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Health-related quality of life (EQ-5D) early after injury predicts long-term pain after burn

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ABSTRACT

Background: Chronic pain after burn can have severe physical and psychological effects on former patients years after the initial injury. Although the issue of pain after burn has gained increased attention over the past years, prospective, longitudinal studies are scarce. Our aim was to prospectively investigate consecutive burn patients for pain severity over time and to evaluate the prevalence and characteristics of post-burn pain to 2–7 years after the burn. As an additional aim, the effects of burn and individual-related factors, especially health-related Quality of Life (HRQoL), were investigated.

Method: Sixty-seven consecutive burn patients were assessed during acute care at 3, 6, 12 and 24 months, as well as at 2–7 years post-burn. HRQoL, symptoms of post-traumatic stress disorder (PTSD) and other psychiatric disorders were investigated. During the interviews that took place 2–7 years after the injury (mean 4.6 ± 1.9 years), current chronic post-burn pain was assessed using the Brief Pain Inventory-Short Form (BPI-SF).

Results: One-third of the patients still reported pain 2–7 years after the injury. Pain severity and interference with daily life were mainly mild to moderate though they were found to be associated with significantly lower HRQoL. Chronic pain after burn was associated with both burn- and individual-related factors. In logistic regression analysis HRQoL at 3 and 12 months and symptoms of PTSD at 12 months were independent factors in predicting chronic pain after burn.

Conclusion: Pain after burn becomes a chronic burden for many former burn patients and decreases HRQoL. A novel finding in this study was that HRQoL assessed early after burn was a predictor for the development of chronic pain. This finding may help to predict future pain problems and serve as an indicator for pain preventive measures.

1. Introduction

Despite intensive analgesic treatment, most burn patients suffer from severe pain during the acute phase [1]. This is not only a result of the burn itself but also of the procedures applied to treat the burns (e.g., dressing changes, surgery, wound closure, scar maturation, movement and stretching exercises) [2]. It is known that persistent pain of a peripheral origin may induce pathological changes on a spinal and

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supraspinal level, leading to central sensitisation and pain maintenance [3]. Indeed, for many burn patients, the pain becomes chronic [4–6], with prevalence rates as high as 52% after an average of 12 years [1].

Living with pain is a challenge and chronic pain can have a negative impact on health-related quality of life (HRQoL) [7,8]. Several studies have reported that, over time, the HRQoL of burn patients approaches the HRQoL levels of the general population [9–12]. However, in those burn patients reporting lower HRQoL larger total body surface area (TBSA) [9,11,12], presence of mental disorders such as major depression [9] or PTSD [10], and higher pain levels [12] are important determining factors.

Severe acute burn pain also seems to have an impact on the development of psychological problems such as post-traumatic stress disorder, PTSD) [13] and the high comorbidity between pain and depression in different populations is well documented [14]. Both of these conditions, which are relatively prevalent among burn patients [15–18], reciprocally seem to influence the development or perception of pain [19,20].

Although the issue of pain after burn has been addressed in the past, prospective, longitudinal studies with consecutive patients are rare. Postal questionnaires are frequently used, but such questionnaires are likely to increase the attrition rate. The different dimensions of pain are rarely assessed and the potential role of individual-related factors is seldom thoroughly investigated.

The aim of this study is therefore to prospectively investigate consecutive burn patients admitted to the Uppsala University Hospital Burn Centre for pain severity over time as well as to evaluate the prevalence and characteristics of pain 2–7 years after the injury. A further aim was to assess the impact of burn- and individual-related factors (e.g., HRQoL, PTSD and depression) on chronic post-burn pain.

2. Participants

Former burn patients, admitted to Uppsala University Hospital Burn Centre between March 2000 and March 2007, were asked to participate in an ongoing prospective study that focused on the long-term impact of burns. Patients were eligible if they fulfilled the following criteria: (1) ≥18 years of age, (2) Swedish speaking, (3) without documented mental retardation or dementia and (4) had a 5% TBSA burn or a length of stay (LOS) at the Burn Centre of more than 1 day. Patients admitted on a temporary basis and who had their main care provided elsewhere were not included.

