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CUTANEOUS MANIFESTATIONS OF CHRONIC KIDNEY DISEASE: A COMPARATIVE STUDY BETWEEN DIALYSIS AND NON-DIALYSIS PATIENTS.

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Abstract: Chronic Kidney Disease (CKD) is a systemic disorder that often presents with cutaneous manifestations. These skin changes can be diverse and can significantly impact the quality of life of patients. This study aims to compare the prevalence and severity of cutaneous manifestations in dialysis and non-dialysis CKD patients. A retrospective chart review was conducted to identify patients with CKD stages 3-5. Demographic data, laboratory parameters, and detailed dermatological examination findings were collected. The prevalence and severity of various skin conditions, including uremic pruritus, xerosis, calciphylaxis, and others, were compared between the two groups. The study will provide valuable insights into the cutaneous manifestations of CKD and highlight the importance of early identification and management of these conditions.

Keyword: Chronic Kidney, CKD, Cross section, Study, kidney

Introduction:

Chronic Kidney Disease (CKD) is a global health concern affecting millions of people worldwide. While primarily recognized as a systemic disease, it often manifests with a variety of cutaneous manifestations. These skin changes can significantly impact the quality of life of CKD patients, both physically and psychologically. The pathogenesis of CKD-related skin disorders is complex and multifactorial, involving a combination of uremic toxins, mineral bone disorder, inflammation, and oxidative stress. Dialysis, a common treatment modality for advanced CKD, can further exacerbate certain skin conditions while alleviating others. A comprehensive understanding of the cutaneous manifestations of CKD is crucial for early diagnosis, appropriate management, and improved patient outcomes. This study aims to compare the prevalence and severity of various skin conditions in dialysis and non-dialysis CKD patients. By identifying the specific skin changes associated with different stages of CKD and treatment modalities, we hope to contribute to the development of effective preventive and therapeutic strategies.

Material & Methods:

This cross-sectional study was conducted in the Department of Dermatology,Ram Krishna Medical College Hospital and Research Centre, Bhopal.from July 6th2024 to 10TH October 2024. The study protocol was approved by the Ethical Review Committee of RKMCH-RC Bhopal.

Sample Size and Selection**:**A sample size of 100 patients was calculated using a sample size formula, assuming a 50% prevalence of cutaneous abnormalities among CKD patients with a 5% margin of error and 95% confidence level. However, due to logistical constraints, a total of 150 hospital-admitted adult (age >18 years) CKD patients (stages III-V) were consecutively recruited. Patients with acute kidney injury, kidney transplant history, or pre-existing skin conditions were excluded.[22]

Data Collection:
Detailed demographic, clinical, and laboratory data were collected from each patient. Laboratory investigations included complete blood count, serum creatinine, 24-hour urine total protein, and serum fasting lipid profile. Estimated glomerular filtration rate (eGFR) was calculated using the Cockcroft-Gault formula. A qualified dermatologist examined all participants for cutaneous manifestations.

1. **Data Collection:**
- **Demographic Data:** Age, sex, duration of CKD, dialysis vintage
- **Medical History:** Hypertension, diabetes mellitus, other comorbidities
- **Clinical Examination:** General physical examination, dermatological examination (including assessment of xerosis severity using a modified Morton scale)
- **Laboratory Investigations:** Complete blood count, kidney function tests, liver function tests, HIV, hepatitis B and C serology, urine analysis, electrocardiogram, abdominal ultrasound

Data Collection and Analysis:
Statistical Analysis: Patients were divided into two groups: those with and without cutaneous abnormalities. The two groups were compared for age, gender, hemoglobin level, serum creatinine, 24-hour urine total protein, and serum lipid profile.

