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ORIGINAL PAPER

Validation of psoriasis disability index (PDI) questionnaire Sinhala version

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Abstract

Introduction/objectives Psoriasis is a chronic inflammatory dermatosis with significant physical and psychological impact leading to negative influence on the quality of life among patients with psoriasis. Other than the disease characteristics many external factors could operate in South Asian context. Lack of a reliable disease-specific instrument prevents objective estimation and monitoring of disability in patients with psoriasis and hence we aim to validate assess the psychometric properties of the Sinhala version of PDI.

Methods A cross-sectional study conducted at dermatology clinic at a tertiary care National Hospital in Sri Lanka. Patients with psoriasis and on therapy at least 4 weeks prior to enrollment, aged more than 18 years, were included while those with already diagnosed psoriatic arthritis and/or nail psoriasis alone without any skin involvement and generalized pustular psoriasis de novo were excluded. All patients were examined by dermatologist to obtain disease characteristics. The reliability was assessed by internal consistency using Cronbach's α and item-total correlation. Convergent validity was measured with the known groups.

Results Of 199 patients studied, the PDI Sinhala version showed Cronbach's α of 0.86 (all 15 items) and ranged from 0.57 to 0.77 for subscales. PDI score and Dermatology Life Quality Index (DLQI) showed good correlation of coefficient 0.76 ($p < 0.01$). Positive associations were noted with extent and severity of psoriasis when using sample medians ($p < 0.05$). The dimensionality of the PDI was determined using exploratory factor analysis and four factors were structured.

Conclusion The PDI Sinhala version is proved to be valid and reliable tool to assess the burden of psoriasis among Sinhala conversant patients in Sri Lanka

Keywords Psoriasis · Quality of life · Patient-reported outcomes · Psoriasis Disability Index · Validation study

Introduction

Psoriasis is a chronic inflammatory dermatosis with a wide range of clinical manifestations on skin, ranging from small plaques to erythroderma. The unsightly appearance and the chronicity of the disease, creates immense physical and psychological impact among 10–62% of patients [1]. The psychological impact leads to isolation and social phobia causing poor social enactment in these patients. High level of distress is reported with psoriasis and is related to the disability and perception of stigmatization than the disease severity [2]. Thus the physical and psychological morbidity causes a negative impact on the quality of life (QoL) in patients with psoriasis [3]. The negative attributes of psoriasis can be expected to be greater in South Asian context due to cultural and social norms, traditional believes and the lack of patient support systems in these countries. Therefore, the true disease burden of psoriasis depends not only on disease characteristics but also external factors.

Since the disease per se does not reflect the true burden of psoriasis physical, psychological and social factors need to be considered in assessing the impact of psoriasis. The contribution made by these factors is not evaluated or underestimated by health care providers during patient evaluation [4]. Patients reported outcome reflects the physical, psychological and social impact of the disease and is important

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in patient management. In the evaluation of health-related QoL patients with psoriasis show significant lower scores in physical and mental functions compared to other major chronic health conditions including cancer, arthritis, hypertension, heart disease and diabetes [5]. Nearly half of the patients perceive having asthma or diabetes instead of psoriasis either " better" or "the same" [6]. In Sri Lankan, of the patients with skin diseases, those with psoriasis show poor QoL [7]. A local qualitative phenomenological study on 12 patients with psoriasis reveal concerning physical, social and psychological issues [8].

There are many tools to assess the QoL and the disability associated with psoriasis. The QoL tools measure the physical and mental domains of health by assessing the objective functioning and subjective well-being in patients with the disease [9]. Both general dermatologic and disease-specific instruments are used on patients with psoriasis to evaluate their quality of life [10]. These include General Health Questionnaire 12 (GHQ12) and Short Form Health Survey Questionnaire (SF-36) assessing general health status and Dermatology Life Quality Index, Skindex-29, namely dermatology-specific indices; Impact of psoriasis on QoL and Psoriasis Disability Index (PDI) which are psoriasis specific. Although there are about 16 psoriatic-specific patient-reported outcome measures, there is no single tool adequately measuring physical, social and emotional well-being among patients with psoriasis [11].