All assessments were done during hospitalisation at 3, 6, 12 and 24 months post-burn. Between April 2007 and August 2008, 2–7 years after their burn, the patients were again contacted and assessed during a series of follow-up interviews. These interviews took place in the patient's home or at another location chosen by the patient.

The study was approved by the Uppsala University Ethics Committee and conducted according to the principles of the Helsinki Declaration.

3. Measures

Sociodemographic information, including age, gender, time since injury and working status at the time of the follow-up interviews 2–7 years after the injury, was collected. Data from patient medical records on such injury characteristics as TBSA-full thickness (TBSA-FT), LOS, location of the burn and whether the injury was visible were also obtained.

Pain was assessed at the 2–7-year follow-up after-injury using the Brief Pain Inventory-Short Form (BPI-SF) [21]. The BPI-SF is a validated, self-administered questionnaire designed to evaluate the severity of pain and the impact of pain on the patient's daily functions. Burn-related pain was considered if the patient answered "yes" on the first question: "*Throughout our lives, most of us have had pain from time to time (such as minor headaches, sprains, toothaches). Have you had pain other than these everyday kinds of pain today?*" It was further specified and ensured by the interviewer (CÖ) that the pain reported was burn-specific. Four 11-point linear scales were used to assess pain severity at its worst, least and average during the previous week, as well as current pain level, with 0 representing no pain and 10 the worst pain imaginable. Seven linear scales were used to assess pain interference with general activities, mood, walking ability, normal work, relationships with other people, sleep and enjoyment of life on an 11-point scale, where 0 = no interference and 10 complete interference. The scale scores can be averaged to obtain a Pain Severity Index and a Pain Interference Index. In addition, the BPI-SF contains questions about the location of the pain and the treatment used. The BPI was originally developed and validated to assess cancer pain [21–23] but has also been used to assess non-malignant pain [24,25], including chronic post-burn pain [4].

HRQoL was assessed at baseline and during acute care at 3, 6, 12 and 24 months post-burn. Further, assessment was done at the 2–7-year follow-up with the EQ-5D, a widely used and valid instrument to measure HRQoL [26]. The patient is asked to describe problems associated with five dimensions: mobility, self-care, usual activities, pain/discomfort and depression/anxiety using a rating scale from 1 to 3, with 1 indicating none, 2 indicating moderate and 3 indicating severe. Because the BPI-SF was administered only at the 2–7-year follow-up, the EQ-5D pain dimension was used to follow pain severity over time.

The results of the EQ-5D dimensions can be transformed into a weighted index ranging from −0.594 (death or worse than death) to 1 (full health). This index is based on norm values in the general population [27]. A 20-cm vertical VAS scale with endpoints of 'worst possible health state' set at 0 to 'best possible health state' set at 100 was used to assess self-rated health status. The EQ-5D has recently been used in adult burn patients [10,28], where it also has been validated showing good psychometric properties [29].

Symptoms of post-traumatic stress disorder (PTSD) were assessed at 3 and 12 months after burn with the Swedish version of the Impact of Event Scale-Revised (IES-R) [30]. The 22-item IES-R is an extended version of the original 15-item IES. The three clusters of PTSD (Intrusion, Avoidance and Hyperarousal) are assessed using scale ratings of 0 (no symptoms), 1,

3 and 5 (high frequency of symptoms). The scores of each subscale or the total score (ranging from 0 to 110) can be reported. The IES-R has recently been validated in Swedish burn patients and is considered a good screening tool for diagnosing PTSD in this patient group [31].

Lifetime and current psychiatric disorders were evaluated at baseline and at the follow-up interviews with the Structured Clinical Interview for DSM-IV Axis I disorders (SCID-I) [32]. Lifetime and current psychiatric disorders were considered if the patient met criteria for a DSM-IV diagnosis at any time before and including the time of the burn or at the 2–7-year follow-up.

3.1. Statistics

Categorical variables were evaluated using χ^2-tests while Fisher's exact p-value was used when applicable. Continuous variables were evaluated with Student's t test if normally distributed. Variables with a skewed distribution (e.g., TBSA, TBSA-FT and LOS) were logarithmically transformed. Results are presented as mean ± standard deviation. Dichotomous variables were coded as yes or no.

