Itch in Elderly People: A Cross-sectional Study

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Ageing is associated with numerous medical afflictions, including dermatological symptoms and diseases. Chronic itch (CI) in elderly people is a frequent symptom of diverse aetiology. This study assessed the prevalence and detailed clinical features of CI among 153 elderly patients hospitalized in the geriatric ward, including associations with comorbidities and pharmacotherapy. CI affected 35.3% of subjects, most commonly due to cutaneous conditions, mixed aetiology and neurological disorders (53.7%, 25.9% and 11.1% of pruritic subjects, respectively). The mean itch intensity assessed with the 4-Item Itch Questionnaire (4IIQ) was 6.6 ± 2.8 points. Viral hepatitis (p = 0.02), higher serum creatinine concentration (p = 0.02) and coexistent purpuric lesions (p = 0.002) were associated with higher 4I IQ scores. In logistic regression analysis CI correlated positively with female sex, atopic dermatitis, immobility, rheumatoid arthritis and ischaemic neurological diseases, while low-molecular-weight heparins, antipruritic drugs, allergy, rosacea and higher haemoglobin concentration had the contrary effect. CI is a frequent and interdisciplinary problem among elderly subjects, which requires a holistic clinical approach.

Key words: itch; elderly; comorbidities; pharmacotherapy.

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Due to increased life expectancy, the elderly population is constantly increasing worldwide, with an estimated 2.1 billion seniors living in 2050 and possibly 3.1 billion in 2100 (1). In addition, in the course of ageing these individuals are more prone to experience numerous clinically evident comorbidities or, at least, possess subclinical pathologies in various organs (2). Another associated problem of increasing importance is polypharmacy, which is characterized by prescription and use of multiple drugs to manage concomitant diseases (3). Ageing affects all organs, and skin is no exception, as it undergoes both intrinsic (physiological and inevitable) and extrinsic ageing (mainly associated with exposure to ultraviolet (UV) light) (4, 5). Unsurprisingly, cutaneous issues in elderly people are profuse, as demonstrated by various studies throughout the years (6–10). Chronic itch (CI), defined as an unpleasant sensation eliciting the urge to scratch, which lasts at least 6 weeks (11), is a flagship example of a condition with multifactorial aetiopathogenesis (12). The International Forum for the Study of Itch (IFSI) classifies pruritus according to its suspected causes as dermatological (I), systemic (II), neurological (III), psychogenic (IV), mixed (V; several categories) and other (VI) (13). Regardless of the cause, CI remains one of the crucial dermatological condition in older individuals, owing to its high frequency and detrimental impact on sleep and quality of life (QoL) of the affected individuals (14, 15). Overall, the detailed aspects of itch in elderly people have rarely been reported in the literature (14, 16). Therefore, this study aimed to investigate the frequency and detailed clinical characteristics of CI in elderly patients, along with possible associations of the aforementioned with comorbidities and co-administration of pharmacotherapy.

SIGNIFICANCE

Chronic itch is a frequent problem of complex aetiopathogenesis, especially among elderly patients. This study extensively evaluated the prevalence, clinical characteristics and possible associations of chronic itch with systemic co-morbidities and pharmacotherapy in a cohort of elderly patients hospitalized in a geriatric ward, which, to the best of our knowledge, have rarely been reported in the literature. The results of this study support the role of an interdisciplinary diagnostic and therapeutic approach to elderly patients with chronic itch.

METHODS

Study population and design

This prospective cross-sectional study was performed between January 2018 and May 2018. We approached 185 patients aged 65 years or older who were hospitalized in the geriatric ward, among whom 153 (82.7%) agreed to participate in the study. The inclusion criteria were: age 65 years or more and informed agreement to participate in the study. Exclusion criteria were: patients who were unable to understand the study procedures (e.g. due to mental state). In addition to basic demographic data, a detailed medical history was gathered, with a particular focus on systemic comorbidities and systemic drug intake. The results of routine laboratory blood tests performed during the hospitalization were also noted. If multiple laboratory tests were performed during the hospitalization, the results closest to the day of dermatological examination were chosen. The laboratory data encompassed concentrations of haemoglobin (Hb; reference range 12–16 g/dl in females, 14–18 g/dl in males), C-reactive protein (CRP; reference range 0.2–5 mg/l),...
aspartate aminotransferase (ASPART; reference range 5–34 U/l), alanine aminotransferase (ALAT; reference range 0–35 U/l), serum creatinine (reference range 0.73–1.18 mg/dl) and glomerular filtration rate (GFR; according to Cockcroft-Gault equation). Concerning the skin, the data on coexisting dermatoses and application of emollients (including daily frequency) was obtained; no data was collected concerning the type of emollients (bland vs. urea containing emollients).

