Occurrence, Chronicity and Intensity of Itch in a Clinical Consecutive Sample of Patients with Skin Diseases: A Multi-centre Study in 13 European Countries

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Itch is an unpleasant symptom, affecting many dermatological patients. Studies investigating the occurrence and intensity of itch in dermatological patients often focus on a single skin disease and omit a control group with healthy skin. The aim of this multi-centre study was to assess the occurrence, chronicity and intensity (visual analogue scale 0–10) of itch in patients with different skin diseases and healthy-skin controls. Out of 3,530 dermatological patients, 54.3% reported itch (mean ± standard deviation itch intensity 5.5 ± 2.5), while out of 1,094 healthy-skin controls 8% had itch (3.6 ± 2.3). Chronic itch was reported by 36.9% of the patients and 4.7% of the healthy-skin controls. Itch was most frequent (occurrence rates higher than 80%) in patients with unclassified pruritus, prurigo and related conditions, atop dermatitis and hand eczema. However, many patients with psychodermatological conditions and naevi also reported itch (occurrence rates higher than 19%).

Key words: Itch occurrence; itch intensity; itch chronicity; skin diseases; European perspective.

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The Global Burden of Disease Study 2010 (1) estimated that 33.7 million years lived with disability (YLD) are caused by skin and subcutaneous diseases. According to this study, which analysed data from 187 countries, skin conditions represent “the fourth leading cause of nonfatal disease burden” (2), affecting 1.9 billion people at any time (2, 3). Itch, defined by Hafenegro as “an unpleasant cutaneous sensation that provokes the desire to scratch” (4) has long been neglected and unrecognized, even though it represents a common symptom in patients with skin diseases (5–7). Thus, there is a need to better document itch in patients with skin disease in order to encourage the development of new treatments, allocate resources more appropriately and develop better care for patients with itch.

The distribution and burden of itch in dermatological patients is mainly known from single-centre studies (8, 9) or studies focusing on a single skin disease (e.g. 10, 11). Also, studies on the occurrence of itch are often uncontrolled (8–12). Recently, the European Society for Dermatology and Psychiatry (ESDaP) completed a large European observational cross-sectional multi-centre study to better document the psychological burden (i.e. anxiety and depression, negative life events and suicidal ideation) of patients with skin disease (13). In this study, patients
with skin diseases from 15 out-patient dermatological clinics in 13 different countries (i.e. Belgium, Denmark, France, Germany, Hungary, Italy (2 study centres), the Netherlands, Norway (2 study centres), Poland, Russia, Spain, Turkey, the UK) were included. The large database generated by this study also enables exploration of the symptom itch in the group of all skin patients, as well as the assessment of the distribution of itch in different skin diseases. Moreover, the data allows the comparison of the occurrence, chronicity and intensity of itch between patients with skin diseases and healthy-skin controls.

The aims of the study are: (i) to describe the occurrence of current (acute) and chronic itch (itch lasting longer than 6 weeks) as well as the intensity of current itch in skin patients compared with healthy-skin controls; (ii) to describe the occurrence of current (acute) and chronic itch (itch lasting longer than 6 weeks) as well as the intensity of current itch among patients with different skin diseases; (iii) to determine whether skin patients with itch differ from skin patients without itch and healthy-skin controls regarding age, sex and the occurrence of physical comorbidities.

MATERIALS AND METHODS

Study design

A secondary analysis of data that have already been published (13) was conducted. However, it should be emphasized that data on the occurrence, chronicity and intensity of itch from this database have not been published previously. The investigation was an observational cross-sectional multicentre study with 15 sites in 13 European countries (13). Out-patients in secondary and tertiary care were recruited from 15 dermatological clinics between November 2011 and February 2013. The study protocol was that, at each clinic, consecutive patients were invited to participate in the study until 250 patients were included (for the exact numbers recruited in each country, see (13)). The participation rate was 79.9% (13). The inclusion criteria were age at least 18 years and not from the dermatology department. Persons in the control-group were subjectively skin-healthy and regarded themselves not in need of consulting a dermatologist due to any skin condition. Controls who reported having a skin condition were excluded.

