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Effects of Chronic Kidney Disease-Associated Pruritus and Xerosis on the Quality of Life in Patients Undergoing Hemodialysis

Medea Ebralidze[1,3,ID], Maia Matoshvili[1,ID], Irma Tchokhonelidze[2,3,ID]

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ABSTRACT

Background: Skin problems are associated with negative effects on the overall QoL of patients undergoing hemodialysis. In particular, dry skin and itching symptoms are factors that greatly reduce patient quality of life (QoL).

Objectives: This study aimed to provide a precise description of the quality of life (QoL) status of patients with mild-to-severe uremic xerosis and pruritus. Correlation tests on QoL with uremic pruritus were also investigated.

Methods: The study protocols and data collection procedures were approved by the Bioethics Commission of Tbilisi State Medical University. Written informed consent was obtained from all participants. Based on the presence of uremic pruritus and/or xerosis, study subjects were divided into three groups: group 1 – patients with xerosis (n=37); group 2 – patients with pruritus (n=19); and group 3 – patients with pruritus and xerosis (n=40).

Results: The study shows that the DLQI score in patients with xerosis is significantly lower than in groups 2 and 3 ($p<0.05$). The comparison between groups 2 and 3 showed a significant difference only on the "Work and school" subscale. The DLQI score for this subscale was significantly higher in patients with uremic pruritus than in patients with xerosis and pruritus ($p<0.05$). Correlation analysis of demographic and lesion status variables with DLQI-score revealed that: age of patients did not correlate with DLQI-index ($r=-0.103$; $p=0.318$); degree of xerosis positively correlated with DLQI-index ($r=0.388$; $p<0.001$); degree of pruritus positively correlated with DLQI-index ($r=0.864$; $p<0.001$).

Conclusions: Our data clearly demonstrate that ESRD patients under hemodialysis experience a significant reduction in their QoL. Uremic xerosis and uremic pruritus, which participate in the deterioration of their QoL, have a psychosocial impact that appears to be vastly underestimated in clinical practice. Uremic xerosis compromises QoL indirectly by aggravating uremic pruritus and, to a lesser extent, directly, but in a way that is not related to the xerotic lesions. However, worsened QoL, as assessed by the DLQI, was associated with the severity of uremic xerosis and pruritus.

Keywords: Chronic kidney disease; dermatology life quality index; end-stage renal disease; pruritus; xerosis.

BACKGROUND

Xerosis (rough and scaly skin) affecting patients under hemodialysis (HD) is a poorly recognized entity that was described previously as "acquired ichthyosis",[1] and more recently by the preferred term "uremic xerosis.[2] It is a neglected disease, with little clinical research. However, it becomes a prominent feature after patients with end-stage renal disease (ESRD) start hemodialysis or peritoneal dialysis. Uremic xerosis has also been described as an important factor influencing uremic pruritus,[3-6] although instrumentally measured stratum corneum water content (corneometry) does not correlate with pruritus intensity.[7] In published series, xerosis of moderate to severe intensity led to a 50–100% increase in uremic pruritus.[4-6,8] It was hypothesized that uremic xerosis, even if it is not the primary cause of pruritus, worsens itch by reducing the itch threshold.[9] Both uremic xerosis and pruritus may also result in aggravated skin excoriation, prurigo nodularis, and infections.[8] Uremic pruritus itself is frequent and leads to marked suffering and distress in HD patients,[10-12] as itchy patients in general experience psychosocial burdens.[12-13] Data about the psychological and social consequences of uremic xerosis is poor. As a chronic, widely distributed condition, its physical and emotional impact is often underestimated, particularly in clinical practice.

Skin problems are associated with adverse effects on the overall QoL of patients undergoing hemodialysis. In particular, dry skin and itching significantly reduce patient quality of life (QoL).[14] However, limited data show the effect of skin diseases on patients with ESRD using the Dermatology Life Quality Index (DLQI). In addition, despite the high prevalence of skin diseases, patients undergoing hemodialysis tend not to actively seek care in the dermatology department. Furthermore, there have been no reports of changes in QoL before and after active expert dermatological treatment. Some authors evaluated the prevalence and characteristics of skin manifestations in patients with ESRD on hemodialysis and indicators of QoL.[15]

This study aimed to provide a precise description of the quality of life (QoL) status of patients with mild-to-severe uremic xerosis and pruritus. Correlation tests on QoL with uremic pruritus were also investigated.

