

Keloid Scars: The Hidden Burden of Disease

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Rec date: December 02, 2015; Acc date: December 11, 2015; Pub date: December 23, 2015

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Abstract

Background: Keloid scar patients are known to present with a combination of symptoms including pain, physical deformity and psychological distress. These three facets that characterise the full extent of the keloid disease (KD) have not been validated in a clinical setting before as a whole and thus the disease is usually approached and managed incompletely. Assessment measures need to accurately quantify the disease's impact on the patients' distress in terms of physical symptoms, life quality and psychosocial status.

Method: 46 keloid scar patients seen at clinic were asked to fill out the MSF-PQ, DLQI and DAS-24 questionnaires. The results were analysed for internal consistency (IC) and convergent validity (CV). Each of the three questionnaires was then further analysed to identify factors which affect patients with the disease.

Results: There was convergent validity between DAS-24 and DLQI scores (0.54, $p < 0.01$). The questionnaires showed excellent IC (α -range 0.86-0.9). Female gender and the presence of scars hidden under the clothesline significantly increased patients' pain (MSF-PQ) and QoL impact scores (DLQI). All questionnaires showed good validity in assessing the aspects of concern for keloid scar patients, severity of physical symptoms and capturing patient's subjective feelings and avoidance behaviours.

Conclusion: KD extends beyond being a hyper-proliferative disease of scars. The resulting lesions can produce disabling symptoms, deforming growths and a level of appearance anxiety whether visible or not. Assessing the extent of the disease and its effects on the patient, by the proposed, validated assessment tools, highlights the need for a more complete management of the disease.

Keywords: Keloid; Scars; Patients

Introduction

Keloid disease is a hyper-proliferative condition that can develop in patients after an innocuous skin abrasion [1]. The exact pathology of a keloid is poorly understood, but benign fibrotic lesions can persist, growing well beyond the margins of the initial injury. The scars are raised, have an irregular border, hyper-pigmented and erythematous; all of which make the visibility of keloid scars evidently distinct from the surrounding skin.

A number of treatments are available for keloid scars, none of which are curative or resolve symptoms completely [2]. They include treatments such as: excision intralesional or extralesional, intralesional steroid injection, local chemotherapy, cryotherapy, radiotherapy and pressure occlusion dressing. The majority of these treatments are aimed at physically reducing the size of the scar, and to varying degrees of success controlling the physical symptoms.

Accurate measurements can be made of the keloid scars in the clinic based upon physical parameters such as: size, thickness, pliability and growth, in addition to patient reported symptoms (pain, pruritis, bleeding, etc). A number of clinical scales have been validated in keloid scar patients to give objective measurement of the above criteria such as the (VSS) Vancouver Scar Scale3 and (POSAS) Patient and Observer

Scar Assessment Scale [3]. Previous studies, however, have shown a discrepancy between patient and observer reported measurements [4]; often patients objectively rate the severity of their scars as being significantly higher [5,6]. These measurements also fail to capture patient's overall subjective feelings, their ability to continue with daily tasks and the Quality of Life (QoL) impact of living with disfiguring symptomatic keloid scars [7]. In addition, the psychological impact of objectively rated identical scars has been shown to be highly variable, depending on patient sensitive factors such as: site of scar [8], Fitzpatrick skin type [9] and gender [10].

Current practice in scar evaluation has been heavily influenced by the need to conceptualise treatment outcomes on the basis of "goal driven" objective clinical measures. These however do not correlate with the disproportionate and personal subjective experience of living with keloid scars. It is therefore important to have validated objective tools that accurately measure the severity of patients' symptoms (physical and psychological) as reported and experienced by them. This will enable clinicians to better track treatment outcomes from the patients' perspective. In addition it may help to identify patients whose needs might be best met with psychological intervention alongside the most appropriate medical treatments.

McGill short-form Pain questionnaire (MSF-PQ)

The MSF- PQ is a multi-dimensional objective pain scale; it is composed of 15 pain descriptors, 11 of which describe the sensory aspect of pain and 4 to describe the affective component [11]. Each pain descriptor is reported by intensity (none-1, mild-2 moderate-3 and severe-4) to provide analytical data on the severity of symptoms. The questionnaire has been adapted from the original McGill pain questionnaire, as an effective short (2-3 minute) previously validated clinical tool to measure pain in chronic conditions (scoring range 0-30). Fibromyalgia, arthritis and chronic cancer pain are three examples where the SFM-PQ has been validated and used routinely in clinical practice [12].

