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CLINICAL REPORT

Burden of Inherited Ichthyosis: A French National Survey

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Moderate to severe ichthyosis is known to have a significant impact on quality of life. A French national survey was performed to describe in more detail how ichthyosis impacts the patients' lives. A questionnaire specifically dedicated to ichthyosis was distributed to patients followed in hospital expert centres or members of the French association of patients. A total of 241 questionnaires were completed and returned (response ratio: 29% for children and 71% for adults). A negative impact of ichthyosis was obvious in terms of domestic life (skin care, housework, clothing, etc.), educational/professional lives (rejections by other children, workplace discrimination, absenteeism, etc) and for leisures/sports activities. The patient's economical resources were also heavily impacted by ichthyosis with important out-of-pocket expenses. ***Key words: ichthyosis; quality of life; financial burden*.**

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Inherited ichthyoses are genetic disorders due to mutations in genes involved in skin barrier function. Patients with ichthyosis are clinically characterised by persistent scaling and hyperkeratosis, often associated with erythema. The severity of this whole-body scaling varies from mild to severe. The onset of ichthyosis ranges from birth (for the rare forms such as autosomal recessive congenital ichthyosis) to childhood (for the common forms such as ichthyosis vulgaris and X-linked ichthyosis) (1). The skin is usually uncomfortable, pruriginous and painful. There is no specific treatment for ichthyosis although the use of emollients, keratolytics and sometimes oral retinoids is of interest in most patients. A significant impact on quality of life (QoL) was previously reported and women with severe scales and pain were those at higher risk for QoL impairment (2, 3). Using focus groups, we previously identified influencing factors that were related to medical care, daily life and relations with others or oneself (4). We herein present the results of a French national survey aiming to precise the individual burden of the disease, by describing the impact of ichthyosis on daily life (home, cost, school/work and leisure/sports) and to identify eventual gaps in the consumed medical resources.

MATERIAL AND METHODS

This study was designed as a French national survey. Ethical review was not required by our institution. The procedures were in accordance with the Helsinki Declaration of 1975, revised in 1983. A questionnaire was designed by an expert committee made of dermatologists, pharmacists, psychologists and social workers, with an input from the French Association of Ichthyosis patients (AIF). This anonymous questionnaire included items linked to the following domains: socio-demographic characteristics, medical care, out-of-pocket expenses for the patient, work/school and leisure activities. Disease severity was self-evaluated by the patient using 5 Visual Analogue Scales (VAS), ranging from 0 to 10 and assessing the intensity of disease symptoms (erythema, scaling, pruritus, ocular troubles and cutaneous pain). The global severity was quoted by the patient as mild, moderate, severe or very severe. In parallel, patients were asked to fulfill a QoL questionnaire (DLQI) whose results were previously reported (3).The questionnaire was sent to all patients with a confirmed diagnosis of ichthyosis (very mild forms not being included), who were seen in one of the 11 French Dermatology Departments experts for rare skin diseases or affiliated to AIF. Patient's initials and date of birth were checked to avoid duplicate responses.

RESULTS

A total of 492 questionnaires was sent, from which 241 were completed and returned (response rate: 49%), including 70 (29%) children and 171 (71%) adults. Their characteristics are described in Table I.

Medical care. Almost all patients were regularly followed by a physician (94.3% of children and 89.2% of adults). For children, physicians were mostly hospital Dermatologists (55.1%). Other involved physicians were private practitioners, including general practitioners, paediatricians and dermatologists (seen by 44.8, 32.3 and 22.6% of patients, respectively). With regards to adults, they were mainly followed up by their general practitioner (49.7%). Other involved physicians included hospital (47.9%) and private dermatologists (27.5%). Despite this high rate of regular medical follow-up, few patients (29.4%) were informed about

Table I. *Characteristics of the study population (171 adults and 70 children)*

Age	
Mean ± SD, years	30.4 ± 21.3
Median (range)	25 years (3 months–88 years)
Sex ratio (F/M)	1.08
Global severity, %	
Mild	22
Moderate	40
Severe	27
Very severe	11
Cutaneous features (VAS/10), mean ± SD	
Erythema	2.71 ± 2.3
Scaling	4.61 ± 2.9
Pruritus	4.25 ± 2.9
Ocular troubles	2.93 ± 3.2
Cutaneous pain	3.60 ± 3.2

the results of laboratory investigations performed to determine the clinical form of ichthyosis they are suffering from.

A major impact on domestic life. Almost all patients (93.7%) used moisturising creams on a daily basis, as shown in Table II. Daily time spent for skin care was linked to disease severity (most patients who spent the longest time on skin care being the most severe). Indeed, the vast majority (88.5%) of mild patients needed less than 30 min for daily skin care, whereas this time was increased for very severe patients, with 7.4% of them reporting more than 2 h/day devoted to skin care.

A percentage of 69.1% of overall patients experienced additional housework because of ichthyosis (vacuum and change bed linens). This extra time for additional housework was estimated to more than 5 h/week for 46.8% of the patients. Furthermore, 71.4% considered that ichthyosis affects clothing and footwear. A percentage of 25% of adult patients also reported an important negative impact on their familial and conjugal (intimate relations) lives.