Psoriasis disability index (PDI) questionnaire is a widely used tool which specifically measure disability associated with psoriasis [12]. Many studies have used PDI to detect the disability on patients' perspective, particularly on the burden of disease and treatment. [13]. Further, the questionnaire provides a multidimensional measure on the impact of psoriasis [12] and covers five main areas of disability encountered by patients including daily activities, work or school related, personal relationships, leisure and problems related to treatment during a recall period of 4 weeks. Each question has four scoring points from 0 to 6 (0, 2, 4, 6) and the total score is calculated by the summation of all scores. The maximum score is 90 and higher scores reflect greater disability. The PDI is associated with high internal consistency [14] and it has been validated in 24 languages including Arabic, Bosnian, Chinese, Czech, Danish, Filipino, Finnish, French, German, Gujarati, Hindi, Icelandic, Italian, Japanese, Lithuanian, Marathi, Portuguese, Romanian, Serbian, Spanish, Thai, Turkish, Ukranian and Zulu [15].

Holistic approach in patient care requires an assessment of the impact of a disease on the QoL and wellbeing of patients. For this purpose, many rating scales have been translated and validated in Sri Lankan population [16]. However, there is a scarcity of such tools for patients with chronic dermatologic diseases. Although Dermatology Life Quality Index has been validated in the local population [17], it does not cover the areas which are specific for patients with psoriasis. The lack of a reliable instrument prevents objective estimation and monitoring of disability in patients with psoriasis. The aim of the study was to translate the existing PDI questionnaire and to validate the translated Sinhalese version of PDI in patients with psoriasis.

Method

The forward translation of the PDI questionnaire from the source language to Sinhala was performed by two translators conversant in both Sinhala and English languages. The translation was done independently, in blinded manner. The two translations were combined to make one single questionnaire and it was back translated to English by another translator who was knowledgeable in both languages to determine the compatibility of Sinhala version and the original questionnaire.

The Sinhala translation was given to a group of patients ($n=5$) with chronic skin disorders attending dermatology clinic at the National Hospital of Sri Lanka (NHSL) to assess the understandability and clarity of the components of the questionnaire and further improvements were done. A pilot study was done using the amended Sinhala version on 30 patients with psoriasis attending dermatology clinics at the NHSL and the basic statistical tests on validity and reliability were performed. The final Sinhala version of the questionnaire was used in the current study adhering to the standard procedures described in the original questionnaire.

The study was done in cross-sectional manner involving patients attending psoriasis clinic at the NHSL. Patients with plaque type psoriasis, confirmed clinically by a dermatologist, were included in the study if they were on therapy at least 4 weeks prior to enrollment, aged more than 18 years, able to read and understand Sinhala. Those with already diagnosed psoriatic arthritis and/or nail psoriasis alone without any skin involvement and generalized pustular psoriasis de novo without associated or previous history of plaque psoriasis were excluded from the study.

The intention and the process of the study were explained and written informed consent was obtained from all participants. Demographic data and disease characteristics were obtained using an interviewer administered questionnaire. The principal investigator (PLANL) examined all patients and area involved and the severity of psoriasis were assessed using the Psoriasis Area and Severity Index (PASI).

The Sinhala version of the PDI questionnaire was given to participants and those with difficulties in completing/or understanding the content were assisted but the answers were solely based on their own experience. Completed questionnaires were collected immediately after they were marked.

The ethical approval for the study was obtained by the Ethics Review Committee, Faculty of Medicine of University of Ruhuna (Reference no.3.6: 15.02.2018).