Each participant completed the same questionnaires. In skin patients, the dermatological diagnosis was made by a dermatologist. Usually one, but in some cases two or more, dermatological diagnoses were recorded. If there were doubts as to whether a skin disease was present (e.g. no diagnosis, no flares or no itch) the patient was not included in the study. The diagnoses were allocated to 27 categories adapted from the Lambeth study (14). The decision about what category the diagnosis should be allocated to was made by 3 dermatologists who are experts in the field of itch research (FD; UG; JAH). The category “unclassified pruritus” was chosen in those cases where patients visited the clinic due to itch, but no explicit diagnosis had yet been given.

The presence of other physical conditions (cardiovascular diseases; chronic respiratory diseases, diabetes, rheumatological diseases and others) was identified by asking the patient or by reviewing the patient’s file. The controls were not examined and information on physical comorbidities was self-reported (for details see (13)).

Questionnaires

Itch and its characteristics were assessed with the following items: “Does your skin itch now?” (yes/no), if yes “For how long?” (under 6 weeks/over 6 weeks), whereby itch lasting for less than 6 weeks represents acute itch, while itch lasting for longer than 6 weeks represents chronic itch (15)) and “How intense is your itching?” with responses given on a visual analogue scale from 0 (“none”) to 10 (“worst imaginable”). The VAS was used to measure itch intensity, because it has been shown to be a reliable and valid tool to measure the subjective symptom itch (16). In addition, self-reported socio-demographic data, such as age, sex, socio-economic status and marital status, were recorded.

Ethics

The protocol for the European study was approved by the Regional Committee for Medical Research Ethics in Norway REK 2011/1087. Local ethical approval was obtained, where necessary, in the other countries. The study was conducted in accordance with the Declaration of Helsinki and ICH/EU good clinical practice.

Statistical analyses

Data were entered into a database at each site and sent to the Statistical Center in Giessen, Germany. The data were consolidated into a single file. SPSS version 22 software (IBM Corp, released 2013) was used to process and analyse the data. To characterize the sample, we report numbers, percentages with 95% confidence interval (CI), or mean values with standard deviation (SD). To compare patients and healthy-skin controls, we used t-tests for continuous variables and χ² tests for dichotomous or categorical variables. We describe the occurrence of physical comorbidities with number and percentages with 95% CI. Multivariate logistic regression analyses were conducted to study the associations between the occurrence, chronicity and groups, adjusted for sex and age. Odds ratios (ORs) were calculated using the regression coefficients β from the regression models. The exponential of the coefficient represents the OR. Because of the great number of regression analyses, the p-values were corrected using the Bonferroni-correction according to Holm (17), as done in a recently published study (18).

RESULTS

Subjects

A total of 3,635 patients from 15 different study centres and 1,359 healthy-skin controls took part in the study (also see (13)). Of these, 3,530 patients (97.1% of all examined patients) and 1,094 healthy-skin controls (80.5% of all healthy-skin controls) responded to the question on the presence of itch. This group of 4,624 subjects constituted the sample in the present study. Regarding the analyses of 27 different skin diseases, patients with 2 or more dermatological diagnoses (441 subjects) were excluded, thus 3,089 patients (having one dermatological diagnosis each) were included in these analyses.

Sociodemographic characteristics of patients and healthy-skin controls are presented in Table 1. There were no significant differences between patients with and
without itch regarding age or sex ($p>0.05$). There were fewer females in the group of patients compared with the group of healthy-skin controls ($p<0.001$). The group of dermatological patients was significantly older than the healthy-skin control group ($p<0.001$). In addition, the socio-economic status varied between patients with itch and healthy-skin controls ($p<0.1$). Also, the marital status differed between groups ($p<0.05$). Moreover, physical comorbidities were significantly more common in patients with itch compared with both patients without itch or healthy-skin controls (also see Table I). Of the patients with itch, 31.5% (95% CI 29.5–33.4) had at least one physical comorbidity, while only 15.7% (95% CI 13.5–17.7) of the healthy-skin control group had at least 1 physical comorbidity. The OR for comorbidities was 1.76 (95% CI 1.43–2.18) in patients with itch compared with healthy-skin controls (adjusted for age and sex).

