

# Skin Manifestations in Patient with Chronic Kidney Disease on Hemodialysis

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**Keywords:** Chronic kidney disease, hemodialysis, skin manifestations

**Abstract:** Skin manifestations are common in patients with chronic kidney disease (CKD) and almost all patients have at least one skin disorder. Early diagnosis and appropriate therapy should be given to improve the quality of life of patients. This cross sectional study was conducted in 125 patients, male patients (52%) were more common than female (48%), the highest number of patients in the age group of 56-65 years (29%), most patients underwent hemodialysis for 0-5 years (91%) and most common aetiology is hypertension (48%). Skin abnormalities were found in 106 patients (85%), xerotic skin was the most common, followed by pruritus, hyperpigmentation, prurigo nodularis, cellulitis and purpura. Hair abnormality assessed was hair loss were found in 43 patients (35%). Nail abnormalities were found in 60 patients (48%), where onychodystrophy was the most common, followed by half and half of nail, white nail, discoloration, pitting nail, longitudinal ridges and melanonychia. Mucosal abnormalities were found in 45 patients (36%) in which xerostomia was the most common abnormalities, followed by gingivitis and stomatitis. There was a significant association between xerotic with urea ( $p = 0.041$ ) and creatinine ( $p = 0.040$ ), skin disorders with creatinine ( $p = 0.031$ ), hair abnormalities with calcium ( $p = 0.001$ ) and gender where women were significantly more often affected ( $p = 0.020$ ), and nail abnormalities with hemoglobin ( $p = 0.007$ ). The prevalence of all skin manifestations is 95%.

## 1 INTRODUCTION

Chronic kidney disease (CKD) is a condition in which the kidneys are unable to fulfill their function in disposing of metabolic waste and maintaining fluid and electrolyte balance (Mourad et al., 2014). Skin manifestations are common in patients with CKD and almost all patients have at least one skin disorder (Gursu et al., 2016). This study was conducted to investigate skin manifestations occurring in CKD patients undergoing hemodialysis in Hemodialysis Installation of Dr. Moewardi General Hospital Surakarta, so early diagnosis and appropriate therapy can be given to improve the quality of life of patients.

## 2 METHODS

The subjects of the study were CKD patients undergone hemodialysis at Hemodialysis Installation of Dr. Moewardi General Hospital Surakarta from

11 to 16 December 2017. This study was conducted cross sectional by doing history taking, physical and supporting examination. History taking was done to determine the etiology of CKD, how long the patients have undergone hemodialysis, and the presence of skin complaints. Physical examination was done to determine the existence of skin abnormalities including hair abnormalities, skin, nails and mucosa. The gram, tzank and potassium hydroxide (KOH) examination was conducted when a lesion was suspected. The data of laboratory findings were taken from the medical record. Statistical analysis was done with SPSS.

## 3 RESULTS

The number of CKD patients who underwent hemodialysis at Hemodialysis Installation of Dr. Moewardi General Hospital Surakarta from 11 to 16 December 2017 was 137 patients. Of these, 125 patients had complete laboratory examination. Based on the data, male patients (52%) were more common

than female (48%), with the largest number of patients in the age group of 56-65 years (29%), most patients underwent hemodialysis for 0-5 years (91%) and the most common aetiology is hypertension (48%).of these patients, 119 patients had skin disorders. Skin abnormalities were found in 106 patients (85%), in which xerotic skin (76%) was the most common disorder, followed by pruritus (67%), hyperpigmentation (40%), prurigo nodularis (1,6%), cellulitis (0,8%) and purpura(0,8%). Hair abnormality assessed was hair loss were found in 43

patients (35%). Nail abnormalities were found in 60 patients (48%), in which onychodystrophy (28%) was the most common, followed by half and half nails (23%), white nail (23%), discoloration (16%), pitting nail (4%), longitudinal ridges (4%) and melanonychia (2%) (Figure 1). Mucosal abnormalities were found in 45 patients (36%) in which xerostomia (73%) was the most common abnormalities, followed by gingivitis (29%) and stomatitis (18%).