Other measurements made

Dermatology life quality index (DLQI)

DLQI assesses the QoL in patients with dermatological diseases, and is originally developed by a Finley AY [18]. Although it is not disease specific, the questionnaire is widely used in the evaluation of dermatology patients. The questionnaire is consisted of ten questions focusing on six aspects of QoL including symptoms/feelings, leisure, work/school, personal relationships and treatment. Each question is scored on a four-point Likert scale ranging 0–3. The minimally clinical important differences for DLQI is defined as five for patients with psoriasis [19]. We used the validated Sinhalese version of DLQI in the study to assess the QOL of study subjects [17].

Psoriasis Area and Severity Index (PASI)

PASI is calculated using basic disease characteristics including erythema, scaling, induration of plaques and the extent of skin surface area involved. It is the most widely used tool for the measurement of psoriasis severity and is a validated instrument with a high intra-rater and inter-rater reliability. The score ranges from 0 to 72 and the severity is categorized in to mild (< 5), moderate (5–10) and severe (> 10) [20]. We assessed the disease severity using PASI based on the assessment made by the principal investigator.

Body surface area (BSA)

The body surface area involved was determined by the principal investigator and patients were classified in to mild (< 3%), moderate (3–10) and severe (> 10) categories [20].

Statistical analysis

Data were analyzed using Statistical Package for the Social Sciences version 20.0. Mean, standard deviation, median, interquartile range, percentiles were calculated for descriptive statistics. Internal consistency of the tool was assessed using Cronbach's α and item-total correlation. Construct validity was measured by means of the convergent validity of the tool with the validity known groups including PASI and DLQI. Spearman rank correlation was used to measure the association between DLQI and PDI. Independent sample non parametric testing was used to compare medians across groups of PASI, BSA and DLQI. The significant level was set at p value < 0.05.

During the exploratory factor analysis principal component analysis was used to extract factors and varimax with Kaiser normalization was used as the rotation method.

Results

Of 202 patients recruited, 199, patients completed the questionnaire and their age ranged from 18 to 80 with mean (SD) of 52 (14) years. Fifty-six percent were male and 72% were married. The majority (57%) had studied up to ordinary level and were in the Social class 3 (39%) according to Barker and Hall classification [21]. Sixty-four percent had no history of smoking and one fifth of the study sample had a family history of psoriasis.

Median (IQR) disease duration was 11 (5–22) years and the median (IQR) Psoriasis Area Severity Index was 4 (2–8). The majority (79%) had experienced itch at some stage of the disease and the median (IQR) itch score was 3 (1–5) according to the visual analog scale which range from 0(denotes no itch) to 10(denotes worst imaginable itch).

Of the 199 patients, 56.8% responded to not at all option for at least in one PDI category while 25.4% opted for "a little" for at least a single item (Fig. 1). All subscales had small ceiling effect < 2% while scales related to personal relationship and treatment had considerable floor effect ≥ 60% (Table 1).

Positive associations were noted with total PDI score and the extent of the disease and the severity of the disease when using sample medians ($p < 0.05$) (Fig. 2). The total score of PDI score and DLQI score showed linear relationship on scatter plot (Fig. 3) and had good correlation of coefficient 0.76 ($p < 0.01$).

PDI Sinhala version showed Cronbach's α of 0.86 for all items while Cronbach's α of subscales ranged from 0.57 to 0.77 (Table 1). The internal structure of the PDI Sinhala version assessed by the Principal Component Analysis with Varimax rotation and Kaiser normalization showed four factor dimensionality. In the exploratory factor analysis, eigenvalue was kept at > 1 the four components showed 58.9% of the cumulative variance (Table 2). The Scree plot showed the point of inflexion at 4 reconfirming the factor structure (see Fig. 4).

First 5 items related to daily activities and the item 15 which is related to treatment draw backs loaded in to 1 component. The items 6, 7 and 8 related to work/school or the alternative questions loaded together while item 9 and 10 related to personal relationships and 11, 12 and13 related to leisure activities loaded together. The item 14 inquiring smoking and alcohol remained as a single component (see Table 3).

