Patients with tattoo reactions have reduced quality of life and suffer from itch

Dermatology Life Quality Index and Itch Severity Score measurements

K. Hutton Carlsen and J. Serup

Department of Dermatology, the ‘Tattoo Clinic’, Bispebjerg University Hospital, Copenhagen, Denmark

**Background:** Tattoos are a trend with increasing side-effects. The burden of local reaction with swelling, itching and discomfort may impel sufferers to consult medical assistance.

**Objectives:** To assess tattoo reactions and their influence on quality of life and itching by utilizing the Dermatology Life Quality Index (DLQI) scoring system and Itch Severity Scale (ISS).

**Methods:** Patients attending the ‘Tattoo Clinic’ at Bispebjerg University Hospital, Denmark with tattoo problems spanning more than 3 months were invited. Forty patients participated during September-November 2012. Patients attending their routine consultations completed the ISS and DLQI questionnaires.

**Results:** Patients with tattoo reactions experienced reduced quality of life, DLQI score 7.4 and were burdened by itch, ISS score 7.2. Both DLQI and ISS results attained the level of discomfort of known skin diseases such as psoriasis, pruritus and eczema albeit the typical tattooed affected areas are smaller.

**Conclusion/Discussion:** Sufferers of tattoo reactions have reduced quality of life and are often burdened by itching attaining the level of other cumbersome afflictions recognized as dermatological diseases associated with itch. Tattoo reactions warrant diagnosis and treatment with same professional intent shared with other skin diseases.

**Key words:** tattoos – itch – DLQI – ISS – sensory – affective
The study was conducted in September–November 2012. Participation was voluntary and participation/non participation would have no influence on future treatment at the hospital. Forty patients attending their routine consultations completed two questionnaires/scoring systems, the DLQI and the ISS after having received a brief oral instruction. Patients were offered privacy while filling out the questionnaires. Records were anonymous.

*Dermatology Life Quality Index*, introduced by Finlay and Khan, is a validated questionnaire with the following topics and elements: 1 and 2: *Symptoms and Feelings* (maximum score 6); 3 and 4: *Daily Activities* (maximum score 6); 5 and 6: *Leisure* (maximum score 6); 7: *Work and School* (maximum score 3); 8 and 9: *Personal Relationships* (maximum score 6); 10: *Treatment* (maximum score 3) (3, 4).

Questions answered ‘a little’ scored 1 point, ‘a lot’ scored 2 points and ‘very much’ scored 3 points. Questions answered ‘not relevant’, ‘not at all’ or ‘unanswered’ scored 0 points. The DLQI was calculated by adding the scores of all questions resulting in a maximum of 30 and a minimum of 0.

Clinical interpretation of the DLQI:

Index 0–1 = no effect at all on patient’s life.
Index 2–5 = small effect on patient’s life.
Index 6–10 = moderate effect on patient’s life.
Index 11–20 = big effect on patient’s life.
Index 21–30 = extremely big effect on patient’s life.

Granted permission, we utilized the Danish translation of the English original version of the DLQI. The Danish translation was evaluated on 300 dermatology patients in a validity and reliability study and concluded valid (5).

*Itch Severity Scale* is a questionnaire designed to be administered by the patient (6). The ISS, introduced by Majeski et al., is an instrument to measure both the sensory and affective dimensions of itch (7). The ISS is constructed with the following seven topics: 1: *Frequency*; 2: *Description*; 2a: *Sensory*, 2b: *Affective*; 3: *Body Area*; 4: *Intensity*; 5: *Effect on Mood*; 6: *Effect on Sexual Desire/Function*; 7: *Effect on Sleep*.

*Topic 1: Frequency* scored from 0 to 3 points and the score multiplied by 4 (4 options for this topic). The result calculated is the raw score, ranging between 0 and 12. To determine the standardized score, the score is divided with the raw score, Score/12.