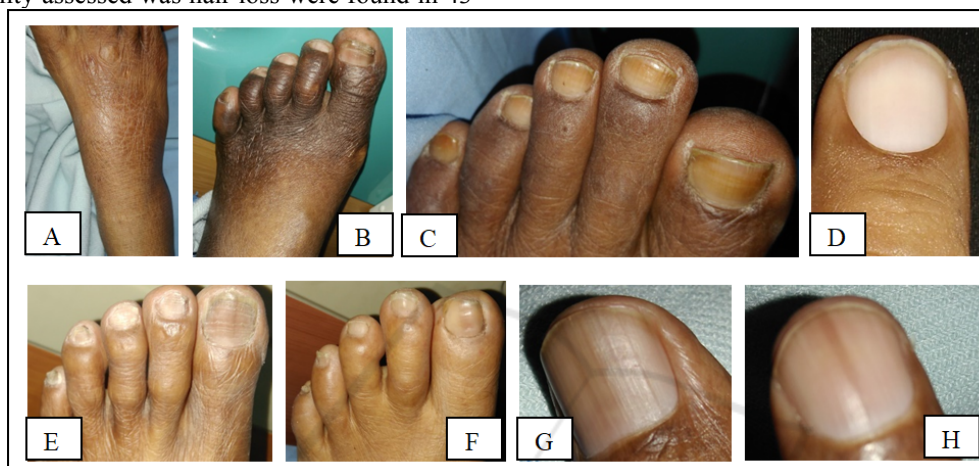


Figure 1. A. Xerotic. B. Hyperpigmentation. C. Half and Half Nail. D. White Nail. E. Discoloration. F. Pitting Nail. G. Longitudinal Ridges. H. Melanonychia

There was a significant relation between xerotic and urea ( $p = 0.041$ ) and creatinine ( $p = 0.040$ ), skin disorders with creatinine ( $p = 0.031$ ), hair abnormalities with calcium levels ( $p = 0.001$ ) and gender whereas female were significantly more affected ( $p = 0.020$ ) than male, while nail abnormalities with hemoglobin levels ( $p = 0.007$ ). There was no significant relation between pruritus

and urea ( $p = 0,392$ ) and creatinine ( $p = 0,396$ ), hemoglobin with xerotic ( $p = 0,258$ ) and pruritus ( $p = 0,286$ ), pruritus with xerotic ( $p = 0,262$ ), duration hemodialysis with pruritus ( $p = 0.827$ ) and xerotic ( $p = 0.262$ ). The relation between skin, hair, nails and mucosa abnormalities with age, sex, duration of hemodialysis and laboratory results can be seen in Table 1.

Table 1. Relation between skin, hair, nail and mucosal abnormalities with age, sex, duration of hemodialysis and laboratory examination results.

	Skin Abnormalities ( $p$ )	Hair Abnormalities ( $p$ )	Nail Abnormalities ( $p$ )	Mucosa Abnormalities ( $p$ )
Age	0.981	0.246	0.190	0.545
Gender	0.819	0.020*	0.271	1.000
Duration of Hemodialysis	0.204	0.185	0.521	0.445
Complete Blood Count				
• Hemoglobin	0.757	0.920	0.007*	0.271
• White blood cell	0.740	0.126	0.223	0.998
• Platelet	0.107	0.614	0.801	0.769
Renal Function				
• Urea	0.694	0.916	0.302	0.818
• Creatinin	0.031*	0.664	0.416	0.516
Electrolyte				
• Natrium	0.459	0.136	0.205	0.385

• Kalium	0.987	0.508	0.579	0.414
• Calsium	0.051	0.001*	0.106	0.701

\*statistically significant.

## 4 DISCUSSION

One study suggested that 50-100% of hemodialysis CKD patients had at least 1 skin manifestation (Shrestha & Mathur, 2014). Study conducted by Gunipudi et al showed that male patients (77%) were more affected than female (23%), with the highest number of patients in the age group of 60-69 years, most patients underwent hemodialysis for 1-5 years (55%) and the most common aetiology was hypertension (39.3%) (Gunipudi et al., 2015). In this study showed that 119 patients (95%) had at least 1 skin manifestation, where male patients (52%) were more common than female (48%), with the largest number of patients in the age group of 56-65 years (29%), most patients underwent hemodialysis for 0-5 years (91%) and the most common aetiology is hypertension (48%).