There is a second Present Pain Intensity (PPI) component to the questionnaire; this was omitted from the analysis as keloid scar pain was reported as being brief and intermittent.

Dermatology Life quality Index (DLQI)

The DLQI questionnaire is composed of 10 questions, it measures the Quality of Life (QoL) impact in 6 separate domains, and they are: symptoms/feelings, daily activities, leisure, work/school, personal relationships and treatment. Each question is scored on a 4-point Likert scale (0-3); the total scoring range of the questionnaire is (0-30), with higher scores indicating a bigger impact on the patients QoL. Overall DLQI score can be converted into a QoL impact score by the following rating scale: (0-1 no impact, 1-5 small impact, 5-10 moderate impact, 10-20 large impact and 20-30 very large impact) [13]. To date the DLQI has been validated in 33-skin conditions¹⁴ (including keloids); it represents a compact clinical tool that helps integrate the physical and psychological symptoms of disfiguring skin conditions.

Derriford-24 appearance scale

The DAS-24 is a psychometric analysis tool that helps to capture several aspects of psychological symptoms in patients with disfiguring features. Among the criteria measured are symptoms of: distress, anxiety, avoidance behaviours, depression and fear of negative evaluation¹⁵. Each of the questions has verbal responses, linked to numerical values (0-4); the scoring range of the test is (11-96) with larger scores indicating greater psychological distress. Previous studies have extensively validated the DAS-24 questionnaire as a sensitive screening tool for detecting appearance anxiety in a number of skin conditions, such as: burns, severe acne and trauma scarring [14].

Methods

Patients

46 patients seen at the The Royal London Hospital specialist keloid clinic were asked to fill out the DLQI, DAS-24 and MSF-PQ questionnaires during the period (June-Aug). There were 16 male patients (33%) and 30 female patients (66%) with an average age of 32 years old (range 22-50). Forty-two patients presented with a single scar and four had two scars, in total there were 46 patients evaluated. The distribution of scars was as follows: abdomen-8, earlobe-7, sternum-14, face-8, shoulder-4, hand-2 and arm-5.

Patients were further divided into those with "hidden" or "exposed" scars, 20 of the patients had hidden scars and 22 exposed scars. Four patients were omitted from the analysis as they had scars on both "hidden" and "exposed" parts of their body. The cohort of patients was

ethnically diverse, the group was divided into the following Fitzpatrick groups: 12 Fitzpatrick type VI (black), 20 Fitzpatrick type V (brown) and 17 Fitzpatrick type I-IV (white-Mediterranean skin tone).

When the results were analysed to look for a statistical difference between two subgroups of the population (gender and scar exposure), the mean results of the two groups for each questionnaire were analysed using a student's T-test. In situations where there were three or more sub groups analysed (scar location and ethnicity), an ANOVA one way single factor analysis test of the variances was applied.

Analysis

Convergent validity: The convergent validity of the questionnaires was measured to ensure that two independent scales, which had been thought to measure similar constructs, were indeed correlated and consistent. To enable this to happen the questionnaires were separated into two categories (constructs), those that measured the physical symptoms and those that measured the psychological symptoms.

The DLQI had (9 questions out of 10) relating to the psychological symptoms of Keloid scars, the raw total scores for these questions were compared using a Pearson correlation coefficient (r) to the raw total scores for the DAS-24 (24 questions out of 24). It is generally accepted in analysing convergent validity that coefficients score of, (0.31-0.5) are weak, (0.51-0.7) are moderate, (0.71-0.9) are strong and (0.91-10) are excellent [17].

The DLQI had 1 question (out of 10) relating to the physical symptoms (pain) of Keloid scars compared to the 15 questions on the MSF-PQ. To allow a comparison of convergent validity, the single question on the DLQI asking patients to report on the severity of pain (no pain, mild pain, moderate pain and severe pain), was compared to MSF-PQ total scores. Mean scores from the MSF-PQ were compared using a student T-test, between those who either reported "no pain or mild pain" V those who reported "moderate or severe pain" (DLQI) to look for a statistically significant difference.