Burn- and individual-related variables were first evaluated univariately to identify possible predictors for post-burn-related pain. To avoid overfitting only variables with a p-value of <0.10 were included in subsequent multivariate regression analyses. The severity variables (i.e. TBSA, TBSA-FT and LOS) were highly correlated, as were EQ-index and EQ-VAS. Thus, only one of these variables in each group was included. To identify independent predictors a forward logistic regression strategy was used, with a p-value of <0.05 as the limit for entry and a p-value of <0.10 for removal from the model. Nagelkerke's R^2 was used as an approximation for the OLS R^2.

Spearman's correlation coefficient (rho) was calculated to evaluate the correlation between the BPI-SF Pain Severity Index and the Pain Interference Index as well as the correlation of the BPI-SF Pain Severity Index with that of the EQ-5D pain/discomfort dimension. All analyses were conducted using SPSS version 21 or 23.

4. Results

4.1. Sample characteristics

During hospitalisation, 112 eligible patients were asked to participate in a follow-up interview study investigating the impact of the burn on social life, activities and work, as well as on the prevalence of pruritus and pain. Six patients were removed for administrative reasons and 17 declined to participate, leaving 89 patients. Before the 2–7-year follow-up, four patients had died and five could not be located. A further 22 patients did not participate: nine declined to participate, two emigrated, one stopped to participate during data collection and one was excluded for other reasons. Thus, the final sample to be interviewed at the 2–7-year follow-up was 67 patients (60%, 52 men). The mean age was 42.6 ± 14.8 years. Mean TBSA was 25.4 ± 20.4%, mean TBSA-FT 10.8 ± 14.8% and mean LOS 27 ± 34 days. Average time since injury at the follow-up interviews was 4.6 ± 1.9 years. There were no statistical differences between the participants and the non-participants in burn characteristics, preburn psychiatric morbidity, sociodemographic variables or HRQoL during acute care or at 12 months after burn. For more details about this sample, see Ref. [10].

4.2. Severity and interference of post-burn pain in daily life

Twenty of the 67 patients (30%) reported current burn-related pain at the time of the 2–7-year follow-up interviews. In these 20 patients the interviewer (CÖ) proceeded with the entire questionnaire.

The mean Pain Severity Index was 3.4 ± 2.0 and the Pain Interference Index was 3.1 ± 2.4 (Table 1). Because almost all of the patients had a Severity or Interference Index of ≤5, no subgroupings for mild, moderate or severe pain severity or interference were made. Pain interfered most often with general activity, work, enjoyment of life and mood. Walking ability, relationships with others and sleep were the items least affected by pain. Patients with a higher Pain Severity Index reported a higher Pain Interference Index (rho = 0.71; $p < 0.001$).

Nineteen patients (28%) answered the question about medications. Of these 19 patients, 10 (53%) reported that they were given treatment for the pain with a relieving effect of 65 ± 21.7%.

4.3. Correlation between pain on the BPI and EQ-5D

Of the 47 patients that did not report pain on the BPI-SF, 20 reported pain on the EQ-5D. However, all 20 patients that did report burn related pain on the BPI-SF also reported moderate or severe pain/discomfort on the EQ-5D. Those who only reported moderate pain/discomfort on the EQ-5D ($n = 17$) reported a Pain Severity Index of 3.1 ± 1.6, whereas those that reported severe pain/discomfort on the EQ-5D ($n = 3$) reported

Table 1 – Severity of pain and its interference with general activities as assessed by the Brief Pain Inventory-Short Form in the 20 patients that reported pain at 2–7 years after the burn.

	Mean	SD	Median	Range
Severity				
Worst	5.3	2.4	6.0	1–9
Least	1.9	2.1	1.5	0–9
Average	3.7	1.9	3.0	1–9
Right now	3.0	2.8	2.0	0–9
Pain severity index	3.4	2.0	2.5	0.5–9
Interference				
General activity	4.2	3.2	4.5	0–10
Mood	3.7	2.8	3.0	0–9
Walking ability	1.4	2.1	0.5	0–7
Work	4.1	3.5	4.0	0–10
Relations	2.2	2.7	1.0	0–8
Sleep	2.9	3.1	2.0	0–10
Enjoyment of life	3.7	3.2	3.0	0–9
Pain interference index	3.2	2.4	3.2	0–7.7

a Pain Severity Index of 5.5 ± 3.3. There was no significant association between the two scales, however ($p = 0.17$).