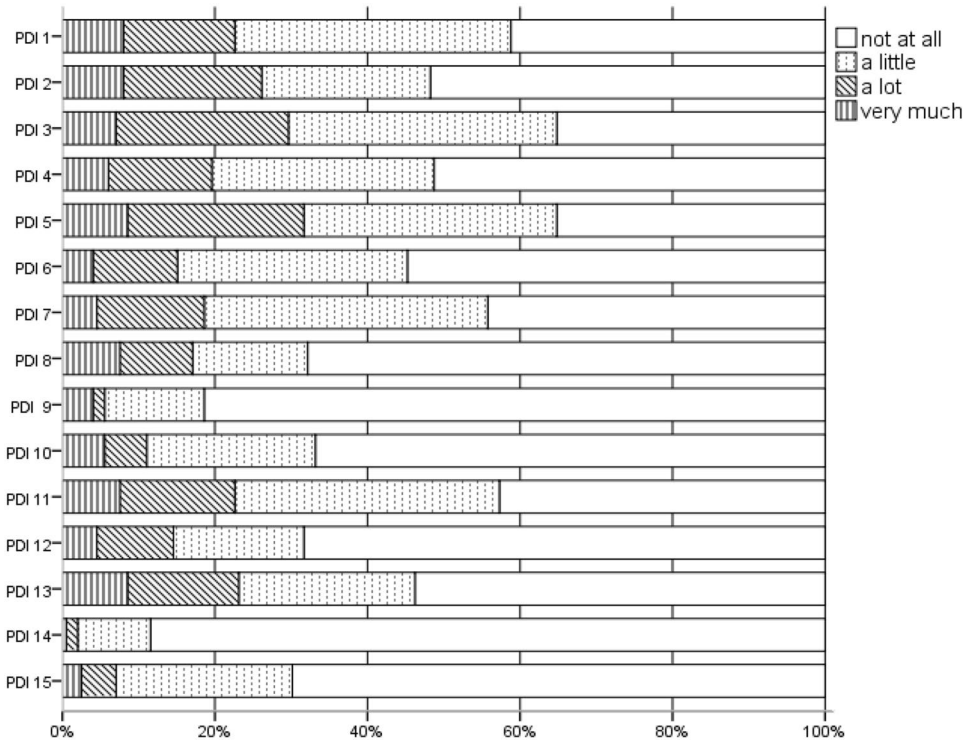


Fig. 1 Distribution of responses to 15 items of PDI

Table 1 Distribution of scores of PDI subscales

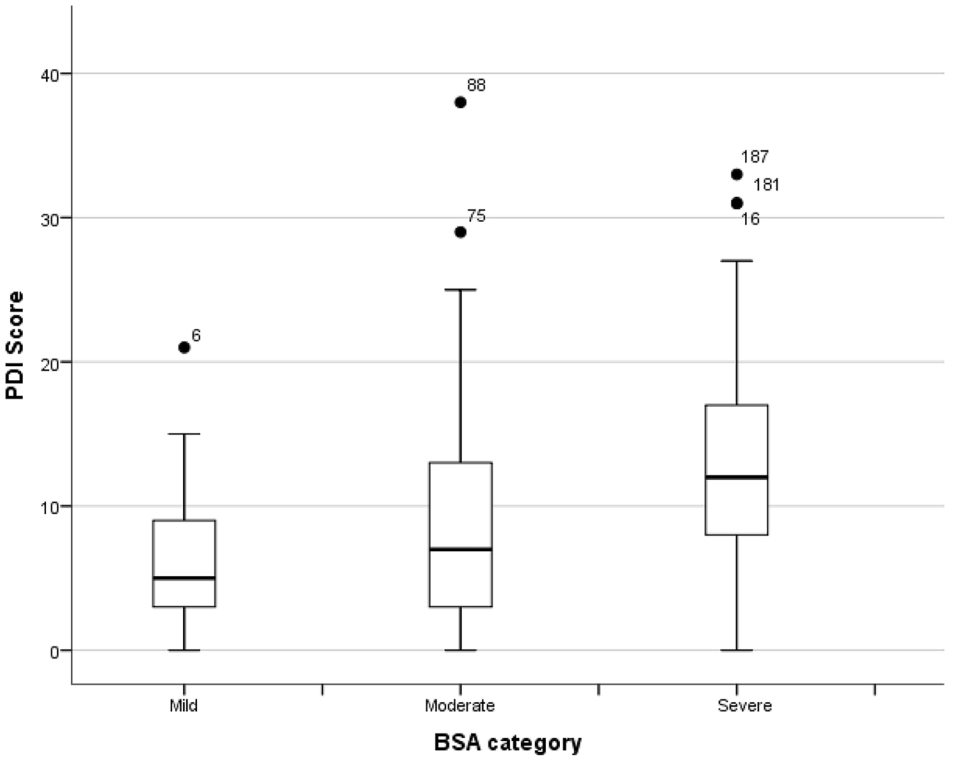
	Total score	Mean	SD	Percentiles			% floor	% ceiling	Item-total correlation	Cronbach's α
				25	50	75				
Daily activities (Q1–Q5)	15	4.5	3.4	2.0	4.0	7.0	8.1	0.5	0.44–0.64	0.77
Work/school related (Q6–Q8)	9	2.0	2.1	0	2.0	3.0	33.7	1.5	0.48–0.65	0.75
Personal relationships (Q9–Q10)	6	0.8	1.3	0	0	1.0	59.8	2.0	0.40–0.40	0.57
Leisure (Q11–Q14)	12	2.3	2.2	0	2.0	4.0	28.1	1.0	0.04–0.53	0.60
Treatment (Q15)	3	0.4	0.7	0	0	1.0	69.8	2.5	-	-