Internal consistency: Internal consistency was measured in all three questionnaires using the Chronbach alpha (α) function. This is a measure to assess how well individual items from a list correlate with one another, in objectively measuring the same construct, typically α values of (0.7-0.95) are considered acceptable [18]. Chronbach alpha (α) values of above 0.95 are undesirable as they indicate that some of the questions may need to be removed because of redundancy.

Corrected chronbach alpha measurements and Item-total correlation (pearsons) coefficients were also performed on the DLQI and MSF-PQ questionnaire items. The corrected chronbach alpha value represents how the internal consistency of the questionnaire changes had that individual item been excluded from the questionnaire. Both of these calculations were used to interrogate individual items on the list to see whether they were candidates for being removed from the list to improve internal consistency.

Results

Analysing the physical symptoms (McGill short form-pain questionnaire)

The results from the MSF-PQ demonstrate that keloid scar pain was commonly described as: throbbing, sharp, aching and tender (inclusion criteria, >40% reported frequency). All of these items came

from the sensory group of pain descriptors; overall the affective pain descriptors were rarely reported (Figure 1). Only one of the pain descriptors, “cramping” had an item total correlation coefficient of less than (0.4), the other 14 pain descriptors had either a good or very good item-total correlation.

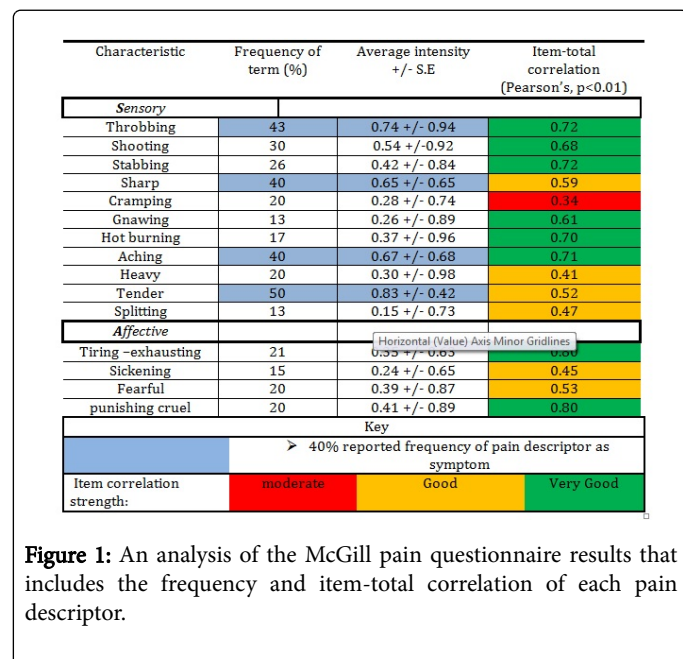


Figure 1: An analysis of the McGill pain questionnaire results that includes the frequency and item-total correlation of each pain descriptor.

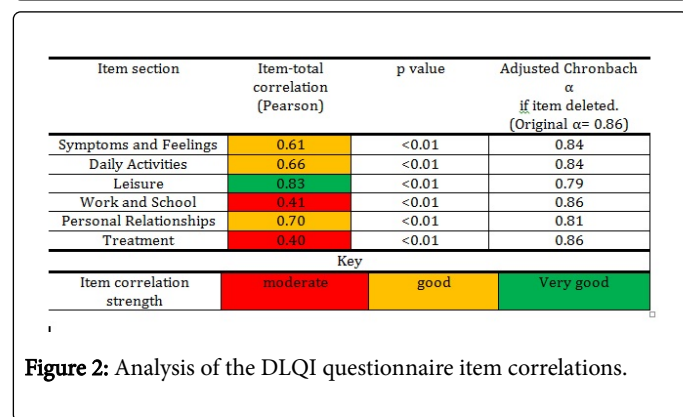


Figure 2: Analysis of the DLQI questionnaire item correlations.