METHODS

The Bioethics Commission of Tbilisi State Medical University approved the study protocols and data collection procedures. Written informed consent was obtained from all participants.

Ninety-six patients were enrolled in the study to assess their QoL. The enrolment period ranged from September 2023

to November 2024, during which these patients were undergoing HD in the dialysis center of Tbilisi State Medical University Hospital. These patients were selected for the study according to specific inclusion and exclusion criteria.

Adult patients (age: 63.3±12.5 years) of both sexes (males/females: 49/47) undergoing hemodialysis (n=82) or peritoneal dialysis (n=14) because of ESRD were studied. Patients with skin complications (prurigo, superinfection, contact dermatitis) were excluded from the study.

The dermatologist examined patients to evaluate disease severity, using the El-Gammal severity score[16] at various body sites. The El Gammal index includes five items: 0= smooth skin; 1=patches of fine, powdery scales; 2=diffuse ashy appearance with many fine scales; 3=moderate; and 4=intense scaling, moderate cracks. To minimize inter-assessor variability, a photo-grader illustrating each grade was provided. A total score was calculated for each patient by summing the scores across sites.

The researchers assessed the global intensity of uremic pruritus using a 4-point analogue scale (0-no pruritus, 1-mild pruritus, 2-moderate pruritus, 3-severe pruritus).

QoL was evaluated by patients using the Dermatology Life Quality Index (DLQI). DLQI is a specific scale assessing the impact of dermatological diseases on patients' quality of life.[17] It is self-explanatory and easily handled by the patients. It comprises six concepts and 10 items: symptoms and feelings (2 items), daily activities (2 items), leisure (2 items), work and school (1 item), personal relationships (2 items), and treatment (1 item). It is calculated by summing the scores for each item (graded 0-3), yielding a minimum of 0 and a maximum of 30. The higher the score, the greater the QoL compromise. It is the most commonly used instrument for QoL evaluation in dermatology, but it may not detect minor impairments.9 For each individual, DLQI questionnaires were given as separate sheets in an envelope that was sealed after being completed. All the questionnaires were provided in Georgian language (validated language version).

Based on the presence of uremic pruritus and/or xerosis, study subjects were divided into three groups: group 1: patients with xerosis (n=37); group 2: patients with pruritus (n=19); and group 3: patients with pruritus and xerosis (n=40).

Mean values±SD were calculated for all scores. The influence of certain variables on DLQI was studied, including categorical variables such as gender, underlying ESRD disease, HD type, and the presence or absence of xerosis and pruritus. Continuous variables were the patient's age, the duration of HD, the duration of xerosis and pruritus, and the clinical intensity of uremic xerosis and uremic pruritus. Statistical comparisons of the DLQI results between stratified subgroups defined by categorical variables were performed using an independent Student's t-test. Chi2-test compared categorical variables. Correlation analysis between variables and QoL scores was performed using Pearson's correlation test. A p-value less than 0.05 is considered statistically significant.

RESULTS

Baseline characteristics are following: Percentage of patients aged of <50 years was 14.6%, 50-59 years – 21.9%, 60-69 years – 30.2%, 70+ years – 33.3%; mean value of the duration of ESRD was 6.3±6.7 years; percentage of patients with ESRT duration less than 5 years was 58.3%, 5+ years – 42.7%. 27 patients suffered from diabetes mellitus. Uremic xerosis was diagnosed in 37 patients (38.5%); uremic pruritus in 19 patients (19.8%). The combination of uremic xerosis + uremic pruritus was manifested in 40 cases (41.7%).

The percentages of responses for the DLQI questions, subscales, and total scores in the whole group are given in Table 1.

TABLE 1. The number of patients and percentages of responses by DLQI questions, DLQI subscale and total scores in the whole group