### Itch occurrence and chronicity in skin patients compared with healthy-skin controls

In total, 54.3% (1,917 out of 3,530) of the patients with skin diseases reported that they currently had itch, compared with 8.0% (88 out of 1,094) of the healthy-skin controls. The OR of reporting itch when having a skin disease was 13.64 (95% CI 10.82–17.20) compared with healthy-skin controls. Chronic itch was reported by 36.9% of the patients and 4.7% of the healthy-skin controls. The overall mean ± SD itch intensity was 2.96 ± 3.3 in patients and 0.29 ± 1.18 in healthy-skin-controls. The mean ± SD intensity of itch among patients reporting itch was 5.50 ± 2.51 (Table II).

### Table I. Sociodemographic characteristics and physical comorbidities (excluding skin diseases) of patients with itch, patients without itch and healthy-skin controls

<table>
<thead>
<tr>
<th>Sex</th>
<th>Patients with itch (n = 1,917/3,530)</th>
<th>Patients without itch (n = 1,613/3,530)</th>
<th>Healthy-skin controls (n = 1,094)</th>
<th>Test patients with itch vs. patients without itch</th>
<th>Test patients with itch vs. healthy-skin controls</th>
<th>Test patients without itch vs. healthy-skin controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>1,077 (56.3)</td>
<td>907 (56.5)</td>
<td>705 (64.6)</td>
<td>$\chi^2(1)=0.02$</td>
<td>$\chi^2(1)=19.80^{***}$</td>
<td>$\chi^2(1)=17.51^{***}$</td>
</tr>
<tr>
<td>Male</td>
<td>837 (43.7)</td>
<td>698 (43.5)</td>
<td>387 (35.4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age, years, mean ± SD</td>
<td>47.2 ± 17.5</td>
<td>46.7 ± 18.3</td>
<td>40.5 ± 13.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Socio-economic status, n (%)</td>
<td>3300</td>
<td>3387</td>
<td>3875</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>403 (21.4)</td>
<td>227 (14.3)</td>
<td>176 (16.2)</td>
<td>$\chi^2(2)=28.80^{***}$</td>
<td>$\chi^2(2)=12.16^{**}$</td>
<td>$\chi^2(2)=2.08$</td>
</tr>
<tr>
<td>Middle</td>
<td>1,325 (70.2)</td>
<td>1,215 (76.6)</td>
<td>809 (74.3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>159 (8.4)</td>
<td>144 (9.1)</td>
<td>104 (9.6)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital status, n (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>442 (25.3)</td>
<td>413 (27.4)</td>
<td>293 (26.8)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>1007 (57.7)</td>
<td>920 (61.0)</td>
<td>679 (62.2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Separated</td>
<td>163 (9.3)</td>
<td>106 (7.0)</td>
<td>92 (8.4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Widowed</td>
<td>132 (7.6)</td>
<td>69 (4.6)</td>
<td>28 (2.6)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical comorbidities (excluding skin diseases), n (%)</td>
<td>573 (31.5), 29.3–33.4</td>
<td>100 385 (25.0), 22.7–27.1</td>
<td>164 (15.7), 13.5–17.7</td>
<td>47 1.48 (1.25–1.75), 1.76 (1.43–2.18), 1.17 (0.93–1.46)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$*p<0.05$, $**p<0.01$, $***p<0.001$ (retrieved by $t$-tests).

Data from patients with one ($n=3,089$) and two or more ($n=441$) dermatological diagnoses. Healthy-skin controls were persons both with and without itch.

SD: standard deviation; MD: missing data; OR: odds ratio (adjusted for age and sex); 95% CI: 95% confidence interval.

### Table II. Occurrence, chronicity and intensity of itch in dermatological patients in 13 European countries and in healthy-skin controls as well as the associations (OR) between the occurrence/chronicity of itch in patients and the occurrence/chronicity of itch in healthy-skin controls