Data from various studies suggest that the prevalence of xerotic varies from 46-90%. Various causes have been identified as the cause of xerotic, such as reduction in the size of eccrine sweat glands, high dose diuretic regimen used to treat CKD, elevated plasma vitamin A, elevated retinol binding protein, dietary restrictions and protein malnutrition (Al Haija et al., 2014). In this study, xerotic is the most common skin disorder found in 81 patients (76%). There was also significant correlation between xerotic with urea ( $p = 0.041$ ) and creatinine level ( $p = 0.04$ ), and there was no significant correlation between xerotic and duration of hemodialysis ( $p = 0.262$ )

Uremic pruritus is common in patients with CKD, which is usually caused by combination of several mechanisms, including increased histamine, vitamin A and parathormone levels, mast cell hyperplasia, peripheral polyneuropathy, and xerosis. Several studies have suggested that uremic pruritus may also occur as a result of inflammatory stages associated with renal failure in which visible increases in inflammatory cytokines, low serum albumin levels and high ferritin levels in plasma (Gerhardt et al., 2011). In this study, the prevalence of pruritus was 67% with the most common affected sites were on the back (55%), inferior limb (30%), abdomen (7%), gluteal (3%), superior extremities (3%) and facial (2%), and no significant association between pruritus ( $p = 0.286$ ), hemodialysis duration ( $p = 0.827$ ) and xerotic ( $p = 0.262$ ).

One of the causes of hyperpigmentation in the skin is due to elevated levels of  $\beta$ -melanocyte stimulating hormone caused by inadequate excretion by the kidneys. One study found that the prevalence of hyperpigmentation in the skin reached 43% (Dorchhom et al., 2014). Mourad et al reported that 56% of CKD patients had skin hyperpigmentation in both sun-exposed and generalized areas (Mourad et al., 2014). In this study, the prevalence of hyperpigmentation in the skin reached 40%.

A study by Shaikh et al mentions that other skin disorders reach 25% which includes acne vulgaris, static dermatitis, psoriasis, contact dermatitis etc (Shaikh & Chandravathi, 2016). In this study, other skin disorders include prurigo nodularis (1.6%), cellulitis (0.8%) and purpura (0.8%).

The same study by Shaikh et al also mentions that hair abnormalities reach 18% which includes rare head and body hair, dull hair, brittle hair, discoloration of hair and dry hair that can be caused by decreased sebum production (Shaikh & Chandravathi, 2016). Other study performed by Mookambika mentions hair abnormalities of 40% (Mookambika et al., 2017). In this study, hair abnormality accounted for 34% of hair loss, and there was a significant relation between hair abnormalities with levels of calcium ( $p = 0.001$ ) and gender where women were more frequently affected ( $p = 0.020$ ).

A study conducted by Ghunawat et al mentions that nail abnormalities reach 43%, where half and half nails are the most common nail abnormalities (Ghunawat et al., 2015). The prevalence of half and half nail as a distinctive mark varies from 16-50.6% when compared to 1.44% in the normal population (Deshmukh et al., 2013). Half and half nails show a white to normal proximal half and a reddish pink to brown in distal half. The discoloration does not disappear with pressure and is not affected by nail growth, suggesting an abnormality in the nail bed. Another theory suggests that the cause of half and half nail is an increase in levels of  $\beta$ -melanocyte stimulating hormone that causes melanocyte activation resulting in melanin pigment deposition on the nail plate, then another theory also mentions this may be due to the constriction of venous return blood flow nail bed (Shafiee et al., 2015). Other nail abnormalities that can be found include absent lunula, vertical stripes, Terry's nail, splinter

hemorrhage, Beau's line, onychomycosis, leukonychia, pitting nail, twenty nail dystrophy, koilonychia and white nail (Ozturk et al., 2014; Shrestha & Mathur, 2014). In this study, nail abnormalities reached 48%, which included onychodystrophy (28%), half and half nail (23%), white nail (23%), discoloration (16%), pitting nail (4%), longitudinal ridges (4%) and melanonikia (2%), and there is a relation between nail abnormalities with hemoglobin ( $p = 0.007$ ).

A study conducted by Sanad et al mentions that xerostomia is the most common mucosal disorder with prevalence of 46%. This xerostomia can be caused by various factors, such as fluid retention in CKD patients and side effects of the use of anti-hypertensive drugs. Other disorders that often occur include macroglossia, thrush, cheilitis and gingivitis (Mourad et al., 2014; Sanad et al., 2014). In this study, mucosal abnormalities reached 36%, which included xerostomia (73%), gingivitis (29%) and stomatitis (18%).

## 5 CONCLUSION

The prevalence of skin manifestations in CKD patients is reach 95%, in which one person has at least one skin disorder. Patients with CKD undergoing hemodialysis should receive routine skin examination so that early diagnosis and appropriate therapy can be given to improve the quality of life of the patients.

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