2. **Patient Recruitment:**
- **Inclusion Criteria:**
  - Age >18 years
  - eGFR < 60 ml/min/1.73 m² (CKD stage V)
  - Undergoing maintenance hemodialysis for at least one month
- **Exclusion Criteria:**
  - Known dermatological disorders
  - Malignant disease
  - Drug rashes
  - HIV, Hepatitis B, and C infections
  - Pregnancy and lactation
  - Acute kidney injury
  - Renal transplant recipients
  - Peritoneal dialysis

3. **Statistical Analysis:**
- **Descriptive Statistics:**
  - Mean, standard deviation, median, and interquartile range for continuous variables[21]
  - Frequency and percentage for categorical variables
- **Inferential Statistics:**
  - **Chi-square test:** To compare categorical variables between groups (e.g., CKD stage, dialysis vintage)
  - **Spearman's correlation coefficient:** To assess the association between continuous variables (e.g., age, duration of dialysis) and xerosis severity
  - **Univariate logistic regression:** To identify factors associated with the presence of xerosis

- **Multivariate logistic regression:** To adjust for confounding factors and determine the independent predictors of xerosis

Common Cutaneous Changes Associated With CKD

Pruritus: Itchy skin also known as pruritus is an unpleasant and irritating sensation that increases the desire to scratch, which can be caused or worsened by dry skin. Xerosis (rough and scaly skin): Abnormal dryness of the skin and mucous membranes caused by a lack of moisture in the skin.[15]

Pallor: Pallor is a pale color of the skin that can be caused by anemia and is the result of a reduced amount of haemoglobin.[16]

Hyperpigmentation/pigmentation: Hyperpigmentation is the darkening of an area of skin or nails caused by increased melanin. Purpura/Ecchymosis: Purpura/ecchymosis is a condition of red or purple discolored spots on the skin. The spots are caused by bleeding underneath the skin.[17]

Ulcerative stomatitis: Refers to the erosions and ulcerations in the mouth. Lesions are located on the buccal mucosa (inside of the cheeks) or on the gingiva (gums).

Bacterial infection: Bacterial infection is a common infection of the skin and the soft tissues underneath such as cellulitis, impetigo, erysipelas, folliculitis, furuncles, carbuncles etc. It happens when bacteria enter through a break skin and spread. Fungal infection: Fungal infections of the skin are very common and include athlete's foot, jock itch, ringworm and yeast infections.[18]

Half and half nails: Half and half nails (also known as "Lindsay's nails") show the proximal portion of the nail white and the distal half red, pink or brown, with a sharp line of demarcation between the two halves.[19]

Definition of CKD According to KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease, CKD is defined as abnormalities of kidney structure or function, present for >3 months[20]

- Stage I: normal e-GFR ≥ 90 mL/min per 1.73 m2 .
- Stage II: e-GFR between 60 to 89 mL/min per 1.73 m2 (mildly decreased renal function).
- Stage IIIa: e-GFR between 45 to 59 mL/min per 1.73 m2 (Mild to moderately decreased renal function).
- Stage IIIb: e-GFR between 30 to 44 mL/min per 1.73 m2 (Moderate to severely decreased renal function).
- Stage IV: e-GFR between 15 to 29 mL/min per 1.73 m2 (Severely decreased renal function).