<table>
<thead>
<tr>
<th>Patients (n = 3,530)</th>
<th>Healthy-skin controls (n = 1,094)</th>
<th>Patients/healthy-skin controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>n/valid cases (%), 95% CI</td>
<td>Missing/out of (n/valid cases (%), 95% CI)</td>
<td>Missing/out of (OR (95% CI))</td>
</tr>
<tr>
<td>Occurrence</td>
<td>1,917/3,530 (54.3), 52.5–55.9</td>
<td>88/1,094 (8.0), 6.6–9.8</td>
</tr>
<tr>
<td>Chronicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>1,225/3,316 (36.9), 35.3–38.6</td>
<td>214/3,530</td>
</tr>
<tr>
<td>In those with itch</td>
<td>1,225/1,703 (71.9), 69.9–74.1</td>
<td>214/1,917</td>
</tr>
<tr>
<td>Intensity</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Overall</td>
<td>2.96 (3.30)</td>
<td>44/350</td>
</tr>
<tr>
<td>In those with itch</td>
<td>5.50 (2.51)</td>
<td>44/1917</td>
</tr>
<tr>
<td>In those with chronic itch</td>
<td>5.92 (2.41)</td>
<td>22/1225</td>
</tr>
</tbody>
</table>

Data constitutes patients with 1 ($n=3,089$) and 2 or more ($n=441$) dermatological diagnoses.

OR: odds ratio (adjusted for sex and age); CI: confidence interval; SD: standard deviation; B: regression coefficient.

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Itch intensity in patients with different skin diseases

The intensity of itch among the different patient groups is given in Table SI.

The highest mean intensity of itch was found in the following diagnostic groups: unclassified pruritis (VAS score: 7.03), prurigo (VAS score: 6.15), atopic dermatitis (VAS score: 5.35), hand eczema (VAS score: 4.73) and urticaria (VAS score: 4.73).

The itch intensity among those reporting itch was highest in unclassified pruritis (VAS score: 7.31), prurigo (VAS score: 6.97), psychodermatological conditions (VAS score: 6.33), urticaria (VAS score: 6.31), atopic dermatitis (VAS score: 6.22) and hidradenitis suppurativa (VAS score: 6.03).

While the mean itch intensity was very low in healthy-skin controls (VAS score: 0.29), it was above 1 in all patient groups, except for patients with naevi (VAS score: 0.77) and patients with benign skin tumours (VAS score: 0.98).

**DISCUSSION**

This is the first large multi-centre study in Europe comparing the occurrence, chronicity and intensity of itch between patients with skin diseases and healthy-skin controls. Approximately half of the patients visiting a dermatological outpatient clinic in Europe reported that they experience itch. About 37% of them reported having itch lasting longer than 6 weeks.

The occurrence of current itch in dermatological patients (54%) reported in this study is higher than the occurrence found previously in a German study, in which 334 patients from a single dermatological practice had a point prevalence of current itch of 36.2% (8). It is hypothesized that the difference may be explained by the high proportion of neoplasms (n=88) in the previous study as only 23.9% of neoplasms were accompanied by pruritus. In the current study, patients with psoriasis...
constituted the largest group of patients with 567 cases, 70.4% of whom reported itch. Moreover, in contrast to the previous study, in our study in 13 out of 27 diagnostic groups the number of patients with pruritus was greater than the number of patients without pruritus. In the previous study, more than half of the patients reported pruritus in only 2 (atopic eczema and dermatitis) out of 9 diagnostic groups (8).

A study of 1,428 dermatology outpatients from Turkey demonstrated an occurrence of chronic itch of 30.9% (9), which is in line with our finding that 37% of the dermatological skin patients experienced chronic itch. A Dutch study of 826 skin patients assessed in a general practice setting found that 53.3% of the assessed patients reported a mean itch intensity >2 on a VAS during the last 4 weeks (19). We speculate that the difference may be explained by the differing time spans studied, i.e. a shorter duration (4 weeks) over which itch was assessed in the Dutch study.

The occurrence of itch among controls in our study (8.0%) is similar to the occurrence that has been reported for the general population previously (8.4% and 6.5%) in 2 large studies in Denmark and Norway (12, 20). Regarding chronic itch, we found that 4.7% of the controls reported having chronic itch, a much smaller percentage than those reported in 2 German population-based studies (13.5% or 15.4%, respectively; (21, 22)). One has to keep in mind, however, that our controls cannot be regarded as representative for the general population, as our controls did not have any skin condition.