Skin dryness (xerosis) was evaluated using a 5-point scale (0: no xerosis; 1: mild; 2: moderate; 3: severe; 4: very severe) (17). The main clinical parameter, the presence of CI, was documented, including the affected anatomical locations. The 4-Item Itch Questionnaire (I4IQ) (18–21) was utilized to assess CI extensity, severity, frequency, and associated sleep impairment. Our modified questionnaire for the description of itch (22) was completed, evaluating the presence of itch in the last 3 days. A numerical rating scale (NRS; 0: no itch; 10: worst imaginable itch) was utilized to assess maximal values of itch intensity both in the last 3 days and during the course of the symptom. Furthermore, the description of cutaneous sensations associated with itch, emotional burden of itch, sleep impairment, certain factors influencing itch intensity and itch impact on psyche were noted. QoL and stigmatization were measured with the Dermatology Life Quality Index (DLQI), questionnaire (23) and 6-Item Stigmatisation Scale (6ISS) (24), respectively. This study was conducted in concordance with the approval of Bioethics Committee of Wrocław Medical University (KB-124/2018).

Statistical analysis

Data were collected for 153 subjects; 54 (35.3%) of whom reported having CI. The data from the latter subgroup was additionally extracted for subsequent analyses. Descriptive statistics were used to display the variables in different age groups (65–79 years; 80 years and older), with an appropriate application of significance tests (Student’s t-test, χ² test, Mann–Whitney test). Pearson correlation coefficient (cc), Spearman rank cc, point-biserial, rank-biserial, and the standardized contingency coefficient (C Pearson) were utilized for correlational purposes, where appropriate. We also performed a logistic regression for the CI variable (as dependent), establishing the crucial impacting factors (independent variables) and their odds ratios (OR). A p < 0.05 was considered statistically significant. All procedures were conducted using Statistica 13 (Dell, Inc., Tulsa, USA) software.

RESULTS

General demographics, systemic comorbidities, basic laboratory tests and pharmacotherapy

The study involved 153 patients (36 males and 117 females; 23.5% vs. 76.5%). The age of the participants ranged from 65 to 95 years (mean ± standard deviation (SD) 78.8 ± 7.2 years), with 73 subjects (47.7%) aged 80 years or older. Clinical characteristics of the examined individuals displayed in different age groups (65–79 vs. 80 years and older) are shown in Table I. The most common systemic comorbidities encompassed arterial hypertension (73.9%), joint disorders (58.8%; mostly osteoarthritis), neurological disorders (51.6%; most commonly ischaemic), cardiovascular disorders (51%; mostly ischaemic heart disease) and gastrointestinal disorders (33.3%; mostly peptic ulcer disease). Basic laboratory evaluations encompassed haemoglobin concentration (mean 12.8 ± 1.5 g/dl), serum creatinine (mean 0.9 ± 0.3 mg/dl), GFR (mean 71.7 ± 21.2 ml/min), ASPAT (mean 23.0 ± 7.5 U/l), ALAT (mean 21.3 ± 9.5 U/l) and CRP concentration (mean 10.4 ± 38.7 mg/l). All patients (100%) were taking at least one systemic drug, most commonly angiotensin converting enzyme inhibitors (ACEI) and angiotensin receptor blockers (ARB) (59.5% in total, mostly ACEI), β-blockers (55.6%), statins (49%), angiotensin converting enzyme inhibitors (ACEI) and angiotensin receptor blockers (ARB) (59.5% in total, mostly ACEI), β-blockers (55.6%), statins (49%), anti-arrhythmics (23.0%), and blood pressure-lowering drugs (22.3%). Drugs with proven antipruritic properties were used by 28.1% of patients (mostly H1-antihistamines).