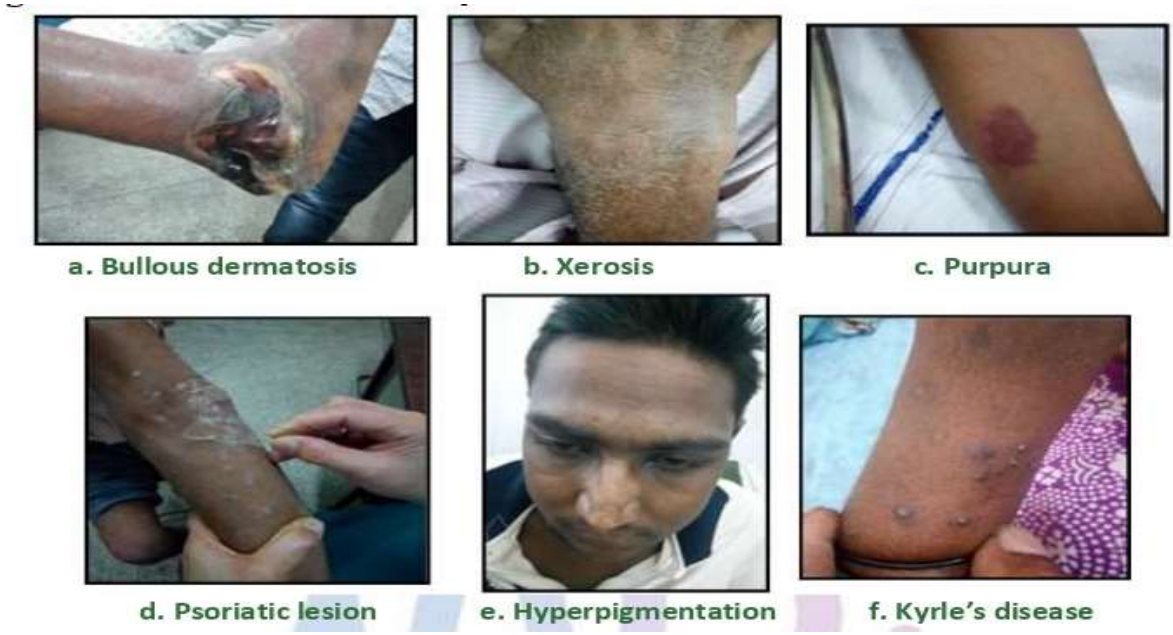
Discussion:

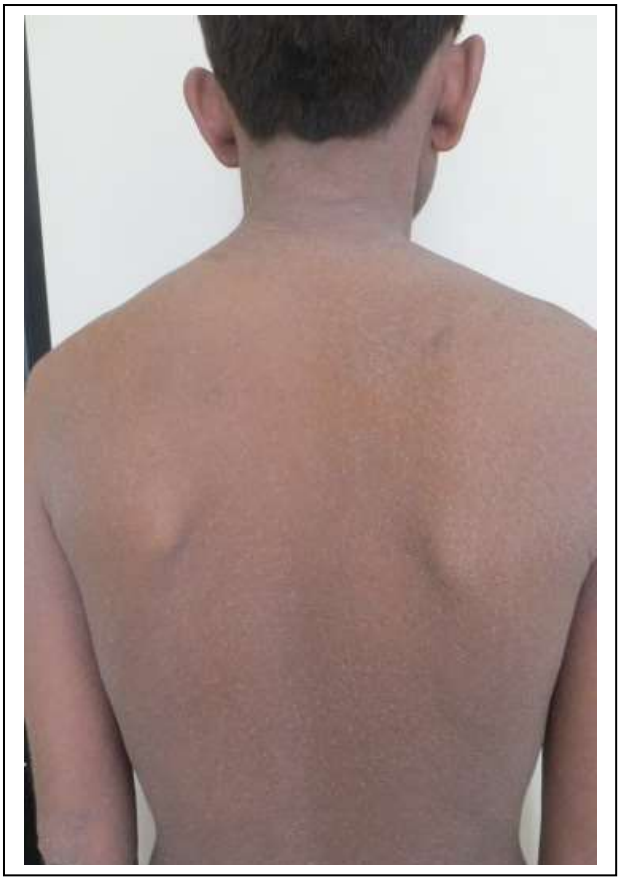
Chronic kidney disease is recognized as a significant worldwide public health problem in the world. Cutaneous manifestations were almost seen in each stages of chronic kidney disease and as the severity of disease progress then these cutaneous manifestations became severe and may also lead to development of new cutaneous manifestations and patients who were on hemodialysis shows improvement and emergence of some cutaneous manifestations. In present study, the prevalence of cutaneous manifestation seen in CKD patients is 73%. On comparison with the others studies this was close to Bencini et al (79%),[6] less to Khanna et al (96%)[4] and Masmoudi et al (88%).[7] The number of patients having pruritis (28%) in the present study is similar to the study of Falodun et al (26.7%).[8] In studies of Singh et al9 and Udaykumar et al[10] the numbers of patients having pruritis were 46.7% and 53% respectively. In present study the number of patients having pruritis was more in dialysis group (Stage 5D) compared to pre dialysis group (Stage 3, 4 and 5). Similar figures were seen in Thomas et al studies which indicate that dialysis may not mitigate pruritis.[11] In present study, 38% patients are having xerosis which is different from all the recent studies. In present study, xerosis patients having diabetes mellitus were less. Xerosis was seen in 57.5% patients in stage 5D, which was similar to Thomas et al study[11] with 48.38% and Falodun et al study with 69.7% patients.[8] In present study as the CKD stages progress then the prevalence of xerosis increases. The pigmentation in the present study is seen in 10% which is less compared to studies of Singh G et al (36.6%), Udaykumar et al (43%),[10] Kolla et al (39.4%)[12] and Thomas et al (32.3%).[11]

