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Original Article

Cutaneous Manifestations in Patients of Chronic Kidney Disease (Stage 1 to stage 5D) in a Tertiary Care Hospital of Bangladesh

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ABSTRACT

Background: *Chronic kidney disease (CKD) is a progressive condition characterized by declining renal function and is often accompanied by a broad spectrum of cutaneous manifestations. These dermatologic features not only affect patients' quality of life but may also serve as early indicators of systemic deterioration, particularly in advanced stages of CKD.* ***Aim of the study:*** *The aim of this study is to assess the prevalence and types of cutaneous manifestations across all stages of CKD (Stage 1 to Stage 5D) in patients admitted to a tertiary care hospital in Bangladesh.* ***Methods & Materials:*** *This descriptive observational study was conducted over six months (July to December 2023) at Anwer Khan Modern Medical College Hospital, Dhaka. A total of 60 patients with CKD (Stages 1 to 5D) exhibiting cutaneous changes were recruited from the nephrology ward, medicine ward, and hemodialysis unit. Data were collected through structured interviews, clinical examinations under proper illumination, and relevant laboratory investigations including skin biopsy and fungal cultures when necessary. Data were analyzed using SPSS version 18.* ***Result:*** *Among the 60 CKD patients, the mean age was 58.2±14.5 years, with a male predominance (55%). The highest proportion of patients was in CKD Stage 5 (35%), followed by Stage 4 (33%) and Stage 3 (20%). The most frequent cutaneous manifestations were pruritus (86.67%), xerosis (78.33%), pigmentary changes (66.67%), fungal infections (41.67%), and acquired perforating dermatosis (38.33%). Nail changes were observed in 48.3% of patients, with half-and-half nails being the most common (30%). Oral mucosal involvement, predominantly glossitis (33.33%), and dry, lusterless hair (28.33%) were also frequently reported.* ***Conclusion:*** *Cutaneous manifestations are highly prevalent among CKD patients, especially in the advanced stages. Pruritus, xerosis, and pigmentary changes are the most common findings. Recognition of these dermatologic signs is essential for timely diagnosis, improved patient management, and better quality of life. Regular dermatologic assessment should be integrated into routine CKD care.*

Keywords: *Chronic kidney disease, pruritus, xerosis, pigmentary changes, half-and-half nails, acquired perforating dermatosis, cutaneous manifestations.*

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INTRODUCTION

Chronic kidney disease (CKD) is defined as the presence of kidney damage, manifested by abnormal albumin excretion or decreased kidney function that persists for more than three months[1,2]. CKD affects between 8% and 16% of the population worldwide. Defined by the presence of kidney damage or decrease kidney function for 3 or more months, irrespective of the cause, CKD is more prevalent in low and middle in-come than in high income nations and contributes to significant mortality and morbidity[3,4,5]. Overall prevalence of CKD in Bangladeshi people of 22.48%, which was higher than the global prevalence of CKD[6]. Chronic kidney disease is divided into 5 stages of increasing severity. Each stage is a progression through an abnormally decreasing and deteriorating glomerular filtrate rate (GFR), which is usually determined indirectly by the serum creatinine level[7,8]. End-stage renal disease (ESRD) is considered the fifth stage of CKD, and can lead to uremic syndrome, which can cause death in patients with this condition if toxins accumulate in the body[9]. Haemodialysis is one of the therapeutic modalities which can

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improve the survival in these patients[10]. About 50-100% of patients with ESRD have at least one associated cutaneous change[11]. This study aimed to assess the prevalence of various cutaneous manifestations in patients of different stages of CKD (S-1 to S-5D).

METHODS & MATERIALS

This was a descriptive type of observational study conducted between July 2023 to December 2023. Sixty patients of CKD (Stage 1 to Stage 5D) with cutaneous manifestations from Nephrology ward, Medicine ward and Haemodialysis unit of Anwer Khan Modern Medical College & Hospital were included in the study. In the selected patients a detailed history of duration of CKD, treatment details and duration of various symptoms and evaluation of lesions was taken. The patients were clinically examined in good light, for various cutaneous manifestations of CKD such as skin lesions, nail changes, mucous membrane involvement. Routine blood investigations for monitoring renal functions were recorded. Specific investigations like skin biopsy, staging of CKD, Gram's stain, bacterial culture, potassium hydroxide mount and fungal culture were done where ever indicated. All the data were processed and analyzed using computer software SPSS (Statistical Package for Social Science) version 18.