Cutaneous comorbidities, emollients application and xerosis

All patients presented at least one cutaneous comorbidity. The most frequent comprised lentigines (76.5%), seborrhoeic keratosis (41.8%), varicose veins (39.9%), senile angiomas (29.4%) and pigmented naevi (28.8%). Daily application of emollients was confirmed by 61.4% of subjects, with the frequency of application once a day (median). Skin dryness (xerosis) concerned 94.1% of individuals, with a median intensity of 2 points.

Itch characteristics

CI was reported by 35.3% of examined patients, with no significant difference between age groups (31.3% vs. 39.7%; p = 0.27). Among CI group there were 46 females and 8 males (85.2% vs. 14.8%). The majority of these subjects reported itch episode during the last 3 days (75.9%). The most common aetiology of CI involved cutaneous conditions (IFSI I; 53.7% of pruritic subjects); mixed aetiology (IFSI V; 25.9%) and neurological disorders (IFSI III; 11.1%). CI mostly affected the back (48.2%), upper and lower limbs (40.7% each), head (29.6%) and anogenital area (9.3%). Generalized itch bothered only one patient (1.9%). The mean I4IQ score was 6.6 ± 2.8 points, with no differences between younger and older age groups (6.5 ± 2.2 vs. 6.8 ± 3.2 points; p = 0.68). Notably, nearly half of pruritic patients reported longer duration of single itch episodes, lasting

| Variables | 65–79 years | ≥80 years | Total | p-value | (n = 153) |
|-----------|-------------|-----------|-------|---------|----------|
| Age, years, mean ± SD | 73.1 ± 4.4 | 85.0 ± 3.8 | 0 | 78.8 ± 7.2 |
| Age class, n (%) | | | | | |
| Younger (65–79 years) | 80 | 8 | 0 | 80 (52.3) |
| Older (age >79 years) | 0 | 73 | 73 (47.7) |
| Sex, n (%) | | | | | |
| Female | 59 | 58 | 17 | 117 (76.5) |
| Male | 21 | 15 | 36 | 36 (23.5) |
| Weight, kg, mean ± SD | 79.4 ± 16.9 | 69.6 ± 14.1 | 0.0002 | 74.7 ± 16.4 |
| Height, cm, mean ± SD | 164.0 ± 7.2 | 160.0 ± 13.6 | 0.02 | 162.1 ± 10.9 |
| Body mass index, mean ± SD | 29.4 ± 5.8 | 26.7 ± 4.8 | 0.002 | 28.1 ± 5.5 |
| Work carried out, n (%) | | | | | |
| Blue-collar (physical) | 47 | 35 | 82 | 53.6 |
| White-collar (intellectual) | 33 | 38 | 71 | 46.4 |

Significant values are given in bold.
over 10 min (46.3%). Itching occurred most frequently during the evening (90.7%), although it was often present in the morning, midday and night (74.1%, 74.1% and 57.4%, respectively). The mean NRS score for itch intensity during last 3 days was 3.7 ± 3.0 points, whereas maximal NRS score was 6.8 ± 2.5 points. Notably, NRS following a mosquito bite was also marked (6.2 ± 2.9 points). Usually, itch was not accompanied by other unpleasant cutaneous sensations (64.8%). Patients frequently described itch as irritating (77.8%) and burdensome (72.2%). Itch contributed to difficulties in falling asleep, awakenings and the use of soporifics in 25.9%, 22.2% and 11.1%, respectively. The most common exacerbating factors included sweating (51.9%), heat (44.4%), hot water (20.4%), fatigue (18.5%) and stress (16.7%), while physical activity, cold water, hot water, cold ambient temperature and dry air were considered as alleviating (in 33.3%, 27.8%, 25.9%, 16.7% and 11.1%, respectively). Nearly two-thirds (63%) of subjects regarded itch as a factor negatively influencing their mood. The detailed data concerning CI characteristics are presented in Table II, whereas the data concerning systemic comorbidities, laboratory scores, pharmacotherapy and cutaneous comorbidities are presented in Table SII.