4.4. *Changes in pain severity and HRQoL over time*

Because the BPI-SF was only administered at the 2–7-year follow-up, the EQ-5D was used to retrospectively compare pain levels and changes over time for patients with and without current post-burn pain at the follow-up. However, to ensure that only burn-specific pain was assessed, the patient groups (current pain, $n = 20$ and no current pain, $n = 47$) were classified according to reported presence or absence of pain on the BPI-SF.

There was an overall decrease pain/discomfort over time for both groups but patients in the current pain group reported significantly higher EQ-5D pain/discomfort levels at all time points except at baseline compared with the patients in the no current pain group (Fig. 2).

Although there was an overall improvement in HRQoL (reported as EQ-5D index) over time for both groups, patients in the current pain group reported significantly poorer HRQoL at all time points except at baseline and at 6 months (Fig. 3).

4.5. *The role of burn- and individual-related factors in post-burn pain*

Post-burn pain at the 2–7-year follow-up was related to the indicators of burn severity (TBSA, TBSA-FT and LOS) but not to gender, age or time since injury (Table 2). Nor was the presence of visible, facial, hand, lower limb or below knee burns related to the reporting of post-burn pain.

Table 3 lists the individual-related variables. As can be seen, the EQ-5D index at all time points, except for baseline, and the EQ-5D VAS and IES-R at 12 months were significantly associated with the reporting of post-burn pain at the follow-up. No associations were observed between pain and lifetime or current psychiatric disorders. In addition, there was no significant difference between the groups in employment status at the follow-up interview.

The forward logistic regression analysis aimed to identify the best prediction equations for post-burn pain based on observations at the different follow-ups. Based on available observations at baseline and 6 months after the injury, only

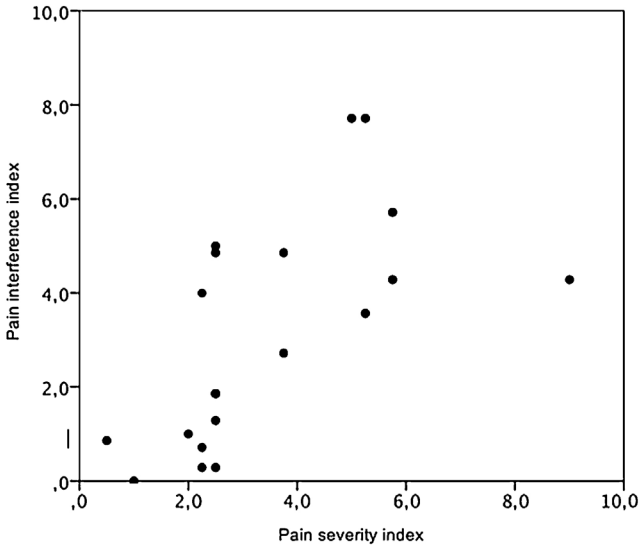

Fig. 1 – Distribution of BPI-SF pain severity and interference indices of the 20 patients reporting post-burn pain at 2–7 years after the burn.

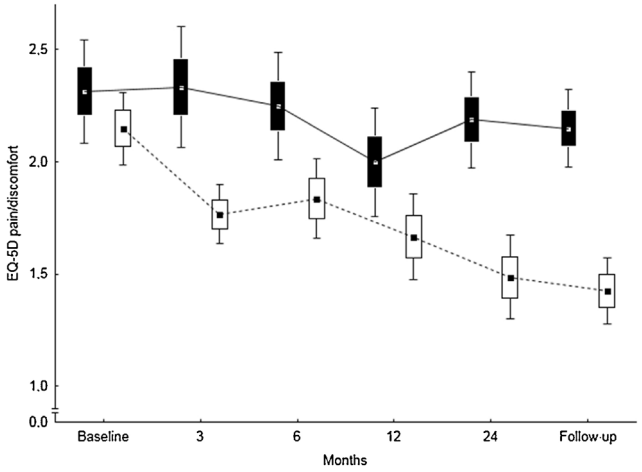

Fig. 2 – Changes in pain severity over time as measured by the EQ-5D pain/discomfort dimension (1 equals no pain, 2 equals moderate pain and 3 equals severe pain). Bars represent mean ± standard error and whiskers represent mean ± 95% confidence interval (CI). Although there was an overall decrease in pain severity over time for both groups, patients in the current pain group (black bars) reported significantly higher pain severity at all time points (except at baseline) compared with the no current pain group (white bars).