Convergent validity

Convergent validity between the (DAS-24 –DLQI) raw total scores was moderate, (0.54) and statistically significant at $p<0.01$. Those patients with “moderate” to “very large” QoL impact scores (DLQI) had a higher mean DAS-24 scores (14) than those with “no” to “small” QoL impact ($p<0.01$). In comparison the convergent validity between (MSF-PQ –DLQI) and (MSF-PQ-DAS-24) raw total scores showed only weak correlation with values of 0.45 and 0.35 respectively, $p<0.02$.

The MSF-PQ mean score of those patients who score “moderate/severe” pain on the DLQI was 11.64, compared to the means those who reported “no/mild pain” was 4.43. The difference between the means of these two groups was statistically significant at the, $p<0.01$ level.

Internal consistency

All three questionnaires showed a high degree of internal consistency; the chronbach alpha (α) values were: DAS-24 (0.88), DLQI (0.86) and MSF-PQ (0.90) respectively. Adjusted chronbach alpha values and item total correlation coefficients together demonstrated that there were no redundant items in the DLQI (Figure 2) or (MSF-PQ). Interpreting the results by patient: gender, scar exposure, ethnicity and scar location.

Female patients reported higher mean score than male patients; the difference between the means was (3.4) in the DLQI and (5.0) in the MSF-PQ questionnaires. The burden of hidden scars increased DLQI QoL mean scores by (4.7) when compared to exposed scars. All three of these differences were statistically significant at the confidence level, $p<0.03$ (Figure 3).

When the scars were analysed by location (back, sternum, earlobe, face, hand and shoulder) and ethnicity, there was no statistically significant difference between the mean reported scores in all three questionnaires. This analysis however was inconclusive as some of the groups’ small numbers of patients (n range, 4-16).

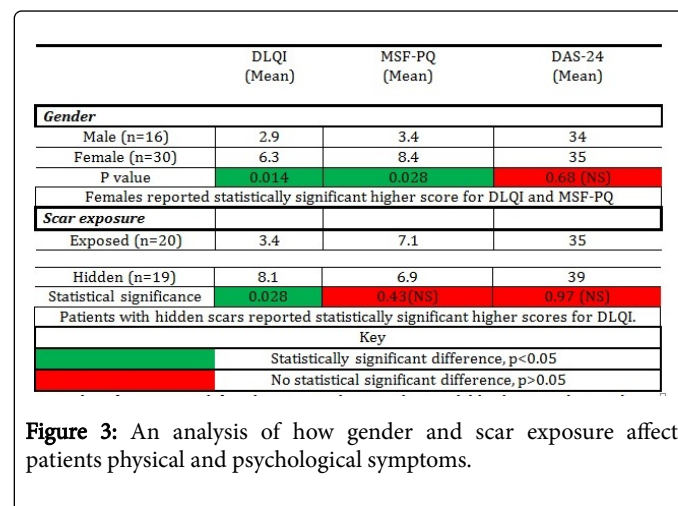


Figure 3: An analysis of how gender and scar exposure affect patients physical and psychological symptoms.

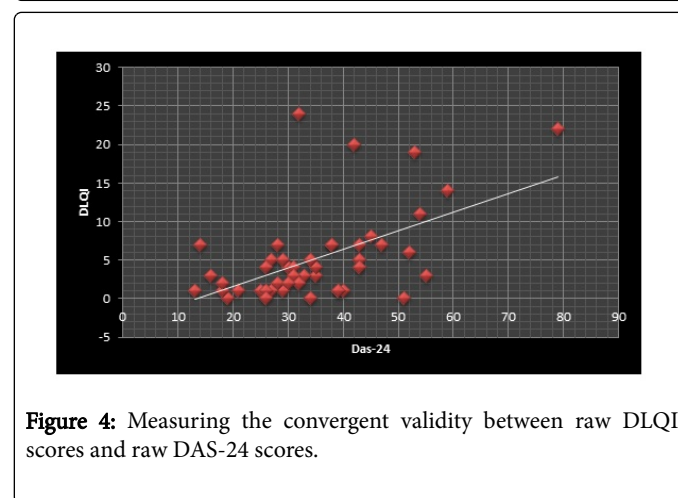


Figure 4: Measuring the convergent validity between raw DLQI scores and raw DAS-24 scores.