Discussion

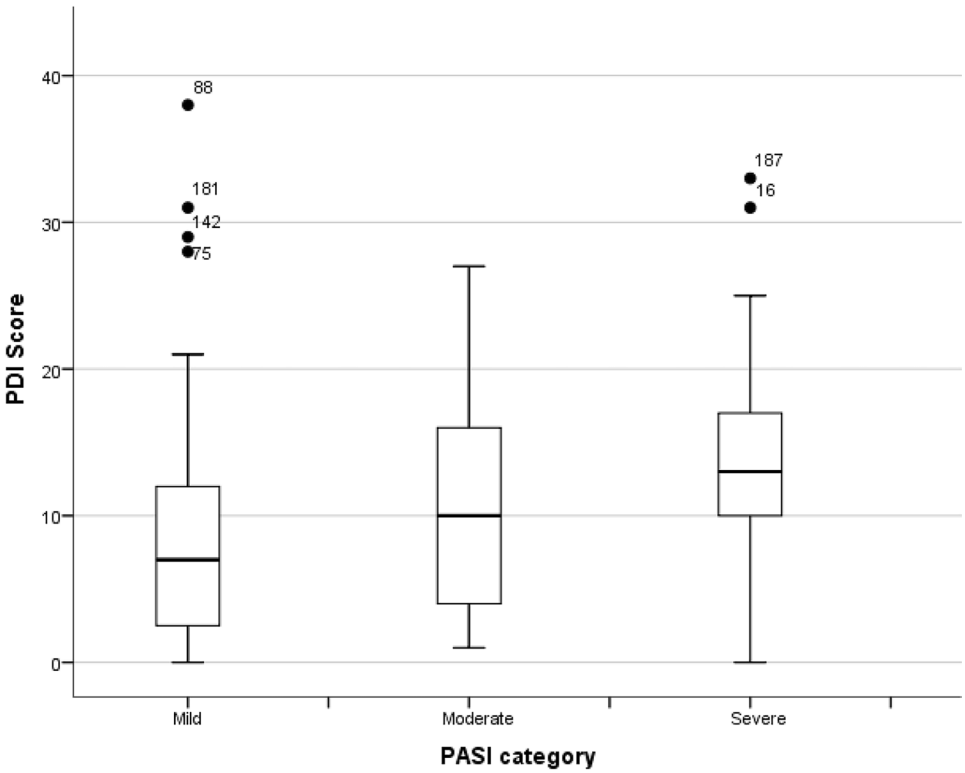
A holistic patient care plan in psoriasis requires a comprehensive assessment of patients including disease burden, psychological impact and the QoL. In Sri Lanka, the QoL among patients with psoriasis is not sufficiently explored partly due to unavailability of an appropriate validation tool. The PDI is a disease-specific tool used in clinical practice and the number of linguistic translations testifies its extensive use. The Sinhala version of PDI used in this demonstrated adequate psychometric properties of its use among Sinhala speaking patients in Sri Lanka.