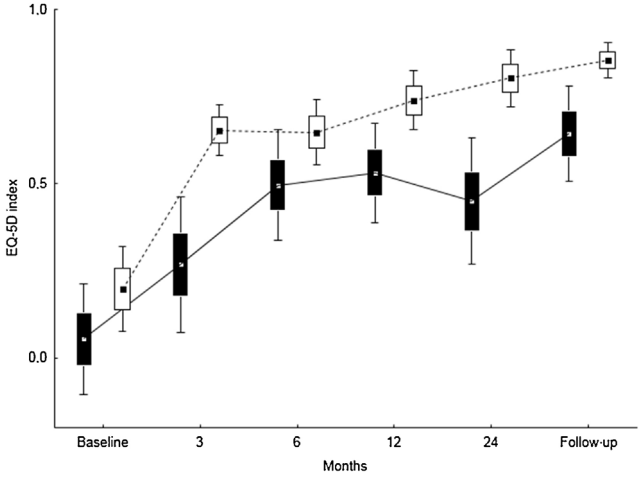

Fig. 3 – Changes in HRQoL over time as measured by the EQ-5D index. Changes range from −0.594 (death or worse than death) to 1.0 (full health). Bars represent mean ± standard error and whiskers represent mean ± 95% confidence interval (CI). Patients in the current pain group (black bars) reported significantly poorer HRQoL at all time points (except at baseline and 6 months of acute care) compared with the no current pain group (white bars).

Table 2 – Burn-related factors and the presence of post-burn pain.

Burn related factors	Pain		
	Yes (20)	No (47)	p[a]
Gender M/F	15/5	37/10	
Age	44.0 ± 16.3	42.0 ± 14.2	
TBSA[c]	36.6 ± 22.5	21.0 ± 17.4	0.007
TBSA-full thickness[c]	18.9 ± 16.0	11.5 ± 15.0	0.024
LOS[c]	37.4 ± 31.8	25.5 ± 40.4	0.002
Time since injury	4.2 ± 1.9	4.7 ± 2.0	
Visible injury[b]	17/3	37/10	
Facial injury	15/5	28/19	
Hand injury	15/5	30/17	
Lower limb injury	13/7	26/21	
Below knee injury	9/11	19/28	

[a] p-values ≤0.10 are reported.
[b] Dichotomous variables are reported as yes/no.
[c] Significance test after logarithmic transformation.

Table 3 – Individual-related factors and the presence of post-burn pain.

Individual-related factors	Pain		
	Yes (20)	No (47)	p[a]
Axis I disorders lifetime			
Any psychiatric disorder[b]	5/15	15/32	
Any affective disorder[b]	12/8	26/21	
Any anxiety disorder[b]	7/13	19/28	
Any substance use disorder[b]	6/14	14/33	
Observations at baseline			
EQ-index	0.06 ± 0.33	0.20 ± 0.41	
EQ-VAS	44.4 ± 19.6	52.5 ± 24.6	
IES-R	35.6 ± 23.8	35.3 ± 27.7	
Observations at 3 months			
EQ-index	0.27 ± 0.36	0.65 ± 0.24	0.001
EQ-VAS	59.0 ± 20.8	70.3 ± 17.8	0.081
IES-R	28.7 ± 29.2	32.6 ± 23.0	
Observations at 6 months			
EQ-index	0.50 ± 0.30	0.65 ± 0.30	0.095
EQ-VAS	59.5 ± 19.6	69.4 ± 22.8	
IES-R	39.6 ± 30.9	33.2 ± 23.1	
Observations at 12 months			
EQ-index	0.53 ± 0.29	0.74 ± 0.27	0.013
EQ-VAS	61.3 ± 19.7	74.3 ± 20.0	0.026
IES-R	46.6 ± 24.0	29.0 ± 24.8	0.014
Observations at 24 months			
EQ-index	0.45 ± 0.34	0.80 ± 0.24	0.001
EQ-VAS	62.9 ± 22.6	74.9 ± 21.7	0.084
IES-R	43.1 ± 29.1	31.1 ± 25.2	
Observations at follow-up			
EQ-index	0.64 ± 0.28	0.85 ± 0.17	0.006
EQ-VAS	72.4 ± 20.4	81.7 ± 16.5	0.081
Any psychiatric disorder[b]	7/13	16/31	
Any affective disorder[b]	4/16	4/43	
Any anxiety disorder[b]	6/14	10/37	
Any substance use disorder[b]	0/20	3/44	
Occupation[c]	9/3/8	31/3/13	