DLQI Question	Scores of responses by DLQI-questions				Mean ± SD
	0	1	2	3	
Q1, n(%)	27(28.1)	35(36.5)	23(24.0)	11(11.5)	1.2±1.0
	Chi2-test=12.50, p=0.006				
Q2, n(%)	41 (42.7)	31(32.3)	15(15.6)	9 (9.4)	0.9±1.0
	Chi2-test=26.83, p<0.001				
Symptoms and feelings					2.1±1.9
Q3, n(%)	18(18.8)	51(53.1)	18(18.8)	9 (9.4)	1.2±0.8
	Chi2-test=42.75, p<0.001				
Q4, n(%)	9 (9.4)	51 (53.1)	25(26.0)	11(11.5)	1.4±0.8
	Chi2-test=46.83, p<0.001				
Daily activities					2.6±1.6
Q5, n(%)	21(21.9)	46(47.9)	22(22.9)	7(7.3)	1.2±0.9
	Chi2-test=32.75, p<0.001				
Q6, n(%)	25(26.0)	46(47.9)	18(18.8)	7(7.3)	1.1±0.9
	Chi2-test=33.75, p<0.001				
Leisure					2.2±1.3
Q7, n(%)	22(22.9)	47(49.0)	3(3.1)	24(25.0)	1.3±1.1
	Chi2-test=40.58, p<0.001				
Work and school					1.3±1.1
Q8, n(%)	53(55.2)	22(22.9)	15(15.6)	6(6.3)	0.7±0.9
	Chi2-test=52.08, p<0.001				
Q9, n(%)	53(55.2)	20(20.8)	15(15.6)	8(8.3)	0.8±1.0
	Chi2-test=49.75, p<0.001				
Personal relationships					1.5±1.9
Q10,n(%)	26(27.1)	42(43.8)	19(19.8)	9(9.4)	1.1± 0.9
	Chi2-test 24.08, p=0.041				
Treatment					1.1±0.9
Total:					10.8±8.3

Abbreviations: DLQI, Dermatology Life Quality Index; SD, Standard deviation.

The percentage of the response "extremely" was significantly lower for the questions Q1, Q2, Q3, Q4, Q5, Q6, Q8, Q9, and Q10. The percentage of the response "mild" was significantly higher for the questions Q1, Q3, Q4, Q5, Q6, Q7, and Q10.

The impact of dermatologic conditions on patients' skin-related quality of life (QoL) must be clearly understood. It is vital to recognize how these conditions affect individuals, underscoring the urgent need for effective treatment and comprehensive support (Tab.2).

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TABLE 2. The distribution of patients by the effect of dermatologic condition on the skin-related QoL

Level of effect	n	%
No effect	0	0.0%
Mild effect	29	30.2%
Moderate effect	30	31.3%
Large effect	17	17.7%
Extremely large effect	20	20.8%

The DLQI subscale and total scores in the study groups are given in Table 3. It shows that the DLQI-score in patients with xerosis is significantly lower than in groups 2 and 3 ($p<0.05$). The comparison between groups 2 and 3 showed a significant difference only for the "Work and school" subscale. The DLQI score for this subscale was significantly higher in patients with uremic pruritus than in patients with xerosis and pruritus ($p<0.05$).

TABLE 3. The DLQI subscale and total scores in the study groups

DLQI concept name	Group 1 Patients with xerosis (n=37)	Group 2 Patients with pruritus (n=19)	Group 3 Patients with xerosis and pruritus (n=40)
Total, Mean±SD	4.5±4.3	14.6±8.2*	13.8±8.1*
Symptoms and feelings, Mean±SD	0.2±0.8	2.8±1.5*	3.1±1.6*
Daily activities, Mean±SD	1.6±0.9	2.8±1.5*	3.1±1.7*
Leisure, Mean±SD	1.3±1.0	2.7±1.7*	2.8±1.6*
Work and school, Mean±SD	0.6±0.8	2.1±1.0*	1.4±0.8*[f]
Personal relationships, Mean±SD	0.3±0.7	2.7±1.9*	2.0±2.0*
Treatment, Mean±SD	0.6±0.6	1.6±0.9*	1.4±0.8*

*Group 2 and group 3 vs. group 1 - $p<0.05$; f group 3 vs. group 2 – $p<0.05$

Abbreviations: SD, Standard deviation.

Correlation analysis of demographic and lesion status variables with DLQI-score revealed that:

- Age of patients did not correlate with DLQI-index ($r=-0.103$; $p=0.318$);
- Degree of xerosis positively correlated with DLQI-index ($r=0.388$; $p<0.001$);
- Degree of pruritus positively correlated with DLQI-index ($r=0.864$; $p<0.001$).