In our study, the response distribution did not show a wide variation and 57% responded "not at all" option for at least one item which is reflected in the large floor effect for personal and treatment subscales. Similar observation have been made in other analyses including a US study [14] and a Chinese study [22]. The wide variation in response distribution observed in the British study [6] was not supported by our study results. The internal reliability of 0.86 for overall PDI and > 0.57 for all subscale is comparable with the results of other validations of PDI [14, 22–24]. Furthermore, the current study confirms the discriminative ability of Sinhala version depending on the disease severity which aligns with the results of previous studies including the original version [6].

The dimensionality of the original PDI is categorized under 5 subscales but the number of factors has varied in subsequent validations. The number of factors observed in the US, Chinese, Norwegian Arabic and Bengali studies were 1, 2, 3, 2 and 3, respectively. The Sinhala version in the current study showed 4 factors, of which one factors included a single item. This could be partly due to the low prevalence of smoking among patients, particularly among women who do not smoke due to social and cultural

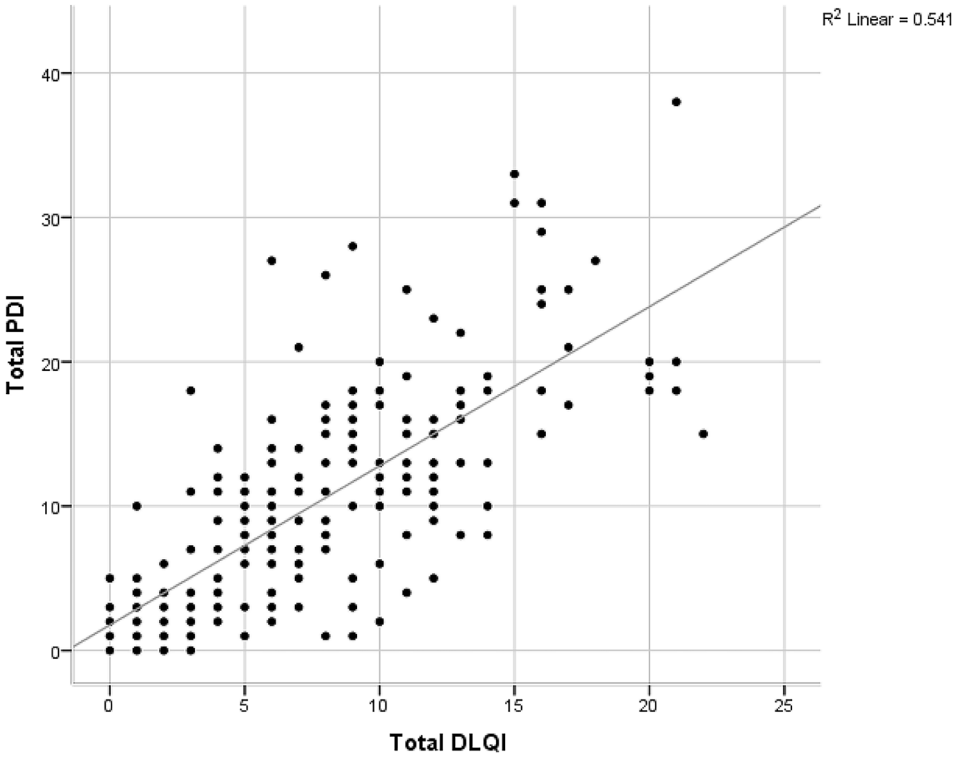


(A)