*Topic 2: Description* with 6 options scored between 0 and 3 points. The raw score ranged 0–18. The standardized score was divided with the raw score. The standardized score ranged 0.0–1.0. The standardized scores for the other topics were calculated applying the same principle, see Table 1.

The sums of the standardized scores were multiplied by three, thereby attaining the ISS results. The total ISS ranged between 0 and 21 (3, 4).

Granted permission, we utilized the Danish translation of the English original version of the ISS. This Danish translation was evaluated on 92 dermatology patients and concluded valid (8).

The higher the scores on the DLQI and ISS systems, the greater the impact on the patient.

**Results**

Forty patients (34 females and 6 males) accepted participation in the study, mean age was 33 years. Tattoo reactions were located on the face/neck on one patient, on the upper extremity on 16 patients, on the trunk on four patients, on the lower extremity on 18 patients, and one on the upper extremity as well as on the trunk.

In the following, the results from the DLQI scoring system will be presented followed by the results of the ISS scoring.

**DLQI Results**

Overall, patients’ scores ranged from 0 to 29. In total, a DLQI score of 7.4 was attained revealing patients’ tattoo reactions had a moderate effect on their lives. Figure 1 shows the distribution of scores under the six different topics: *Symptoms and feelings; Daily activities; Social activities and leisure; Work and school; Personal relationships; Treatment*.

The different topics impact on DLQI is listed in Table 2.

*Symptoms and feelings* had the greatest impact on quality of life. Nine patients experienced a little itching, soreness, pain and/or stinging symptoms, 19 patients answered a lot and 11 patients answered very much. Patients feelings associated with their tattoo problems had also an impact. More than half of the patients 22/40
had experienced varying degrees of embarrassment/self-consciousness due to their tattoo reactions. Twelve patients experienced a little embarrassment/self-consciousness, four patients had experienced a lot and six patients had experienced very much.

Daily activities were influenced in 15/37 (37.5%) cases of housekeeping. Eleven patients expressed housekeeping and gardening as being a little troublesome; two patients answered a lot while two patients answered very much. Reactions influenced choice of clothing in half of the participants (53%). Reactions had a little effect on seven patients, eight patients reported a lot and six patients reported reactions having influenced choice of clothing very much.

Leisure was influenced in 16/40 (40%) patients. Nine patients expressed a little influence, three patients expressed a lot while four expressed very much. Tattoo reactions influence on sports activities was also examined in this topic. Eleven patients expressed tattoo reactions as having little impact on sports activities, four patients reported a lot and six patients reported reactions having influenced choice of clothing very much.

Work and school; patients tattoo reactions had for the majority no virtual effect on their ability to work and study. Three patients stated tattoos reactions had prevented them, while 37 reported tattoo reactions had no effect. These 37 patients, who weren’t impeded from working/studying, furthermore informed whether their reactions had been a problem at work/school, or not. Thirteen patients replied a little bit, one replied a lot, 26 replied no effect.

Personal relationships (and sexual difficulties) were mildly influenced. Six patients expressed their tattoo reactions caused a little problem with their partner, close friends or relations. Two patients’ reactions had caused a lot of problems and two patients expressed, they had caused very much. With focus on sexual difficulties during the past week, one patient experienced little sexual problems due to tattoo reactions, three patients experienced a lot of
sexual problems while one patient’s tattoos reactions had affected sex very much.

Treatment was a problem in 10/40 (25%) cases. Six patients had experienced a little problem with treatment, one patient had experienced a lot and three patients answered very much.

ISS results
ISS score was 7.2. Figure 2 shows the distribution of ISS scores under the different topics: Frequency; Description; Intensity; Effect on mood; Effect on sex; Effect on sleep.

Frequency (itching/stinging etc.) was observed during morning, afternoon and evening.

Once in a while during morning/afternoon/evening/night: 16/15/10/12 patients.

Often experienced during morning/afternoon/evening/night: 14/13/17/14 patients.