Discussion

A number of clinician rated scar scales are commonly employed within clinical practice, but many of them fail to accurately capture the

patient centred, QoL impact of keloid scars. By definition all scar assessment scales are highly subjective, typically consisting of arbitrary parameters judged on visual approximation by an observer. With the exception of POSAS which includes the single weighted criteria of “itchiness” none of the established scar scales take into account patient reported symptoms (Vancouver Scar Scale (VSS), Manchester Scar Scale (MSS) and Visual Analogue Scale (VAS)).

It is therefore essential for clinicians to have scales available that are designed to accurately simulate patients’ perceptions of their scars as experienced by them. In order to do this any keloid scar scale must measure clinical outcomes of treatment not only on aesthetic criteria, but also on an appropriately weighted background of the accompanying physical and psychological symptoms. In addition to this any candidate questionnaire must prove to be reliable, easy to conduct in the clinical environment and sufficiently sensitive to detect changes in outcomes pre and post treatment.

Previous studies on keloid scar patients have noted that “pruritis” and “pain” are the two common reported physical symptoms that affect patients QoL. This study is the first to objectively measure in qualitative and quantitative terms the pain experienced by keloid scar patients. Results from the MSF-PQ showed that the four most common pain descriptors used to describe keloid scars were all sensory (throbbing, sharp, aching and tender). This is consistent with the fact that keloid scars are local discreet lesions that rarely have an affective component to the pain.

The overall QoL impact scores (DLQI) were more strongly correlated with the psychological symptoms scores (DAS-24, $r=0.54$, Figure 4), than the physical symptom scores (MSF-PQ, $r=0.43$). One previous study has shown similar results demonstrating that the greatest effect on patients QoL is due to the psychological distress of living with a chronic disfiguring skin condition [13]. Mean DAS-24 scores of Keloid scar patients were shown to be greater than in the average population and consistent with other groups of patients with disfiguring skin conditions (burns) [15]. This was best demonstrated in patients with “moderate-very large” QoL impact scores; they demonstrated high levels of avoidance behaviours that were captured well in both the DAS-24 and DLQI total scores. Overall mean DLQI scores of the patients indicated that keloid scars had a “moderate” QoL impact but that the range was large, 0-24 (“no – very large” QoL impact) [16,17].

The Dermatology Life Quality Index (DLQI) is a clinical measure that has been validated for use in a number of other chronic skin conditions including, psoriasis [18], vitiligo [19], severe acne [20] and Keloid disease [21]. Previous studies have shown the DLQI to have good content validity [20] and to be a sensitive enough tool to detect meaningful changes in the QoL impact scores over time in response to treatment (Psoriasis) [22]. This study was able to show that the DLQI had an excellent internal consistency for keloid scar patients ($\alpha=0.86$) and that all 6 sections of the questionnaire were consistent with one another (item-total correlation, Figure 4). In addition our results showed that the DLQI was a sensitive screening tool for detecting overall scar pain (MSF-PQ), it helped to differentiate well between those who had severe and non-severe physical symptoms in an abbreviated single pain question.

The presence of scars hidden beneath the cloth line was shown to paradoxically increase patients QoL impact scores. A previous study conducted on raised (keloid and non keloid) scars showed similar results suggesting that the presence of visible scars allows patients to

better habituate to their presence and the associated psychological stigma [23]. Further analysis of the QoL scores showed that patients with hidden scars report higher mean scores ($p<0.05$) in (4/6) of the DLQI components: (symptoms/feelings, leisure, personal relationships and treatment). These results show that patients with hidden keloid scars were associated with a greater psychosocial burden and that patients adopt a range of concealment strategies to cope.

The results of this study have shown that QoL life assessment (DLQI) in Keloid scar patients can be of two major benefits. Firstly it can be used as a patient centred measure of clinical outcome to be used in parallel with other established objective scar scales. Both patient subjective and clinician objective measure can be used together to better define clinical outcomes and measure the true impact of any KD treatment.

Secondly the convergent validity of the DLQI with validated psychometric measures (DAS-24) enables it to be used as a psychological screening tool. Those patients with high QoL impact scores can be recommended for comprehensive psychological assessment and intervention if needed to compliment medical treatment. The DLQI is compact (10 questions) and easy to administer, its proven validity and clinical value support its use in routine Keloid scar treatment assessment.

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