A financial burden for the patient. Despite the fact that ichthyosis care costs are susceptible to be totally reimbursed by the French Social Security (FSS), 48.3% of patients reported disease care expenses that were not fully covered (21.2% because they were unaware of such possibility, 22.6% because they never asked for it although they were aware of this possibility and 4.5% because they were rebutted from reimbursement by FSS despite prerogatives). Patients must therefore access private insurance (health care mutual) in case of partial public coverage. Nevertheless, after coverage by the FSS, possibly complemented by private health insurance, the out-of-pocket expenditure attributable to ichthyosis still concerned 86.1% of the patients and was estimated at €526 (SD €450) per year and per patient (median [range]: €300 [€50–€1,500]). This could represent a maximum of 12.5% of the total annual salary. When adjusting these additional costs for medically-indicated measures only (moisturising creams and thermal cure (5)), the out-of-pocket expenditure was still estimated at €397 (SD €366) per year. The distribution of annual patient costs related to ichthyosis is presented in Table SI[1]. Moisturising creams and special hygiene/cosmetics products represented the highest spending, with 57% and 20% of the total costs paid by the patient, respectively.

An impairment of educational/professional activities. With regard to children, 48% of the families considered ichthyosis as influencing the child's performance. Additional support for school activities were set-up for 51% of them. In addition, 46% reported a feeling of rejection from other children at school and 20% declared having been excluded from birthday parties of their friends. With regard to adults, 27% of employed patients reported workplace discrimination that had affected their career choices. Work absenteeism related to ichthyosis was reported in 14% of them.

An impact on leisure and sports. More than one-third of patients (34.7%) experienced important restrictions related to ichthyosis. In particular, swimming pool activities were banned in 32.7% of the children, mainly because they were embarrassed by their skin aspect or because they were denied from access to the pool.

DISCUSSION

Although our study population cannot be considered as exhaustive, it was broadly representative of the French ichthyosis population. The questionnaires were widely distributed to patients both recorded in the

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Table II. *Daily time spent for skin care according to ichthyosis severity*

		Global severity			
Daily time spent to skin care	All the patients (*n* = 237, 4 missing data) *n* (%)	Mild (*n* = 52) *n* (%)	Moderate (*n* = 94) *n* (%)	Severe (*n* = 64) *n* (%)	Very severe (*n* = 27) *n* (%)
No moisturising cream	15 (6.3)	5 (9.6)	3 (3.2)	5 (7.8)	2 (7.4)
< 30 min/day	143 (60.3)	46 (88.5)	63 (67)	26 (40.6)	8 (29.6)
30–60 min/day	54 (22.8)	1 (1.9)	20 (21.3)	23 (36)	10 (37.1)
60–120 min/day	16 (6.8)	0 (0.0)	6 (6.4)	5 (7.8)	5 (18.5)
> 120 min/day	9 (3.8)	0 (0.0)	2 (2.1)	5 (7.8)	2 (7.4)

French expert centres in ichthyosis and in the French patient support group, with a survey response rate that can be considered as satisfactory (6). The total of collected questionnaires represented a quarter of the French ichthyosis population, according to a recent epidemiological study in which ichthyosis prevalence (very mild forms excluded) has been estimated at 13.3 (95% CI [10.9–17.6]) per million people (7). Our study population was consistent with that of the epidemiological study (7). With regard to age distribution, mean ages were similar (30.4 years in the present study vs. 28.7 years in the epidemiological study), with a close proportion of patients < 15 years old (26.3% vs. 30.4%). With regard to global severity distribution, our ichthyosis population was also quite well-balanced (mild severity: 22% in the present study vs. 34.5% in the epidemiological study; moderate: 40% vs. 34.5%; severe: 27% vs. 22.4%; very severe: 11% vs. 8.6%).

One of the few limitations of our study might be the absence of a precise characterisation of the clinical form of ichthyosis in patients recruited via the patient support group. This was due to the design of the study (survey) aiming to be broadly representative of this rare disease by including not only patients seen in hospital-based expert centres. The fact that very few people knew the clinical form of ichthyosis they are suffering from, also contributes to this limitation. Nevertheless, in all patients, the diagnosis of ichthyosis has been ascertained by a physician at a given time of their illness.

Another limitation could be the use of a non-validated questionnaire. To our knowledge, such a questionnaire is not available. The recently published questionnaire evaluating the burden of ichthyosis is only intended to parents of children suffering from autosomal recessive congenital ichthyosis (8). The questionnaire we have developed is easy-to-use and comprehensible for patients. Most items concerned individual perception of one's position in life and were thus consistent with a patient self-assessment via a survey design. The self-evaluated disease severity scoring had been validated prior to the survey by comparing physician and patient's assessments, without finding any significant differences (unpublished data).

Our study helps to better describe how ichthyosis impacts daily life. The major impact was related to the use of moisturising creams that was considered as time consuming and was responsible for additional housework (together with the loss of scales), by greasing clothes and house. Moisturising creams also contributed significantly to the financial impact of the disease.

To the best of our knowledge, the patient financial contribution to ichthyosis care has never been evaluated. Annual direct and indirect health costs were only studied in a recent American cost analysis and estimated at a mean of $3,192 (SD $7,915) per patient (9). The French out-of-pocket expenditures, specifically adjusted for medically-indicated measures, highlight a failure in the French social care system to cover the financial expenses related to ichthyosis. This study also highlights the lack of information about reimbursement opportunities. More detailed information should therefore be given to families via specific therapeutic educational programs. Dermatologists should play an important role since they are preferentially involved in the disease care and laboratory investigations should be widely performed and accessible to patients. Campaign information aiming at the general population should also be carried out in order to minimise/avoid discrimination (work, school and leisure such as swimming pool).

In conclusion, our study clearly demonstrates the burden of ichthyosis on daily life and identifies some gaps in patient's care. It will help setting up targeted measures to improve patient management.

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