

Introduction

- Approximately 50%-90% of patients with end-stage renal disease (ESRD) on hemodialysis report itchy and dry skin (ie, markers of pruritus).^{1,2} Both are quantified via the Kidney Disease Quality of Life 36 (KDQOL) questionnaire, which is administered yearly at a large dialysis organization.
- Pruritus has been associated with:
 - Reduced quality of life
 - Increased risk of negative health outcomes, including hospitalization, infections, and death³⁻⁵
 - Increase in antibiotic use⁶
 - Increase in missed hemodialysis sessions⁷
 - Increase in health care costs⁸

Objective

To identify the characteristics of patients undergoing hemodialysis who are at risk of pruritus.

Methods

- This retrospective cohort study examined characteristics of patients who received in-center hemodialysis at least 3 times a week between 1 December 2008, and 30 June 2012.
- Health records were analyzed for eligible patients who were ≥ 18 years old, had completed a KDQOL assessment of itchy and dry skin after ≥ 3 months of dialysis, and had Medicare as their primary payer.
- Baseline differences across itchiness and dryness severity categories were described for demographic and clinical characteristics using chi square tests of trend and generalized linear model tests for mean differences. Unadjusted means for IV medications for the 6 months following the KDQOL assessment were obtained. Patient characteristics and clinical parameters (labs) were measured during the 1-month baseline period prior to KDQOL assessment date.
- In this analysis of 38,815 patients, approximately 20% of ESRD patients reported the most severe itchiness and dryness scores.
- A greater proportion of African American patients reported itchy and dry skin as compared to other racial/ethnic groups, and the proportion of these patients reporting itchy (range, 39% to 46%; $P < 0.0001$) and dry (range, 38% to 50%; $P < 0.0001$) skin increased across worsening severity scores.
- Comorbidity burden was higher in patients with increasing itch severity, including those with diagnosed pruritus, cardiovascular disease, chronic obstructive pulmonary disease, liver disease, and history of bacteremia and septicemia ($P < 0.0001$ for each).
- Among patients with the worst itchiness or dryness scores, serum phosphorus, parathyroid hormone, and calcium were slightly greater for each.
- Hemoglobin concentrations did not differ across groups (mean, 11.3 g/dL; $P = 0.8122$) nor did Kt/V (mean, 1.56-1.57; $P = 0.7504$).
- Clinically meaningful differences in intravenous antibiotic use were observed among patients who were very much and extremely bothered by pruritus, the two worst itchiness or dry skin categories.
- Patients with the most severe itchiness and/or dryness missed on average 2.6 more dialysis sessions per year as compared to patients with no itchiness and/or dryness.

Table 1. Patient Characteristics by Itchiness Score

	Not at all Bothered n = 15,319	Somewhat Bothered n = 11,567	Moderately Bothered n = 5,867	Very Much Bothered n = 3,571	Extremely Bothered n = 1,991	P-value
Age (years; mean \pm SD)	62.32 \pm 14.44	61.96 \pm 14.25	61.55 \pm 14.30	61.32 \pm 14.61	59.37 \pm 14.25	< 0.0001
Gender (% female)	46.3	45.47	45.36	48.19	50.88	0.0022
Race/Ethnicity (%)						< 0.0001
African American	41.94	41.71	39.34	41.89	45.61	
Asian	1.88	2.12	2.44	2.63	1.46	
Caucasian	37.57	37.82	39.82	36.26	34.2	
Hispanic	14.28	13.74	13.87	15.23	14.97	
Other	4.33	4.61	4.53	3.98	3.77	
Cause of ESRD (%)						
Diabetes	44.1	43.43	43.43	45.53	43.95	0.0339
Hypertension	32.3	32.84	31.63	30.52	30.29	
Other	23.6	23.73	24.94	23.94	25.77	
Vintage (years; mean \pm SD)	3.83 \pm 3.85	4.01 \pm 3.89	3.98 \pm 3.89	3.9 \pm 3.56	4.07 \pm 3.88	0.004
DaVita Vintage (years; mean \pm SD)	3.08 \pm 3.06	3.2 \pm 3.03	3.19 \pm 3.05	3.17 \pm 2.94	3.19 \pm 3.03	0.0155
Comorbidities (%)						
Cardiovascular	28.53	29.45	31.36	31.5	32.7	< 0.0001
Cancer	2.21	2.43	2.49	2.8	2.71	0.0215
COPD	3.39	4.05	4.57	5.26	6.48	< 0.0001
Liver disease	1.81	2.03	2.03	2.38	2.66	0.0029
Pruritus	3.46	4.88	5.37	7.17	10.1	< 0.0001
Bacteremia	27.39	29.2	31.57	32.68	33.85	< 0.0001
Septicemia	5.88	6.57	7.12	7.2	7.89	< 0.0001
Renal Transplant History (%)	5.46	5.58	5.69	5.04	5.07	0.4387
Dry Skin Category (%)						< 0.0001
Not Bothered	58.05	19.24	11.2	7.5	5.63	
Somewhat Bothered	25.69	58.51	16.06	9.66	6.43	
Moderately Bothered	9.64	12.17	52.91	14.37	9.09	
Very Bothered	4.45	7.09	14.64	59.12	13.71	
Extremely Bothered	2.17	2.98	5.2	9.35	65.14	

Abbreviations: COPD, chronic obstructive pulmonary disease; ESRD, end-stage renal disease; SD, standard deviation.

