

# DISTURBED SKIN BARRIER IN CHILDREN WITH CHRONIC KIDNEY DISEASE



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## INTRODUCTION AND AIMS

Cutaneous lesions in patients with chronic kidney disease (CKD) are polymorphic and diverse. The most common skin symptom in adults suffering from CKD is pruritus. It is termed "uremic pruritus" or more accurately "chronic kidney disease-associated pruritus" (CKD-P). Another common problem is skin dryness. It may appear at various stages of CKD, but it is more frequently diagnosed in dialysis adults (45%). There are very limited data on skin lesions in children with CKD, especially in earlier stages of the disease. The aim of the study was to evaluate pruritus and xerosis in children with different stages of CKD. The prevalence of CKD-P, its severity and characteristic as well as its link with dry skin and selected factors typical for CKD were examined.

## MATERIALS AND METHODS

The study included 103 children: 72 with CKD stage 3-5 (34 on dialysis and 38 treated conservatively) and 31 as a reference group (Table 1). Each participant in the study was assessed for pruritus and dryness of the skin. In patients with CKD the assessment also included results of blood tests. The intensity of pruritus was assessed using the Visual Analogue Scale (VAS) and the 4-item Itch Questionnaire. Skin dryness was estimated by clinical evaluation, non-invasive corneometric assessment of epidermis moisturizing with Corneometer and measurement of transepidermal water loss with Tewameter.

Table 1. Characteristics of examined groups (CKD - chronic kidney disease. Continuous data given as means  $\pm$  SD).

	Control group N=31	CKD on conservative treatment N=38	CKD on dialysis N=34	p
Age (years)	10.7 $\pm$ 3.9	11.0 $\pm$ 4.5	11.1 $\pm$ 4.2	0.95
Gender: F/M (%)	17/14 (54.8/45.2)	8/30 (21.1/78.9)	22/12 (64.7/35.3)	<0.001
Cause of CKD:				
- anomaly of urinary tract	-	23 (60.5)	13 (38.2)	0.2
- polycystic kidney disease	-	7 (18.4)	6 (17.6)	
- chronic glomerulonephritis	-	3 (7.9)	7 (20.6)	
- chronic interstitial nephropathy	-	4 (10.5)	4 (11.8)	
- other	-	1 (2.6)	4 (11.8)	
CKD duration (years)	-	7.3 $\pm$ 4.9	7.4 $\pm$ 4.8	0.98
CKD stage				
3	-	20	0	
4	-	18	0	
5	-	0	34	

## RESULTS

CKD-P was found in **20.8%** of patients.

In the group of children treated conservatively, CKD-P was observed in **18.4%** of patients, and among dialysis in **23.5%**. There was no difference between children treated conservatively and dialyzed with regard to the severity of itching. Among the children with CKD, in the subgroup with pruritus compared with the group without pruritus a significantly lower eGFR and higher ratio of the Ca x P were noted. Most CKD children reported dry skin.

**Xerosis** was identified more frequently in patients on **dialysis (67.6%)** than on **conservative treatment (42.1%)** (p=0.01). Xerosis was more commonly found in children with pruritus (66.7%) compared to those without pruritus (50.9%) (p<0.01).

**Dry skin** was more severe in children with pruritus than without pruritus (p<0.01).

Table 2. Prevalence, severity and site of skin dryness and pruritus in the study subjects.

	Control group N (%)	CKD patients on conservative treatment N (%)	CKD patients on dialysis N (%)	p
Skin dryness:				
- none	27 (81.1)	22 (57.9)	11 (32.4)	<0.001
- mild	4 (12.9)	15 (39.5)	17 (50.0)	
- moderate	0 (0)	1 (2.6)	6 (17.6)	
Prevalence of dry skin				
Forearm	3 (9.7)	3 (7.9)	8 (23.5)	0.12
Lower leg	3 (9.7)	9 (23.7)	12 (35.3)	0.05
Abdomen	0 (0)	3 (7.7)	5 (14.7)	0.09
Chest	0 (0)	1 (2.6)	4 (11.8)	0.06
Presence of pruritus	0 (0)	7 (18.4)	8 (23.5)	0.01

Table 3. Assessment of dry skin (results demonstrated as means  $\pm$  SD).

	Control group	CKD patients on conservative treatment	CKD patients on dialysis	p	
Clinical evaluation of dry skin	forearm	0.1 $\pm$ 0.3	0.13 $\pm$ 0.41	0.35	
	lower leg	1. $\pm$ 0.3	0.3 $\pm$ 0.5	0.03	
	abdomen	0	0.1 $\pm$ 0.3	0.2 $\pm$ 0.5	0.04
	thorax	0	0.03 $\pm$ 0.2	0.1 $\pm$ 0.3	0.13
Epidermis moisturizing (corneometry) [AU]	forearm	31.2 $\pm$ 6.2	30.4 $\pm$ 9.8	28.4 $\pm$ 5.7	0.32
	lower leg	31.8 $\pm$ 7.7	25.9 $\pm$ 7.2	24.5 $\pm$ 6.6	<0.001
	abdomen	35.6 $\pm$ 7.8	29.5 $\pm$ 10.1	25.1 $\pm$ 7.0	<0.001
	thorax	45.5 $\pm$ 7.8	40.4 $\pm$ 13.5	33.8 $\pm$ 7.7	<0.001
Transepidermal water loss [g/m <sup>2</sup> /h]	forearm	5.5 $\pm$ 2.9	8.5 $\pm$ 4.1	8.3 $\pm$ 3.1	<0.001
	lower leg	6.7 $\pm$ 3.6	7.9 $\pm$ 5.0	9.8 $\pm$ 5.3	0.04
	abdomen	6.9 $\pm$ 5.3	9.6 $\pm$ 6.4	9.2 $\pm$ 5.5	0.12
	thorax	6.7 $\pm$ 3.7	9.5 $\pm$ 6.8	7.6 $\pm$ 3.3	0.06

## CONCLUSIONS

Uremic pruritus occurs not only in adults but also in children with chronic kidney disease. It is already present in the early stages of chronic kidney disease, and there is a trend of a higher incidence in children undergoing dialysis than in those treated conservatively. In the aetiology of pruritus in children with CKD, dryness of the skin may play an important role.