(B)

Fig. 2 Stem and leaf plots total score of PDI and BSA category (**a**) and PASI score (**b**)



(A)

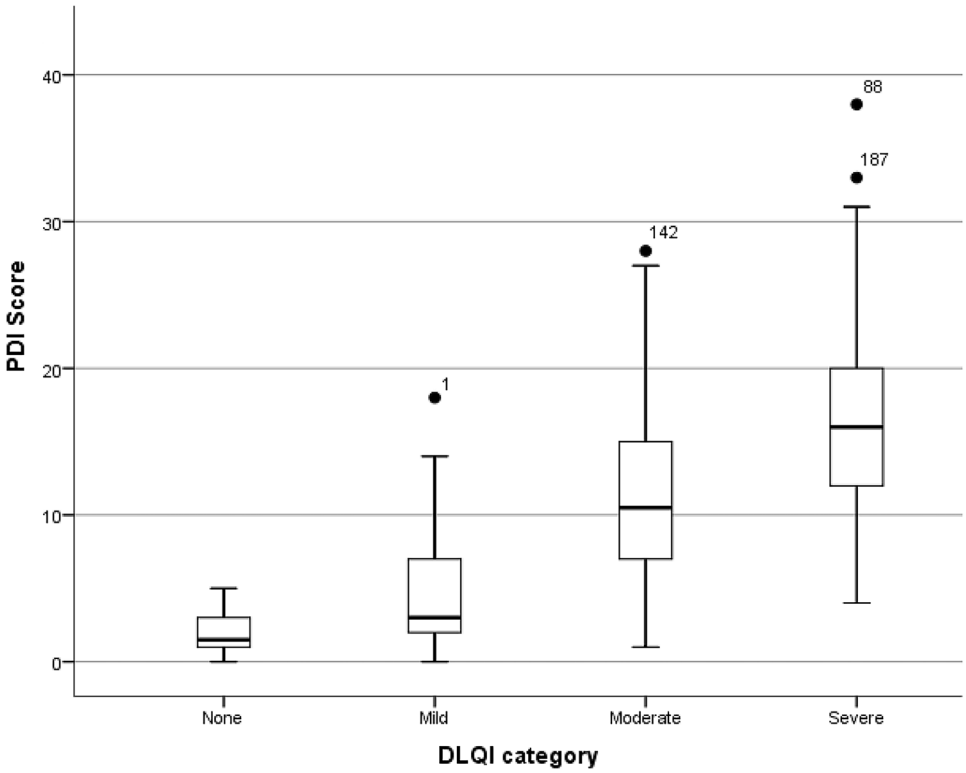


Fig. 3 Scatter plot (**a**) and Stem and leaf plot (**b**) of PDI and DLQI category

factors. Similarly the consumption of alcohol is low among Sri Lanka women, once again due to cultural and religious influences [25].

The strengths of our study include relatively large sample considering the disease prevalence and population in local setting thereby is feasible to draw the conclusions. However,

Table 2 Total variance explained

Component	Initial Eigenvalues			Rotation sums of squared loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.288	35.254	35.254	2.584	17.226	17.226
2	1.417	9.444	44.698	2.487	16.580	33.806
3	1.105	7.365	52.063	2.486	16.571	50.378
4	1.026	6.841	58.903	1.279	8.526	58.903
5	0.926	6.173	65.076			
6	0.826	5.509	70.585			
7	0.731	4.870	75.455			
8	0.680	4.531	79.986			
9	0.600	4.003	83.988			
10	0.556	3.706	87.694			
11	0.448	2.988	90.683			
12	0.423	2.819	93.502			
13	0.384	2.559	96.061			
14	0.320	2.134	98.194			
15	0.271	1.806	100.000			