Table 2. Dialysis-Related Clinical Measures by Itchiness Score

	Not at all Bothered n = 15,319	Somewhat Bothered n = 11,567	Moderately Bothered n = 5,867	Very Much Bothered n = 3,571	Extremely Bothered n = 1,991	P-value
Vascular Access (%)						0.005
Catheter	17.56	16.25	17.33	17.36	17.43	
Fistula	60.95	60.74	61.72	61.72	58.92	
Graft	21.49	23.01	20.95	20.95	23.66	
BMI (kg/m ² ; mean \pm SD)	28.8 \pm 7.1	28.9 \pm 7.2	29.1 \pm 7.5	28.9 \pm 7.3	28.9 \pm 7.6	0.0978
Prescribed Time on Dialysis (%)	99.74	99.69	99.66	99.31	98.99	< 0.0001
Attended Sessions (mean \pm SD)	12.4 \pm 1.6	12.4 \pm 1.5	12.4 \pm 1.6	12.3 \pm 1.7	12.3 \pm 1.7	< 0.0001
Serum Phosphorus (mg/dL; mean \pm SD)	4.9 \pm 1.5	5.1 \pm 1.6	5.1 \pm 1.6	5.2 \pm 1.7	5.3 \pm 1.7	< 0.0001
Corrected Calcium (mg/dL; mean \pm SD)	8.71 \pm 1.8	8.75 \pm 1.8	8.81 \pm 1.6	8.76 \pm 1.8	8.88 \pm 1.6	< 0.0001
Ca*P Product (mean \pm SD)	43.9 \pm 14.4	45.5 \pm 15.5	45.8 \pm 15.4	46.0 \pm 16.6	47.4 \pm 16.8	< 0.0001
Serum PTH (pg/mL; mean \pm SD)	350.5 \pm 368.3	362.3 \pm 372.5	358.5 \pm 356.4	375.1 \pm 376.3	368.9 \pm 367.9	0.0003
TSAT (%; mean \pm SD)	26.6 \pm 16.9	26.9 \pm 16.8	26.8 \pm 16.8	26.6 \pm 16.6	26.9 \pm 16.9	0.65
Serum Ferritin (ng/mL; mean \pm SD)	516.9 \pm 432.0	519.7 \pm 422.3	519.6 \pm 426.0	524.6 \pm 447.4	495.9 \pm 412.3	0.5620
Hemoglobin (g/dL; mean \pm SD)	11.3 \pm 1.2	11.34 \pm 1.2	11.33 \pm 1.2	11.29 \pm 1.3	11.28 \pm 1.3	0.8122
Albumin (g/dL; mean \pm SD)	3.83 \pm 0.85	3.83 \pm 0.85	3.84 \pm 0.73	3.78 \pm 0.79	3.77 \pm 0.73	0.0001
Kt/V (mean \pm SD)	1.6 \pm 0.5	1.6 \pm 0.5	1.6 \pm 0.5	1.6 \pm 0.5	1.6 \pm 0.5	0.7504
Use of IV Antibiotics (%)	4.52	4.86	5.06	5.82	6.98	< 0.0001
Use of Pruritus Treatments (%)						0.0003
IV	3.69	3.74	4.33	4.56	5.68	
Oral	10.74	13.24	14.88	19.04	24.71	
Topical	2.17	2.37	2.66	2.8	3.37	
Missing	83.39	80.64	78.13	73.59	66.25	

Abbreviations: BMI, body mass index; IV, intravenous; PTH, parathyroid hormone; SD, standard deviation; TSAT, transferrin saturation.

Conclusions

- Clinically meaningful differences in demographic characteristics, comorbidity burden, and clinical measures were observed when patients with more severe itchy and dry skin were compared to patients with no or less severe itchy and dry skin. The analyses showed that patients with itch and dryness severity were more likely to be African-Americans; to have slightly higher levels of serum phosphorus, parathyroid hormone, and calcium levels; and to have higher comorbidity burden.
- Pruritus has quality-of-life and health care outcomes, compliance, and cost implications. However, the large sample size used in this study may have produced statistical significance where there was little or questionable clinically meaningful significant difference.
- Future analyses are needed to further define the ESRD subpopulation that reports itchy and/or dry skin and to evaluate the economic impact of itchy and/or dry skin within the health care system.

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Acknowledgments

We extend our sincere appreciation to the teammates in more than 1,800 DaVita clinics who work every day to take care of patients and also to ensure the extensive data collection on which our work is based. We thank DaVita Clinical Research® (DCR®), and specifically acknowledge Michele G. Scheid of DCR for editorial contributions in preparing this poster. DCR is committed to advancing the knowledge and practice of kidney care.

This study was funded by Mitsubishi Tanabe Pharma Corporation.

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World Congress of Nephrology, 31 May - 4 June 2013, Hong Kong