Operational definition:

Pruritus: Pruritus, commonly known as itching, is a sensation exclusive to the skin. It may be defined as the sensation that produces the desire to scratch. CKD is the most common systemic cause of pruritus; 20-80% of patients with chronic renal failure (CRF) itch. The pruritus is often generalized, intractable, and severe; however, dialysis - associated pruritus may be episodic, mild, or localized to the dialysis catheter site, face, or legs[12].

Xerosis: Reduced sweat, elevated plasma vitamin A, alkalinity of skin, use of diuretics and malnutrition
are the causes of xerosis in CKD patients[13] (Fig-1).

Pigmentary changes: Diffuse hyperpigmentation could be attributed to increase levels of beta-melanocyte stimulating hormone as a result of its inadequate excretion through and dialysis[13].

Acquired perforating dermatosis: Perforating folliculitis, Kyrle"s disease, and acquired perforating collagenosis are designations that have been supplanted by the more inclusive term acquired perforating dermatosis. The condition is not uncommon and is most often associated with renal failure or diabetes or both.14 Between 4% and 10% of dialysis patients develop umbilicated dome- shaped papules on the legs, or less often on the trunk, neck, arms, or scalp with variable itchiness (Fig-2).

Usually the papules are discrete, but they may coalesce to form circinate plaques. Koebner phenomenon may also be observed, in which case plaques or elevated verrucous streks are formed[14].

Gynecomastia: Gynecomastia may be observed in patients with chronic renal failure, which is attributed to the accumulation of prolactin and its high serum levels (above 30 micrograms/ L) are directly related to worsening of the renal function. In such cases, hyperprolactinemia inhibits the release of the follicle-stimulating hormone (FSH) and luteinizing hormone resulting in lower production of estrogen and progesterone. The dermatologic implications are gynecomastia in men, hirsuitism and acne in women[15].

Uremic Frost: It is one of the rare skin changes that can occur in the acute setting of severe uremia, consists of a white or yellowish coating of urea crystals on the beard area and other parts of the face, neck and on the trunk. It is due to eccrine deposition of urea crystals on the skin surface of patients with CRF[16].

Half and Half Nail: It is characterized by a marked brownish or pinkish discoloration in the nail extremity and such manifestation is more prevalent in dialysis patients[17] (Fig-3). Increased nail bed capillary density and stimulation of nail melanocytes by increased levels of plasma melanotrophic hormone are proposed etiology for band like discoloration[18].

Beau's line: Temporary cessation of nail growth in the matrix due to illness results in the formation of Beau's lines[19].

Xerostomia: Xerostomia is a common debilitating condition that occurs when saliva production decreases or stops. Xerostomia may be due to medications, medical conditions, dehydration, radiation, and surgical therapy[20]. Xerostomia in CKD patients may be due to dehydration and mouth breathing[21].

RESULT

A total number of 60 patients with Chronic Kidney Disease (stage 1 to stage 5D) were included in the study. Mean age of the patients is 58.2 ± 14.5 (Range 21-80 years). Most of the patients were of 51-60 years of age (33.3%) and 21.7% of the patients were of 71-80 years. (Table I). Among them 38(63.3%) were from urban areas where 22 (36.7%) came from rural areas. Most of them were Muslim 58 (96.7%) followed by Hindu 1(1.7%) & Christian 1(1.7%). Majority of the patients were housewives 27(45%) and service holders 26(43.3%). Socioeconomically middle class 54(90%) comprising the major percentage of the patients. Out of 60 patients, 32(53.3%) completed the Secondary School Certificate Examination. (Table II). Of the 60 patients, 33 (55%) were male and 27 (45%) were female. (Figure-4). Fig 5 shows majority 21(35%) of the patient with cutaneous manifestations were found in stage 5 of CKD followed by stage 4-20(33%), stage3-12(20%), stage 5D -3(5%), stage 1-2(3.3%) & stage 2-2(3.3%). Mean ± SD of the important biochemical variables are Serum Creatinine (4.75 ± 3.16) mg/dl, Blood Urea (113.92 ± 52.72) mg/dl, HbA1c (6.22 ± 0.79)%, Serum IgE (219.23 ± 70.21) UI/ml, Serum Phosphorus (6.22 ± 1.49) mg/dl & Serum PTH (Parathyroid Hormone) level (137.57 ± 49.59) pg/ml. (Table III). Table IV describes the Cutaneous Manifestations of the CKD patients (Stage 1-Stage 5D). Among the Skin changes, most common manifestations were pruritus (86.67%), followed by xerosis (78.33%), pigmentary changes (66.67%), fungal infections (41.67%) and acquired perforating dermatosis (38.33%). In the present study the most common Nail changes was half and half nails (30%). Among the oral mucosal changes glossitis

