50 years.

This contrasts together with the results of numerous researches where it was discovered that reduced Socioeconomic status (SES) experienced an adverse effect on consequences following treatment for proximal as well as distal radius fracture, fracture of humerus, and hip fracture (Orive et al. 2016, Clement et al. 2014, Paksima et al. 2014, Duckworth et al. 2012, Chung et al. 2007).(8) This shows that characteristics could be independent to SES in an average population, however in posttraumatic patient's Socioeconomic status might be adversely impact results. Demetracopoulos et al. (2014) analyzed the results of peroneal tendon repair while using the LEFS. They figure out average LEFS points of 71, signifying an effective result of their treatment approach. Between the criteria indicator of improvement and both questionnaires, a strong correlation was found. Both LEFS and Anterior Knee Pain Scale (AKPS) showed strong test-retest consistency and tend to be fairly receptive in patients with front knee pain to therapeutic changes. In the LEFS, reliability and response were marginally higher than in the Anterior Knee pain scale (9). (4) Cynthia J. Watson et al. (2005) measures the consistency as well as awareness of the lower extremity Functional scale along with Front Knee Pain Scale. They figured that LEFS appeared to be relatively much responsive as compare to the AKPS. The better awareness

of this LEFS could be associated to both the nature and number of the queries on the survey. There were 13 queries on the AKPS and 20 on the LEFS. Although both the LEFS and also the AKPS enquire patients to clarify their capability during uphill/stair climbing, walking, running, squatting, hopping/jumping and prolonged sitting, the LEFS continues on to incorporate further practical events such as getting in and out of the bath, housework/work activities and also getting in and out of the car, etc. Neither set of survey incorporates a question associated with kneeling, that has been suggested by medical experts within the research of Harrison et al. (2)

The result of our own research, provide evidence for supporting the LEFS, as with increasing Age and BMI had negative influence on the score. Though, we made an effort to equalize the number of females and males in equal distribution. Moreover, we continuously examined the distribution of feedback in various age groups. We experience moreover, that with our study people of more than 1,000 participants, we had been capable to conclude a precise estimation of normative scores/values for the LEFS.

CONCLUSION

The study determined that Lower extremity functional scale scores vary according to the age and gender of the participants. Lower extremity functional score decreases with increasing age. Women have relatively higher scores than men.

REFERENCES

1. Schneider W, Jurenitsch S. Normative data for the American Orthopedic Foot and Ankle Society ankle-hindfoot, midfoot, hallux and lesser toes clinical rating system. *International orthopaedics*. 2016;40(2):301-6.
2. Demetracopoulos CA, Vineyard JC, Kiesau CD, Nunley JA. Long-term results of debridement and primary repair of peroneal tendon tears. *Foot & ankle international*. 2014;35(3):252-7.
3. Binkley JM, Stratford PW, Lott SA, Riddle DL, Network NAORR. The Lower Extremity Functional Scale (LEFS): scale development, measurement properties, and clinical application. *Physical therapy*. 1999;79(4):371-83.
4. Heikkinen R-L, Ageing W. The role of physical activity in healthy ageing. World Health Organization, 1998.
5. Binkley JM, Stratford PW, Lott SA, Riddle DL, Network NAORR. The Lower Extremity Functional Scale (LEFS): scale development, measurement properties, and clinical application. *Physical therapy*. 1999;79(4):371-83.
6. Haley SM, Fragala-Pinkham MA. Interpreting change scores of tests and measures used in physical therapy. *Phys Ther*. 2006;86:735-743.
7. Pua Y-H, Cowan SM, Wrigley TV, Bennell KL. The lower extremity functional scale could be an alternative to the Western Ontario and McMaster Universities Osteoarthritis Index physical function scale. *Journal of clinical epidemiology*. 2009;62(10):1103-11.
8. Yeung TS, Wessel J, Stratford P, MacDermid J. Reliability, validity, and responsiveness of the lower extremity functional scale for inpatients of an orthopaedic rehabilitation ward. *Journal of orthopaedic & sports physical therapy*. 2009;39(6):468-77.
9. Dingemans SA, Kleipool SC, Mulders MA, Winkelhagen J, Schep NW, Goslings JC, et al. Normative data for the lower extremity functional scale (LEFS). *Acta orthopaedica*. 2017;88(4):422-6.
10. Cruz-Díaz D, Lomas-Vega R, Osuna-Pérez MC, Hita-Contreras F, Fernández ÁD, Martínez-Amat A. The Spanish lower extremity functional scale: a reliable, valid and responsive questionnaire to assess musculoskeletal disorders in the lower extremity. *Disability and rehabilitation*. 2014;36(23):2005-11.
11. Mehta SP, Fulton A, Quach C, Thistle M, Toledo C, Evans NA. Measurement properties of the lower extremity functional scale: a systematic review. *Journal of orthopaedic & sports physical therapy*. 2016;46(3):200-16
12. Watson CJ, Propps M, Ratner J, Zeigler DL, Horton P, Smith SS. Reliability and responsiveness of the lower extremity functional scale and the anterior knee pain scale in patients with anterior knee pain. *Journal of Orthopaedic & Sports Physical Therapy*. 2005;35(3):136-46.
13. Stasi S, Papatthanasiou G, Anagnostou M, Galanos A, Chronopoulos E, Baltopoulos PI, et al. Lower Extremity Functional Scale (LEFS): Cross-cultural adaption into Greek and reliability properties of the instrument. *Health Science Journal*. 2012;6(4):750.
14. Heikkinen R-L, Ageing W. The role of physical activity in healthy ageing. World Health Organization, 1998.
15. Binkley JM, Stratford PW, Lott SA, Riddle DL, Network NAORR. The Lower Extremity Functional Scale (LEFS): scale development, measurement properties, and clinical application. *Physical therapy*. 1999;79(4):371-83.
16. Hart DL, Mioduski JE, Stratford PW. Simulated computerized adaptive tests for measuring functional status were efficient with good discriminant validity in patients with hip, knee, or foot/ankle impairments. *Journal of clinical epidemiology*. 2005;58(6):629-38.
17. Pua Y-H, Cowan SM, Wrigley TV, Bennell KL. The lower extremity functional scale could be an alternative to the Western Ontario and McMaster Universities Osteoarthritis Index physical function scale. *Journal of clinical epidemiology*. 2009;62(10):1103-11.
18. Yeung TS, Wessel J, Stratford P, MacDermid J. Reliability, validity, and responsiveness of the lower extremity functional scale for inpatients of an orthopaedic rehabilitation ward. *Journal of orthopaedic & sports physical therapy*. 2009;39(6):468-77.
19. Haley SM, Fragala-Pinkham MA. Interpreting change scores of tests and measures used in physical therapy. *Phys Ther*. 2006;86:735-743.