DISCUSSION

This study is the first survey to investigate the QoL of patients with uremic xerosis and pruritus in Georgia. Uremic xerosis and pruritus are common chronic cutaneous complications among ESRD patients undergoing HD.[3,18] According to the literature, it affects 50-85% of HD patients,[4,6,8] whereas 30–40% of ESRD patients report this symptom before starting HD.[4,19] Furthermore, the majority of uremic xerosis cases observe remission of the xerotic signs after renal transplantation. Uremic xerosis often affects the entire body and may be more pronounced in some areas. In large series, the intensity of the lesions has been described as mild in 30-40%, moderate in 35-50%, and severe in 15-30% of HD patients.[4,6] It is a permanent syndrome, with a clinical picture comprising a dry skin appearance, marked scaling and roughness, and poor skin turgor (i.e., failure of the skin to reassume a prompt normal contour when the skin is stretched). Associated signs include premature skin ageing (elastosis) and pruritus.[3,20] Severe involvement of specific areas, such as the hands and feet, may lead to possible functional impairment. Because the cutaneous barrier function is reduced, the skin is more easily exposed to external factors, such as wind, cold, sun, and reduced air humidity.[21] As in some other severe xerotic conditions, a greater susceptibility to irritation from chemical factors (e.g., soaps and detergents) may be observed.[22] Therefore, patients should be advised to avoid frequent hand-washing and baths in order to limit cumulative soap-induced irritation.[23] Irritating clothes must often be replaced with smoother fabrics (e.g., cotton).[24] In some patients, uremic xerosis is associated with diminished sweating and poor wound healing.[25-27] The cause of uremic xerosis is unknown. The skin is a significant reservoir of water, containing 10-20% of the total body water content;[21] it is conceivable that HD sessions, where the volemia equilibrium is frequently disturbed, require water homeostasis at the expense of cutaneous integrity at the epidermal and even the dermal level (e.g., elastin disruption). This study used a validated cross-cultural QoL questionnaire (DLQI). In the study population, which experienced both ESRD and uremic xerosis, skin-related QoL impairment was analyzed using DLQI items. The dermatologically oriented DLQI questionnaire showed that uremic xerosis contributed to a partial aggravation of their QoL (4.5±4.3). By ranking the degree of QoL alteration according to individual DLQI scores,[17] uremic xerosis patients were distributed widely from mild impairment (DLQI<2) to severe impairment (DLQI>11). Uremic xerosis affects QoL through the bad feelings and low self-esteem the symptoms induce; however, the physical component and daily activity outcome also participate in QoL alteration. Analysis of demographic and lesion status variables on the DLQI score revealed that patient age did not correlate with the DLQI index ($r= -0.103$; $p=0.318$). The same trend was observed for gender, personal history (ESRD causal condition, duration of HD, xerosis, and pruritus), and HD modality; none of these factors contributed to changes in QoL.

In our study, approximately half of patients with uremic xerosis had persisting pruritus even though antihistamine treatments were allowed. In contrast, an increased sensitivity to histamine has been reported previously in patients with uremic pruritus.[28] The presence of pruritus resulted in greater QoL alteration ($p<0.05$). A previous study using SF-36 and DLQI also showed markedly decreased QoL in HD patients with uremic pruritus compared with those without itch.[29] Both uremic xerosis and pruritus intensity were apparently shown to have a negative impact on QoL ($r=0.388$ and $r=0.864$, respectively; $p<0.001$). Our findings confirmed previous observations that uremic xerosis aggravates uremic pruritus,[4,6]

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whereas there was no relation between age and xerosis or between age and pruritus. Such a correlation raises the possibility that xerosis may be a confounding factor. Using a multiple linear regression model, some authors found that age and pruritus intensity taken individually both compromised QoL ($p<0.001$),[29] but xerosis intensity had no distinct impact on QoL. We can deduce that the intensity of xerotic lesions, as measured by the El-Gammal score, compromises the QoL of uremic xerosis patients mainly by aggravating the associated pruritus. Nevertheless, uremic xerosis patients without associated pruritus also had QoL impairment, but to a lesser extent (mean±SD DLQI: 3.24±3.99).

CONCLUSIONS

Our data clearly demonstrate that ESRD patients under HD experience a significant reduction in their QoL. Uremic xerosis and uremic pruritus, which participate in the deterioration of their QoL, have a psychosocial impact that appears to be vastly underestimated in clinical practice. Uremic xerosis compromises QoL indirectly by aggravating uremic pruritus and, to a lesser extent, directly, but in a way that is not related to the xerotic lesions. However, worsened QoL, as assessed by the DLQI, was associated with the severity of uremic xerosis and pruritus.

AUTHOR AFFILIATIONS

[1]Department of Dermatology and Venereology, Tbilisi State Medical University, Tbilisi, Georgia;
[2]Department of Internal Medicine N2, Tbilisi State Medical University, Tbilisi, Georgia;
[3]TSMU and Ingorokva High Medical Technologies University Clinic, Tbilisi, Georgia.

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