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(33.33%) was the most common finding. Regarding Hair changes, dry lusterless hair (28.33) was common. (Table IV).

Figure – 1: Xerosis

Figure – 2: Acquired perforating dermatosis

Figure – 3: Half and Half Nail

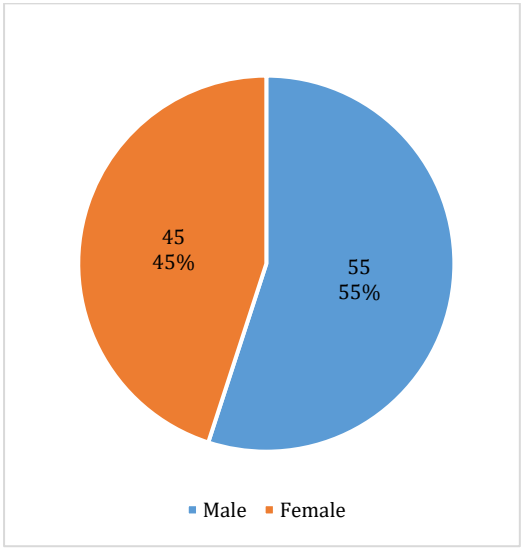

Figure – 4: Distribution of Patients According to Sex (*n*-60)

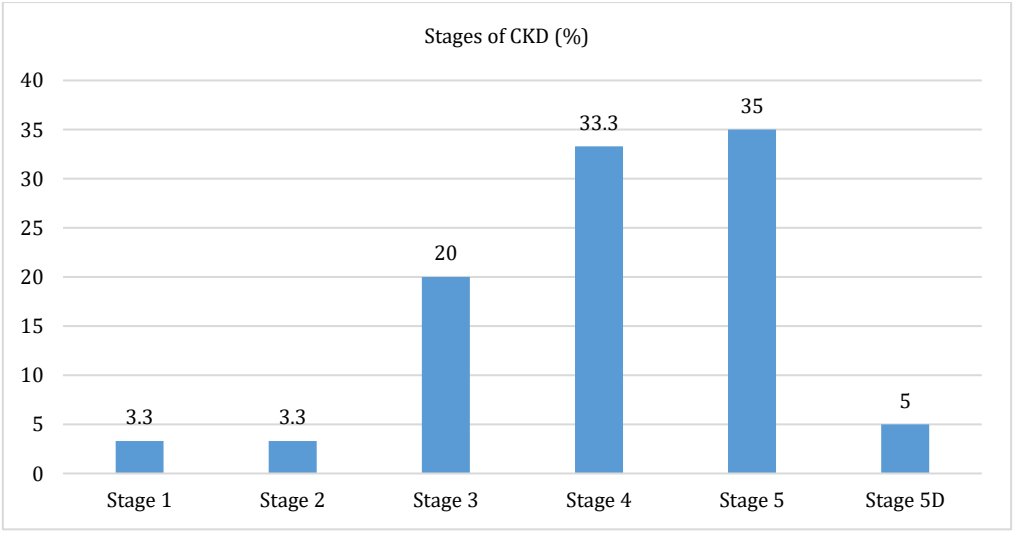

Figure – 5: Distribution of Patients According to Stages of CKD (*n*=60)

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Table – I: Distribution of Patients According to Age (*n*=60)

Age (Years)	Frequency (%)
21-30	4 (6.6)
31-40	3(5.0)
41-50	8(13.4)
51-60	20(33.3)
61-70	12(20)
71-80	13(21.7)
Total	60 (100%)

Table – II: Distribution of Patients According to Demographic Variables- (*n*=60)