Extraction method: principal component analysis

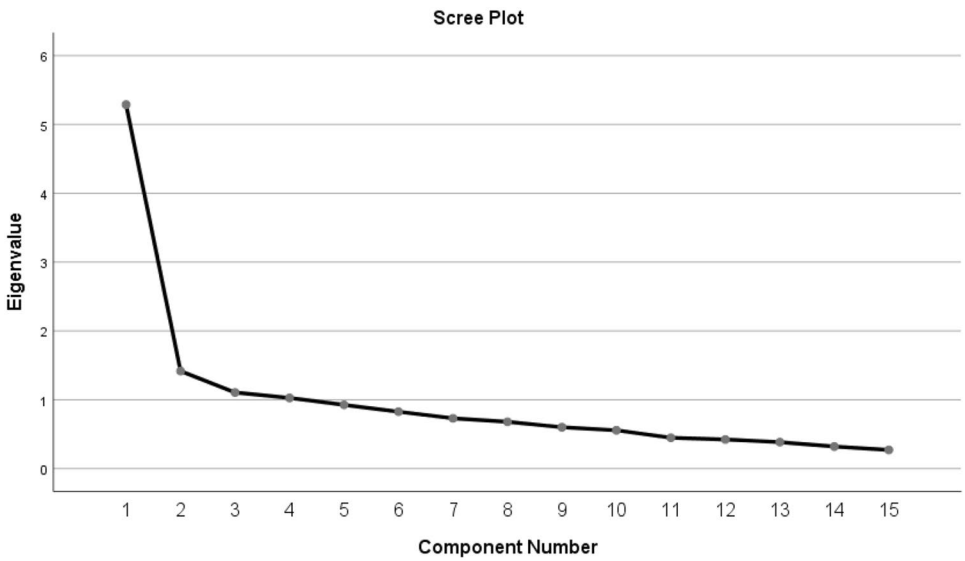


Fig. 4 Scree plot of the factor analyses of the PDI

test–retest reliability and definition of minimally clinical difference were unable to assess with the single administration of the tool.

Conclusion

The Sinhala version of PDI is proved to be valid and reliable tool to assess the impact of psoriasis among patients with psoriasis in Sri Lanka with good psychometric properties. The future studies using the tool will shed light on the true disease burden in Sri Lankan perspective and thereby improve the betterment of care for the patients with psoriasis.

Availability of data and material (data transparency):

Datasets generated during and/or analyzed during the study are available from the corresponding author on reasonable request.

Table 3 Factor analysis of PDI

	Component			
	1	2	3	4
Daily activities				
PDI 1	0.478			
PDI 2	0.594			
PDI 3	0.709			
PDI 4	0.527			
PDI 5	0.796			
Work/School				
PDI 6		0.719		
PDI 7		0.819		
PDI 8		0.639		
Personal relationship				
PDI 9			0.677	
PDI 10			0.581	
Leisure				
PDI 11			0.607	
PDI 12			0.657	
PDI 13			0.636	
PDI 14				0.838
Treatment				
PDI 15	0.497			

Extraction method: principal component analysis

Rotation method: varimax with Kaiser normalization

Code availability (software application or custom code)

Open source software used.

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Authors' contributions All authors contributed to the study conception and design. The material preparation was done by Dr. Achala Liyanage and Dr. Gayani Liyanage. Data collection done by Dr. Achala Liyanage, Dr. Janaka Akarawita and Dr. Chalukya Gunasekera. The data analysis was performed by Dr. Achala Liyanage and Prof. Sarath Lekamwasam. The first draft of the manuscript was written by Dr. Achala Liyanage and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Compliance with ethical standards

Conflicts of interest Authors declare no conflicts of interest.

Ethical approval The study obtained ethical approval from the Ethical Review Committee of Faculty of Medicine, University of Ruhuna (Ref No. 15.02.2018:3.6) and is accordance with the 1964 Helsinki declaration.

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