**Quality of life and stigmatization among subjects with chronic itch**

The mean DLQI score was 3.3 ± 3.2 points (range 0–15 points), with no statistically significant difference between age groups (3.3 ± 2.6 for patients aged 65–79 years, 3.2 ± 3.7 for those aged 80 years and over; p = 0.97). In general, patients exhibited low stigmatization levels (mean 0.4 ± 1.2 points).

**Table II. Detailed characteristics of chronic itch (CI) patients (n = 54)**

| Variables | Younger (65–79 years) | Older (≥ 80 years) | p-value | Total |
|-----------|-----------------------|--------------------|---------|-------|
| IFSI (I–VI): |                       |                    |         |       |
| Class I [dermatological] | 16 | 13 | 0.16 | 29 (53.7) |
| Class II [systemic] | 0 | 3 | 0.24 | 3 (5.6) |
| Class III [neurological] | 4 | 2 | 0.40 | 6 (11.1) |
| Class IV [psychogenic] | 0 | 0 | n/a | 0 (0.0) |
| Class V [mixed etiology] | 5 | 9 | 0.54 | 14 (25.9) |
| Class VI [others] | 0 | 2 | n/a | 2 (3.7) |
| Itch episode in last 3 days [yes vs. no] | 18 | 23 | 0.53 | 41 (75.9) |
| 4-Item Itch Questionnaire (4IIQ) [3–19], mean ± SD | 6.5 ± 2.2 | 6.8 ± 3.2 | 0.68 | 6.6 ± 2.8 |
| Itch episode duration (combined score: 1–3), incl. | | | | |
| <1 min | 11 | 8 | 0.33 | 19 (35.2) |
| 1–10 min | 3 | 7 | 0.31 | 10 (18.5) |
| >10 min | 11 | 14 | 0.75 | 25 (46.3) |
| Itch treatment history [yes vs. no] | 6 | 5 | 0.78 | 11 (20.4) |
| NRS in last 3 days (0–10 score), mean ± SD | 3.7 ± 3.2 | 3.7 ± 2.9 | 0.98 | 3.7 ± 3.0 |
| NRS max in history (0–10 score), mean ± SD | 7.2 ± 2.4 | 6.4 ± 2.7 | 0.24 | 6.8 ± 2.5 |
| NRS of mosquito bite (0–10 score), mean ± SD | 6.2 ± 2.6 | 6.2 ± 3.2 | 0.96 | 6.2 ± 2.9 |
| Xerosis [yes vs. no] | 23 | 28 | 0.59 | 51 (94.1) |
| Xerosis intensity [on 0–4 scale], median | 2 | 2 | 0.02 | 2 |
| Emollients [times per day, 0–5] | 18 | 17 | 0.30 | 35 (64.8) |
| Emollients administration [times per day, 0–5], median | 1 | 1 | 1.0 | 1 |
| DLQI [0–30 score], mean ± SD | 3.3 ± 2.6 | 3.2 ± 3.7 | 0.97 | 3.3 ± 3.2 |
| 6ISS [0–18 score], mean ± SD | 0.6 ± 1.7 | 0.2 ± 0.5 | 0.24 | 0.4 ± 1.2 |

IFS: International Forum for the Study of Itch; SD: standard deviation; NRS: numerical rating scale; DLQI: Dermatology Life Quality Index; 6ISS: 6-Item Stigmatisation Scale.