Demographic variables		No (%)
Residence	Rural	22(36.7)
	Urban	38(63.3)
Religion	Islam	58(96.7)
	Hinduism	1(1.7)
	Christianity	1(1.7)
Occupation	House Wife	27(45)
	Service holder	26(43.3)
	Others	7(11.7)
Socioeconomic condition	Upper Class	1(1.7)
	Middle Class	54(90)
	Lower Class	5(8.3)
Education	Primary	8(13.3)
	Secondary	32(53.3)
	College & University	19(31.7)
	Illiterate	1(1.7)

Table – III: Mean Value of important Biochemical Variables of CKD patients

Biochemical variables	Mean ± SD
S. Creatinine	4.75 ± 3.16 mg/dl
Blood urea	113.92 ± 52.72 mg/dl
Haemoglobin	10.94 ±1.69 gm/dl
HbA1C	6.22 ± 0.79 %
Serum IgE	219.23 ± 70.21 UI/ml
Serum Phosphorus	6.22 ± 1.49 mg/dl
Serum PTH	137.57 ± 49.51 pg/mL

Table – IV: Distribution of Patients According to Cutaneous Manifestations

Skin Manifestations	No of Patients (%)
Pruritus	52(86.67)
Xerosis	47(78.33)
Pigmentary Changes	40(66.67)
Fungal Infection	25(41.67)
Acquired Perforating Dermatosis	23(38.33)
Pallor	20(33.33)
Gynecomastia	12(20)
Bacterial Infection	10(16.67)
Viral Infection	8(13.33)
Purpura & Ecchymosis	7(11.67)
Uremic Frost	1(1.67)
Nail Manifestations	
Half & Half Nail	18(30)
Onycholysis	9(15)
Subungual Hyperkeratosis	9(15)
Koilonychia	8(13.33)
Nail dystrophy	7(11.67)
Beau's line	5(8.33)
Leukonychia	4(6.67)
Pitting	4(6.67)
Clubbing	3(5)
Splinter Hemorrhage	2(3.33)
Oral mucosal changes	
Glossitis	20(33.33)
Xerostomia	15(25)
Chelitis	9(15)
Pigmentation of Oral mucosa	8(13.33)
Macroglossia	3(5)
Hair Changes	
Dry lusterless hair	17(28.33)
Sparse body hair	7(11.67)
Diffuse alopacia	6(10)

DISCUSSION

Chronic kidney disease is recognized as a significant worldwide public health problem in the world. Skin problems are very common and diverse in patients with CKD of various stages. About 50-100% of patients presents with at least one skin lesion. Cutaneous manifestations are almost seen in each stages of CKD and as the severity of disease progress then these skin, hair and nail changes become severe and may also lead to development of new skin lesions and patients who are on haemodialysis shows improvement and emergence of