Always during morning/afternoon/evening/night: 7/10/12/6 patients.

Never experienced during morning/afternoon/evening/night: 3/2/1/8 patients.

Description (itching/stinging etc.) was subdivided into Topic 2a Sensory and Topic 2b Affective.

Stabbing itch was experienced to a very high degree, 9/40 (22.5%).

Stinging sensation to a very high degree, 8/40 (20%).

Burning itch to a very high degree, 6/40 (15%).

Nineteen patients 19/40 (47.5%) expressed concern about their tattoo reactions. 15/40 (37.5%) experienced them as troublesome while 10/40 (25%) experienced them as unbearable, see Table 3.

Body area scored 0.000412%. In total, the affected tattoo area covered 392.5 cm² with an average of 9.8 cm² per patient. On average, female patients had problems in tattoos covering 8.8 cm² of their skin, while male patients had problems in tattoos covering 15.5 cm² of their skin. The skins surface area is according to REACH standard, 1.69 m² for females and 1.94 m² for males.

Intensity (of itching/stinging etc.) was no problem at all for one of the participants while 39/40 (97.5%) reported itching/stinging etc. Of these, 6/40 (15%) reported little effects. 13/40 (32.5%) reported a moderate degree of itching etc. 16/40 (40%) reported a lot of itching etc., while 4/40 (10%) patients reported very much so. Apparently, reactions were a big problem.

Participants also answered questions about their bouts of itching at its worst and bouts of itching at its mildest.

Itching at its worst: 3/40 (7.5%) reported bouts to a mild effect, 4/40 (10%) reported to a moderate effect, 12/40 (30%) reported a lot while 20/40 (50%) reported extreme bouts. Itching is not simply a problem for almost all participants; it is also at an extreme level when at its worst.

Itching when mildest in degree: 13/40 (32.5%) experienced bouts of occasional absence of itching. 13/40 (32.5%) experienced bouts of itching to a mild extent. 9/40 (22.5%) experienced bouts of itching to a moderate extent. 4/40 (10%) experienced bouts of itching a lot while 1/40 (2.5%) experienced bouts of itching to an extreme extent.

Effect on Mood was relevant in 23/40 (57.5%) cases. 8/40 (20%) patients experienced depression and 7/40 (17.5%) patients experienced irritation. 19/40 (47.5%) patients experienced concentration problems while 17/40 (42.5%) patients expressed anxiety about their tattoo reactions.

Effect on sexual desire/function was a problem for 4/40 (10%) of the participants whose sexual

### TABLE 3. Tattoo reactions sensations

<table>
<thead>
<tr>
<th></th>
<th>Mild degree experienced</th>
<th>Moderate degree experienced</th>
<th>Very high degree experienced</th>
<th>Never experienced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stabbing</td>
<td>17</td>
<td>4</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Stinging</td>
<td>12</td>
<td>8</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Burning</td>
<td>8</td>
<td>11</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Troublesome</td>
<td>7</td>
<td>13</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>Unbearable</td>
<td>7</td>
<td>13</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Worrying</td>
<td>6</td>
<td>11</td>
<td>19</td>
<td>4</td>
</tr>
</tbody>
</table>

Fig. 2. Tattoo itching vs. topics scored by ISS (n = 40 patients).
desires had been impaired. All 40 patients expressed, reactions had no absolute influence on their ability to have sex.

**Effect on sleep** (difficulty falling asleep, sleep disturbance and sleep medication). Difficulty falling asleep was an occasional problem for 22/40 (55%) patients, 9/40 (22.5%) patients experienced difficulty practically every evening while 9/40 (22.5%) patients had no problems. Sleep disturbance for 24/40 (60%) patients was an occasional problem, 5/40 (12.5%) patients answered almost always, while 11/40 (27.5%) patients experienced undisturbed sleep. Sleep medication was an occasional necessity for one patient, regularly for two patients while 37 patients found sleep medication unnecessary.