Unsurprisingly, patients taking drugs with proven beneficial effects on itch reported CI less often (cc = −0.34; p = 0.004), especially those taking H1-antihistamines (cc = −0.29; p = 0.02). Remarkably, CI was also less common in patients with allergic disorders (asthmatic asthma, allergic rhinitis, allergic conjunctivitis, oedema of Quincke) (cc = −0.26; p = 0.04) and malignancies (excluding cutaneous) (cc = −0.35; p = 0.004). Higher 4IIQ values were reported by subjects with viral hepatitis (cc = 0.32; p = 0.02), purpura (cc = 0.42; p = 0.002), benign prostatic hyperplasia (BPH) (cc = 0.28; p = 0.04) as well as those with higher creatinine levels (cc = 0.31; p = 0.02) and lower GFR (cc = −0.27; p = 0.05). On the other hand, diabetes mellitus (cc = −0.28; p = 0.04), lower limb oedema (cc = −0.27; p < 0.05) and administration of ACEI/ARB (cc = −0.37; p = 0.01) were associated with lower 4IIQ scores. With higher age the likelihood of itch being alleviated by cold water was increased (cc = 0.31; p = 0.02). Itch located on lower limbs occurred more often in individuals with chronic venous insufficiency (cc = 0.49; p = 0.01), hypothyroidism (cc = 0.44; p = 0.04), as well as those taking psychiatric drugs, excluding selective serotonin reuptake inhibitors (SSRI) (cc = 0.50; p < 0.01) and novel oral anticoagulants (NOAC) (cc = 0.45; p = 0.02). Abdominal location of itch was strongly correlated with higher concentrations of CRP (cc = 0.67; p < 0.001). The intake of α-blockers was associated with higher NRS scores in the last 3 days (cc = 0.30; p = 0.03), higher maximal NRS scores (cc = 0.31; p = 0.02) and the need to use soporifics.
Concerned 78.5% of examined subjects aged 55 years and over. In the most comprehensive clinical report focusing on CI in elderly people so far, Valdes-Rodriguez et al. (14) recounted that the mean VAS score for CI was 6.0 ± 2.1 points among elderly Mexicans, which is a higher value than in our cohort. Similar to our study, the most commonly affected anatomical areas were the legs (54%) and the back (45%). In contrast to our study, however, CI was correlated with the presence of diabetes mellitus (OR 2.3) and chronic venous insufficiency (OR 4.4), whereas no correlations were found in relation to drug intake. Among CI group, diabetes affected 27.8% of subjects.

Interestingly, the QoL impairment of CI subjects in our study was relatively low (mean DLQI score 3.3 ± 3.2 points) when compared with the results of a study conducted in Singapore (mean DLQI value 6.7 points) (26). Even more surprising is the fact that geriatric ward patients in our study presented low stigmatization levels. We speculate that these individuals were able to develop sufficient coping mechanisms due to the chronicity of this symptom.

The occurrence of CI in our cohort seemed to correlate with several factors. Firstly, antipruritic drugs (especially H1-antihistamines) decreased the probability of its occurrence. Histamine is considered as a classic itch mediator (27), although numerous other mediators also play a role in eliciting CI of various aetiology (28). Paradoxically, patients with allergic disorders were less prone to develop CI, possibly as a result of a more frequent intake of H1-antihistamines. However, we deem the supposed “protective” role of systemic malignancies to occur accidentally (none of the 16 patients with malignancies reported CI), especially when acknowledging the reports linking CI with various malignancies (29, 30). Higher itch intensity in subjects with purpura might reflect, at least partially, chronic skin insufficiency (dermatoporosis). Indeed, Saurat et al. (31) recounted that the presence of dermatoporosis was correlated with itching. Viral hepatitis has been associated with pruritus in the literature (32, 33), while higher creatinine levels along with lower GFR may denote CKD, which is a classic itchy disorder, especially in its advanced stages (34). The association

### Table III. Logistic regression parameters for chronic itch (CI) as an effect

|                           | Regression coefficient (βi) | Standard error | Wald      | p (βi) | Odds ratio (–95%) | Confidence interval (+95%) |
|---------------------------|-----------------------------|----------------|-----------|--------|------------------|---------------------------|
| Sex (female)              | 1.492                       | 0.525          | 8.070     | 0.005  | 4.447            | 1.588                     |
| Ischaemic neurological diseases | 0.897                      | 0.427          | 4.414     | 0.036  | 2.453            | 1.062                     |
| Rheumatoid arthritis      | 3.226                       | 1.382          | 5.448     | 0.020  | 25.183           | 1.677                     |
| Immobility                | 3.064                       | 1.253          | 5.977     | 0.014  | 21.411           | 1.836                     |
| Allergic disorders        | –2.416                      | 1.116          | 4.684     | 0.030  | 0.089            | 0.010                     |
| Low molecular weight heparin | –3.239                     | 1.568          | 4.267     | 0.039  | 0.039            | 0.002                     |
| Antipruritic drugs        | –2.650                      | 0.673          | 5.197     | 0.000  | 0.071            | 0.019                     |
| Atopic dermatitis         | 2.630                       | 1.244          | 4.469     | 0.035  | 13.875           | 1.211                     |
| Rosacea                   | –1.509                      | 0.795          | 3.601     | 0.058  | 0.221            | 0.047                     |
| Haemoglobin concentration | –0.128                      | 0.041          | 9.894     | 0.002  | 0.880            | 0.812                     |