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some cutaneous manifestations. In our study, the mean age was found 58.2 ±14.5 years varied from 21-80 years. Most of the patients were in the age group of 51-60 years. In Malkud et al. study majority of the patients were aged between 61-70 years[21]. In this study, male patients outnumbered female patients were among 60 cases, 33(55%) were male and 27(45%) were female. In Vudayana K et al. study 83% of patients were male and 17% of patients were female[22]. In present study, cutaneous manifestations were seen maximum in stage 5(35%) of the patients followed by stage 4(33%), stage 3(20%), stage 5D (5%), stage 1(3.3%) & stage 2(3.3%). This finding is compatible with Jogendra Singh et al. study where maximum number of cases belonged to stage 5D[23]. Pruritus was the most common cutaneous manifestation observed in our patients. We had 86.67% of patients complained of pruritus. In Thomas et al. study 43.4% of patients were found with pruritus[24]. In a study by Udayakumar et al. they found the prevalence of pruritus to be 53%[16]. Xerosis was the second most common cutaneous change noted in our study which was found in 78.33% of patients. In Vudayana K et al. study xerosis was found in 91% of patients[22]. Diffuse hyperpigmentation over sun exposed area was observed in 66.67% of patients in present study. Udayakumar et al.study reported this finding in 43% of their patients[16]. Another common cutaneous manifestation among our patients was fungal infection, with a prevalence rate of 41.67%. Malkud et al. study reported incidence of fungal infection in 23% patients with CKD[21]. Acquired perforating dermatoses were reported in 38.33% cases in our study as compared to 21% cases in Udayakumar et al. study[16]. Pallor of the skin is due to anemia which is a hallmark of CKD[16]. It was observed in 33.33% patients which was similar to Malkud et al.Gynecomastia was found in 20% patients in the present study where as Malkud et al. noted it in 5% of their patients[21]. We found 16.67% patients having bacterial infection and 13.335% patients with viral infection. In Malkud et al. study, bacterial and viral infections were found in 16.7% patients and 13.3% patients respectively[21]. In our study, purpura and ecchymosis was noticed in 11.67% patients which was similar (9%) to Udaykumar et al. study[16]. Uremic frost was found in 1.67% patients in this study. This is similar to the study finding of Vudayana K et al.[22]. Half and half nail was the most common nail change in our cases which was almost consistent with Vudayana K et al. study[22]. Onycholysis and Subungual hyperkeratosis were observed in 15% of our patients compaired to Malkud et al. study which was 10% of patients[21]. Out of 60 patients, we had 13.33% patients with Koilonychia which has been reported in 18%-93% of patients in ESRD in various studies[16,25]. Nail dystrophy is observed in 11.67% of patients in present study which was consistent with the finding of Malkud et al. study (10%)[21]. Beau's line was noticed in 8.33% of patients in our study which was similar to Malkud et al. study[21]. Other nail changes observed were Leukonychia (6.67%). Pitting (6.67%), clubbing (5%), and splinter hemorrhage (3.3%). Glossitis was the most common oral mucosal change in our study. It was found in 33.33% of patients. In Malkud et al. study, glossitis was found in 16.6% cases[21]. Other oral mucosal changes noticed in our study were Xerostomia (25%), chelitis (15%), pigmentation of oral mucosa (13.33%), and macroglossia (5%). In present study hair changes were seen in 50% patients whereas in Deshmukh et al. hair changes were observed in 25.71% patients[13]. In this study it is observed that cutaneous manifestations were associated with aged population (more in age group 51-60), male predominance, population of rural areas, lower socio-economic conditions (more in middle class), CKD stage 4 and 5 and in population suffering from uncontrolled diabetes mellitus (HbA1C 6.22 ± 0.79 %) and of raised serum IgE level (219.23 ± 70.21 UI/ml), raised S. phosphorus as well as Parathyroid hormone level. There is an association with raised S. creatinine and Blood urea level. So, it is obvious that there is association of all these parameters. If we can control these, we can control cutaneous manifestations as well.

Limitations of the study:

This study was conducted in a single tertiary care hospital with a relatively small sample size, which may limit the generalizability of the findings to the broader CKD population in Bangladesh. Additionally, the cross-sectional design precludes establishing causal relationships. Certain diagnostic procedures, such as skin biopsies, were selectively performed, possibly underestimating less obvious dermatological conditions. Furthermore, subjective assessment of symptoms like pruritus may have introduced reporting bias, affecting the accuracy of prevalence estimates.

CONCLUSION

Cutaneous manifestations are common in CKD patients. Patients presenting with these symptoms should be suspected to have derangements in their renal function and need to be evaluated. Moisturisers, avoiding sunlight, iron therapy and anti-pruritic therapy are noteworthy for these patients for their better quality of life. This is a single centre study and study population is less. A multicentre study with larger population is needed further, for better management of these patients.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee.

REFERENCES

1. *Foundation NK. KDOQI clinical practice guidelines and clinical practice recommendations for anemia in chronic kidney disease. American journal of kidney diseases: the official journal of the National Kidney Foundation. 2006 May;47(5 Suppl 3):S11-45.*
2. *Levey AS, Eckardt KU, Tsukamoto Y, Levin A, Coresh J, Rossert J, Zeeuw DD, Hostetter TH, Lameire N, Eknoyan G. Definition and classification of chronic kidney disease: a position statement from Kidney Disease: Improving Global Outcomes (KDIGO). Kidney international. 2005 Jun 1;67(6):2089-100.*
3. *Nunley JR. Dermatologic manifestations of renal disease. E Med J. 2002;550.*
4. *Kidney Disease: Improving Global Outcomes (KDIGO) CKD Work Group. KDIGO 2012 clinical practice guideline for the evaluation and management of chronic kidney disease. Kidney Int Suppl.*

2013;3(1):1–150.