[a] p-values ≤0.10 are reported.
[b] Dichotomous variables are reported as yes/no.
[c] Occupation is reported as employment and studies/retirement/unemployed or sick leave.

Table 4 – Best fit regression models for prediction of the outcome variable Pain at various times after the burn.

	Odds ratio	95% CI	Nagelkerke's R^2
Baseline			
lnLOS	2.54	1.28–5.05	0.18
Three months			
EQ-5D index at 3 months	0.016	0.001–0.17	0.36
Six months			
lnLOS	2.54	1.28–5.05	0.18
Twelve months			
lnLOS	2.88	1.34–6.23	
IES-R at 12 months	1.032	1.005–1.060	0.32
Twenty-four months			
lnLOS	3.92	1.30–11.8	
EQ-5D index at 24 months	0.010	0.001–0.231	0.49

lnLOS was an independent predictor of post-burn pain (Table 4). At 3 months, HRQoL, measured as EQ-5D index, was the only significant independent predictor; at 12 months, lnLOS and IES-R were independent predictors; and at 24 months, lnLOS and EQ-5D index were independent predictors. To exclude the possibility that the pain component of the EQ5D index was responsible for a carryover effect of perceived pain from the earlier assessment periods to the final assessment of post-burn pain, we calculated the sum scores within the EQ-5D index without the pain/discomfort dimension and then used this variable in separate regressions. Because these regressions were similar to those presented (data not shown), any carryover effects can be excluded.

5. Discussion

Using the BPI-SF, one third of the patients reported burn-related pain still present 2–7 years after the injury (4.6 ± 1.9 years). Pain severity and interference with daily life were mainly considered mild to moderate when assessed according to suggested classifications [33–35], and with a high correlation between the two scales. An important and novel finding was that patients reporting pain experienced a significantly lower HRQoL which when measured 3 months after burn was independently related to reporting of pain 2–7 years after the injury.

The prevalence of pain in our study is consistent with that reported in previous studies [1,4–6]. In a recent cross-sectional study [4] the BPI was used in burn patients at an average of 5.3 years after the injury with results comparable to those obtained by us.

The instrument used does not allow for discrimination between different pain characteristics. Previous qualitative analyses of post burn pain characteristics have, however, largely pointed to the importance of neuropathic mechanisms [5,6].

Our patients were classified into two groups, current pain and no current pain, according to self-reports of the presence or absence of burn-specific pain on the BPI-SF. Pain severity over time was then approximated using the EQ-5D pain/discomfort dimension ratings. Because all burn patients suffer

from severe acute pain [1,2], it is not surprising that no significant difference between the groups was observed at baseline. However, the current pain group reported significantly higher pain/discomfort levels than the no current pain group at almost every assessment point. Although an overall decrease in pain/discomfort over time was noted in both groups (Fig. 1), also reported in previous studies [19,36–38], the pattern over time differed between the two groups. More specifically, patients in the no current pain group subsequently reported less pain/discomfort at each assessment point. An abrupt change in self-reported pain severity (i.e. pain was reported to increase) occurred in the current pain group at 12 months post-burn and then remained constant at this higher level between 24 months after burn and the 2–7-year follow-up, indicating an impact of other factors.