Goodness of fit: Hosmer–Lemeshow=3.2; p = 0.92; R² Nagelkerke=0.47; LR=−72.83; −2LR=145.7.
of more severe itch with BPH is peculiar, although an association with the intake of α-blockers (especially tam- 
sulosin) might be considered (35). Notably, among itch-
allieving factors, physical activity was reported most 
commonly by our patients. Previous reports on subjects 
with CI due to atopic dermatitis, CKD or psoriasis con-
cordantly mentioned physical activity as an exacerbating 
factor of itch (19, 36, 37), perhaps as a result of sweating 
and friction from clothes. We hypothesize that physical 
activity in our elderly cohort served as a protective factor 
because it provided psychological distraction from itch.

Our logistic regression model demonstrated a vast 
impact of RA on itch occurrence. Douglas et al. (38) 
reported that 34% of patients with RA complained of 
itch, compared with 40% of controls with miscellaneous 
rheumatic non-inflammatory disorders (p-value non-
significant). Other autoimmune disorders frequently ma-
manifesting with itch encompass Sjögren’s syndrome, sys-
temic sclerosis and dermatomyositis (39–41). Immobility 
was another factor strongly impacting itch occurrence 
in the current study. It complicates effective topical care 
of the skin (12) and is associated with decreased water 
content in the skin (42), fostering xerosis and facilitating 
itch. Immobility may also stem from neurological disor-
ders, e.g. ischaemic stroke. The latter is another possible 
cause of itch itself, as reported by several groups (43, 
44). Other CI-precipitating factors in our study involved 
atopic dermatitis (in which itching is a predominant and 
essential diagnostic feature) (45) as well as female sex. In 
fact, itch differences between sexes have been reported 
by Ständer et al. (46), with women being more prone to 
neuropathic and multifactorial causes of itch. On the 
other hand, current therapy with low molecular weight 
heparins seemed to play a role in decreasing the proba-
bility of CI in our study. This remains in concordance 
with studies reporting beneficial effects of enoxaparin 
in lichen planus, both in terms of cutaneous lesions and 
pruritus (47, 48). A possible explanation involves the 
decreased expression of T-lymphocyte heparanase by 
heparin, subsequently inhibiting T-cell migration and 
delayed type hypersensitivity (48). The seemingly pro-
ective role of rosacea in our cohort is difficult to account 
for, as pruritus is a typical feature of this disease (49). It 
is possible that the role of UV exposure might play a role. 
As described earlier, immobile patients were more prone 
to develop CI; it also seems that their limited activity 
results in less exposure to UV. Therefore, we speculate 
that higher activity status and subsequent exposure to UV 
might predispose to rosacea and concurrently decrease 
the probability of CI occurrence. Higher haemoglobin 
concentration might also be associated with lower risk of 
pruritus; conversely, the role of anaemia in eliciting 
pruritus is widely acknowledged (50–52).

All of the aforementioned observations require a cau-
tious approach in the clinical decision-making process, 
as the data in the literature, particularly regarding the 
causative relationships between different aspects and 
factors influencing CI, is still lacking. Multifactorial ae-
tiology of CI is well-known; however, the relative impact 
of individual factors remains an issue. Nevertheless, our 
experience clearly demonstrates that patients with CI will 
benefit from a holistic and interdisciplinary approach. 
Although challenging and time-consuming, managing 
coexistent disorders and acknowledging polypharmacy is 
a sine qua non of therapeutic success in CI in the 
elderly population.

The authors have no conflicts of interest to declare.

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