**Skin area afflicted by tattoo reaction and DLQI and ISS**

Figures 3 and 4 show the relation between afflicted area and DLQI and ISS of individual patients. Obviously, grade of symptom is independent of afflicted area. Remarkably, even very small tattoo reactions may occasionally elicit severe symptoms and large tattoos may occasionally show a minor degree of complaints. Figure 5 illustrates red ink tattoo reactions on two of the participants where swolenness and itch are problems.

**Discussion/Conclusion**

The main findings of this study revealed, patients with tattoo reactions had reduced quality of life, mean DLQI 7.4, and were burdened by itch, mean ISS score 7.2. These are new findings illustrating that tattoo reactions are a severe problem for patients. It is noteworthy that the affected areas on the skin were very small (i.e. average 9.8 cm²) and patients were otherwise healthy with no medical reason for reduced quality of life measured by DLQI or for increased itch by ISS.

Itch is an important dermatological symptom and reported in diseases concerning eczema, nodular prurigo, senile pruritus and psoriasis, in the latter especially during the progressive disease. These conditions range from diseases affecting a limited area of the skin to widespread affections, however the afflicted skin area is typically major and the disease widespread. The typical area with disease is to be expected much larger than 9.8 cm² found in tattoo reactions.

DLQI and ISS are reported in some of the pruetic conditions, listed in Table 4, with a review of the literature (6–13). Our findings show that reactions to tattoos and their affection on quality of life attains the level of the above mentioned skin diseases, diseases that normally affect a much larger area than the typical tattoo reactions do. ISS results reveal that itch is a leading symptom in tattoo reactions; accordingly, DLQI results of the topic *Symptoms and feelings* consequently disclose major affection.

Clinical examination reveals that tattoo reactions, albeit small in area, are frequently heavily inflamed due to the culprit pigment that elicits the response residue permanently in the dermis under the level of the basement membrane zone and cannot be metabolized or excreted (14–16), therefore, reactions may be chronic and devastating. Histology shows that most reactions are lichenoid with interface dermatitis, a condition affecting the papillar dermis as well as epidermis with blurring and affection of the basement membrane. It is in this layer of the skin, that sensory nerves are concentrated and our finding of itch as a lead symptom is therefore consistent with the distribution of sensory nerves in the
Our study finds that sufferers of tattoo reactions should be accepted and treated as patients with a dermatological condition, deserving diagnostic evaluation and treatment on line with good standard in clinical dermatology. Treatment with topical corticoids, which reduces inflammation of the skin, may have some role as first line treatment, however, to cure the condition the culprit pigment has to be removed or destroyed. Lasers, including Q-Switch lasers, cannot deplete tattoo pigment particles and chemicals from the skin and may produce new chemicals by photocleavage, chemicals which may have other risks including carcinogenic, mutagenic and teratogenic effects (17–20). For treatment of the cumbersome tattoo reactions described earlier, surgical removal of the tattoo pigment appears the most rational and fundamental treatment of the problem, but of course used as a second line treatment. In our department, we prefer removal by dermatome shaving (21).

The sensory aspect of ink safety was not considered in the past. We have in our clinic observed cases of tattoo complications manifested as itch and pain only, thus, without underlying inflammation. Tattoos are made for decoration and to beautify. The manufacturing and use of tattoo inks undergo surprisingly few controls and regulations. Our findings highlight the need for controlled production of tested inks to prohibit reactions resulting in itch with following poor quality of life.

### References

3. Finlay AY, Khan GK. Dermatology Life Quality Index (DLQI): a simple practical measure for routine

Address:
Katrina Hutton Carlsten
Bispebjerg University Hospital
Bispebjerg Bakke 23, Department of Dermatology D
Copenhagen NV DK-2400, Denmark
Tel: +45 35 31 31 77
Fax: +45 35 31 31 13
e-mail: katrinahuttoncarlsen@hotmail.com