Many burn patients suffer from PTSD [13,39] and it seems that while some of these patients recover, a large number suffer from chronic PTSD or develop delayed symptoms during the first year after the injury [40]. Although disparate findings have been reported with respect to direction, PTSD does seem to alter pain thresholds [41,42]. Indeed, chronic pain patients suffering from PTSD report more severe pain and greater interference than those with pain alone [20]. In this study the current pain group scored significantly higher on the IES-R at 12 months compared with the no current pain group, indicating more symptoms of PTSD. Such a finding suggests a possible explanation for the increase in pain severity for this group at 12 months post-burn, and also why the IES-R score at 12 months proved to be an independent predictor for persistent post-burn pain at follow-up. It is noticeable, though that the presence of psychiatric disorders was not related to the reporting of pain, which could possibly be attributed to insufficient power in the study.

In our study and the study of Browne et al. [4] patients with chronic post-burn pain had not only a significantly greater TBSA but also a significantly longer LOS. In fact, LOS was shown to be an independent predictor of chronic pain for all time points, except for 3 months after the injury. LOS can be seen as an indirect indicator of both burn severity and complexity. Larger TBSA, deeper injuries and more surgery and infections are examples of factors that lead to longer LOS. All this could lead to a higher physical and psychological burden, health outcomes that in turn may be related to chronic pain problems.

For both the current pain and no current pain group, pain severity and HRQoL were inversely related: a lower reported pain/discomfort was followed by a higher reported HRQoL. However, the current pain group reported significantly lower HRQoL (and higher pain/discomfort level) at almost all time points than the no current pain group. In best fit regression models, HRQoL as early as 3 months post-burn was an independent variable in the prediction of chronic pain. The underlying explanation could be that at 3 months post-burn, when still in the early recovery phase, HRQoL reflects the impact of both burn- and individual-related factors, where patients experiencing a heavier physical or psychological burden are more likely to develop and report chronic pain. It is for that reason a more holistic measure than for example LOS, is better in identifying patients early in the course that are at risk of developing chronic pain. Assessment of HRQoL using the EQ-5D is a simple measure that could be used as an indicator for pain preventive measures.

Because pain/discomfort is a component of the EQ-5D, we also conducted regression analyses excluding the pain/discomfort dimension from the weighted index to make certain that the predictive effect of the EQ-5D index at 3 months was due to the total HRQoL and not the impact of pain on HRQoL. In this regression the EQ-5D index at 3 months was still found to be an independent predictor of pain at the follow-up. HRQoL at 24 months was also shown to be an independent predictor for persistent post-burn pain. For now, it is reasonable to assume a reciprocal relationship between HRQoL and pain. The effect could be due to the lowering effect of pain on HRQoL and that a lower HRQoL, as stated above, represents a larger and more complex burn that increases the probability of developing pain after the burn.

The association between the BPI-SF Pain Severity Index and the EQ-5D pain/discomfort dimension was not significant. This lack of significance may be due to a skewed distribution of scores in that an association has been demonstrated in other studies [34,35]. All patients reporting burn-related pain on the BPI-SF also reported pain/discomfort on the EQ-5D, although many patients reporting pain/discomfort on the EQ-5D did not report pain on the BPI-SF. This is consistent with the perception that BPI-SF specifically assesses specific pain, such as burn- or cancer-related, whereas the EQ-5D assesses non-specific pain as well as discomfort, i.e. a larger spectrum of symptoms.

This study used a prospective, longitudinal design to evaluate consecutive burn patients for pain severity over time which adds strength to the results. The BPI-SF and a majority of the other instruments were administered during interviews, decreasing the risk of misinterpretation and the number of missing responses. However, the BPI-SF was administered only at the follow-up, why changes in post-burn pain prevalence and severity over time were approximated by using the EQ-5D VAS. Further, the BPI-SF is not a burn-specific pain scale. Although the interviewer specified that the pain was burn-related, there is always the potential influence of the subjective interpretation of the interviewer as well as the patient's own interpretation of the questions. Moreover, the small patient sample and the lack of a normative comparison group are other important limitations of this study.

6. Conclusion

Pain after burn becomes a chronic burden for many former burn victims. It may significantly decrease HRQoL, which can be easily assessed with the EQ-5D. A novel finding in this study was that HRQoL assessed early after burn was a predictor for the development of chronic post-burn pain. This finding may help to predict future pain problems and serve as an indicator for pain preventive measures.

Conflict of interest statement

The authors have no conflicts of interest to declare.

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