In the current study itch was most prevalent in patients diagnosed with unclassified pruritus, prurigo, atopic dermatitis, hand eczema, other eczemas and urticaria. The occurrence and chronicity of itch across different skin diseases has already been reported, but mainly in patients with psoriasis and eczema: In a large US questionnaire-based study including 17,425 respondents, itch was reported by 79% of the psoriasis patients (11). In atopic eczema, the occurrence of daily itching was 87% and 91% in 2 studies in which 100 or 304 patients were investigated (10, 23). Moreover, it was found that in chronic idiopathic urticaria, itch occurred in 68% of patients on a daily basis (24). In a recent study investigating 78 patients with lichen planus, 69.2% of the patients reported experiencing itch during the examination (25). In a questionnaire-based study assessing 1,541 adult patients with vitiligo, 35% of the patients reported itch or burning (26). In patients with hidradenitis suppurativa, itch occurred in 57.3% of the patients (27). These studies in most cases report occurrence rates that are comparable to ours. However, many of them are single-centre studies often including small numbers of patients. In contrast, our study had a large sample size and the simultaneous inclusion of many patient groups, some not previously reported.

With the current study, we were able to show that the occurrence of itch is also quite high in diseases usually not characterized by itch, e.g. infections of the skin, leg ulcers, naevi, skin cancer, rosacea and alopecia areata. In these skin diseases, the occurrence of itch was at least 2.88 times higher than in healthy-skin controls.

The mean itch intensities found in the current study in patients with atopic dermatitis, urticaria, psoriasis or seborrheic dermatitis were all lower than the ones found in a large US study (28). The difference in itch intensities between these studies is not surprising as the US patients were highly selected patients with very intense itch due to their visit to a specialized tertiary itch centre.

The strengths of our study are the large sample size, inclusion of a large spectrum of skin diseases with some in which the epidemiology of itch has not been reported previously, the standardized assessment of the occurrence, chronicity and intensity of itch as recently recommended (29) and the continental scope of the data reflecting a wide range of cultural and socio-economic settings.

The weaknesses of the study include a possible selection bias, as the clinics where patients were recruited are predominantly academic settings. Moreover, it would have been preferable to validate self-reported diagnoses by doctors. Persons in the control group categorized themselves as skin healthy without being seen by a dermatologist. Thus, it is possible that persons were included in the control group, who regarded themselves as skin healthy, but actually had some kind of skin disease. It is also of note that all persons in the control group were part of the working population as they were recruited from hospital staff, while we do not know how many of the skin patients were working. Moreover, the study design did not allow us to distinguish between untreated patients and those who had already received treatment for their skin disease. Comparing these 2 groups in future studies would allow assessment as to whether the relationship between itch and physical comorbidities was greater in patients experiencing itch for a long time than in patients that had just received the diagnosis. Also, we did not further differentiate between different kinds of bullous diseases. As there are apparently large differences in itch between bullous pemphigoid, dermatitis herpetiformis and pemphigus, these differences should be assessed prospectively in future studies. In addition, almost one-third (31.5%) of patients with itch had at least one physical comorbidity. Since itch is a symptom of some systemic diseases (e.g. renal failure, lymphoma, endocrine disease) and can be a side-effect of many drugs used to treat physical diseases (30), it would also be interesting to differentiate between itching and non-itching comorbidities in future studies. Some groups of patients were small: 8 groups of patients had less than 50 participants, which led to big confidence intervals in the analysis. However, we still chose to report the occurrence, chronicity and intensity of itch in these patients in order to not exclude any patients.
For a thorough discussion of the strength and weaknesses of the design, see Dalgard et al. (13).

In conclusion, this multi-centre study, which included dermatological patients and healthy-skin controls, emphasizes that itch is a common symptom among dermatological out-patients with many different skin diseases. It thus highlights the need for better itch-specific therapies and tailored management strategies.

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Conflicts of interest. LM report Astellas, Celgene, Expanscience, Johnson&Johnson, Novartis, Pierre Fabre, Sanofi. FS has been a consultant for Janssen and Abbvie. FP has been consultant for Leo-Pharma. AYF has received honoraria for consultancy with travel expenses from Galderma, Novartis, Napp, Sanofi, Archimedes, Amgen. GBEJ is a consultant and investigator for AbbVie and Novartis, has received unrestricted grants from AbbVie, Leo Pharma and Novartis; sits on Advisory Boards of AbbVie; InflaRx, LEO Pharma, Novartis, Janssen Pharmaceuticals, Pierre Fabre, and UCB; and is Investigator for AbbVie, InflaRx, Novartis, Regeneron, Sanofi and UCB.

REFERENCES