Even in dialysis group, the percentage of patients having pigmentation (15%) is less compared to studies by Kolla et al (39.4%),[12] Thomas et al (41.4%).[11] However, Falodun et al (9.2%)[8] observed less pigmentation prevalence than our study. This might be due to difficulty in appreciating hyper pigmentation in dark coloured individuals, unless it is extensive. In present study, pallor of the skin is evident in only 39% patients who are less compared to studies of Udaykumar et al (60%),[10] Sultan et al (45%)[13] and Thomas et al (45.45%).[11] In studies of Falodun et al, [8] pallor was seen in only 2.5% which is less compared to present study. In the dialysis group, pallor (58.97%) is similar to previous studies mentioned above except in study of Falodun et al which is only 3.9%.[8] Pallor maximum found in CKD stage 5D and minimum in CKD stage 3, followed by stage 4 and stage 5. In present study, purpura is seen in 16% of patients which is in accordance with studies of Udaykumar et al (9%)10 and Thomas et al (10%).11 In the study of Sultan et al, [13] purpura is seen in more number of patients (19%) compared to present study. Nail changes

Results: Organize by Skin Manifestation:

- **Pruritis:**
  - Prevalence: 28%
  - Age group: 36-44 years most affected
  - Stage of CKD: Predominantly stage 5D
  - Statistical significance: p-value = 0.030, correlation with CKD stage (p-value = 0.0439)
- **Xerosis:**
  - Prevalence: 38%
  - Severity: 84.21% Grade 1, 15.79% Grade 2
  - Stage of CKD: Predominantly stage 5D
  - Statistical significance: Correlation with CKD stage (p-value = 0.0003)
- **Pallor:**
  - Prevalence: 39%
  - Stage of CKD: Predominantly stage 5D
  - Statistical significance: Correlation with CKD stage (p-value = 0.0004)
- **Hyperpigmentation:**
  - Prevalence: 10%
  - Stage of CKD: Predominantly stage 5D
  - Statistical significance: No significant correlation with CKD stage (p-value = 0.09)
- **Purpura, Petechiae, and Ecchymosis:**
  - Prevalence: 16%
  - Stage of CKD: Predominantly stage 5D
  - Statistical significance: No significant correlation with CKD stage (p-value = 0.078)
- **Nail Changes:**
  - Prevalence: 30%
  - Most common: Half-and-half nails (12%)
  - Age group: 54-62 and >72 years most affected
  - Stage of CKD: Predominantly stage 5D
- **Hair Changes:**
  - Prevalence: 29%
  - Most common: Sparse hair (19%), lusterless hair (10%)
  - Stage of CKD: Predominantly stage 5D
- **Infections:**
  - Prevalence: 19%
  - Types: Bacterial (8%), fungal (8%), viral (2%), scabies (1%)





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