5. *Chen TK, Knicely DH, Grams ME. Chronic kidney disease diagnosis and management: a review. Jama. 2019 Oct 1;322(13):1294-304.*
6. *Banik S, Ghosh A. Prevalence of chronic kidney disease in Bangladesh: a systematic review and meta-analysis. International urology and nephrology. 2021 Apr;53:713-8.*
7. *Goddard J, Turner AN, Cumming AD, Stewart LH. Kidney and urinary tract disease. Davidson's principles and practice of Medicine. 20th ed. Edinburgh: Churchill Livinstone. 2006:455-511.*
8. *Watnick S, Morrison G. Kidney. In: Tierney LM, McPhee SJ, Papadakis MA, editors. Current Medical Diagnosis and Treatment. 43rd ed. New York: McGraw-Hill; 2004. p. 863–98.*
9. *Bargman JM, Skorecki K. Chronic kidney disease. In: Fauci A, Braunwald E, Kasper D, Hauser S, Longo D, editors. Harrison's Principles of Internal Medicine. 17th ed. New York: McGraw-Hill Companies, Inc; 2011. p. 1761–72.*
10. *Pastan S, Bailey J. Dialysis therapy. New England Journal of Medicine. 1998 May 14;338(20):1428-37.*
11. *Hajheydari Z, Makhlogh A. Cutaneous and Mucosal Manifestations in Patients on Maintenance Hemodialysis A Study of 101 Patients in Sari, Iran.*
12. *James WD, Elston D, Berger T. Andrew's diseases of the skin E-book: clinical dermatology. Elsevier Health Sciences; 2011 Mar 21.*
13. *Deshmukh SP, Sharma YK, Dash K, Chaudhari NC, Deo KS. Clinicoepidemiological study of skin manifestations in patients of chronic renal failure on hemodialysis. Indian dermatology online journal. 2013 Jan 1;4(1):18-21.*
14. *James WD, Berger TG, Elston DM, Neuhaus IM. Diseases of the skin appendages. Andrews' Diseases of the Skin: Clinical Dermatology. 2006;10:749-93.*
15. *Löcsey L, Lenkey À, Leövey A. Hormonal changes in haemodialysed and in kidney-transplanted patients. International Urology and Nephrology. 1987 Jun;19:201-13.*
16. *Udayakumar P, Balasubramanian S, Ramalingam KS, Lakshmi C, Srinivas CR, Mathew AC. Cutaneous manifestations in patients with chronic renal failure on hemodialysis. Indian journal of dermatology, venereology and leprology. 2006 Mar 1;72:119.*
17. *Abdelbaqi-Salhab M, Shalhub S, Moran MB. A current review of the cutaneous manifestations of renal disease. Journal of cutaneous pathology. 2003 Oct 1;30(9).*
18. *Al-Hamamy HR, Al-Mashhadani SA, Fadheel BM, Salman SH. Nail changes in hemodialysis patients and renal transplant recipients: a case-control study. Am J Dermatol Venereol. 2014;3(3):30–4.*
19. *Singh G. Nails in systemic disease. Indian Journal of Dermatology, Venereology and Leprology. 2011 Nov 1;77:646.*
20. *Katz SI, Gilchrest BA, Paller AS, Leffell DJ. Fitzpatrick's dermatology in general medicine. Wolff K, Goldsmith LA, editors. New York: McGraw-Hill; 2008.*
21. *Malkud S, Dyavannanavar V, Varala S. Cutaneous manifestations in patients with chronic kidney disease on hemodialysis. Journal of Pakistan Association of Dermatologists. 2020 Oct 1;30(3):490-6.*
22. *Vudayana K, Korla V, Chintada D, Shree JV. Study of cutaneous manifestations in chronic kidney disease patients on maintenance hemodialysis at a tertiary care centre. Int J Res Dermatol. 2019 Oct;5(4):771-3.*
23. *Jogendra Singh G. Cutaneous manifestations in chronic kidney disease patients: A cross sectional study.*
24. *Thomas EA, Pawar B, Thomas A. A prospective study of cutaneous abnormalities in patients with chronic kidney disease. Indian journal of nephrology. 2012 Mar 1;22(2):116-20.*