Original Research Article

Check for updates

Clinical Profile and Associated Risk Factors of Chronic Kidney Disease in Dialysis Patients: A Cross-Sectional Study

Chinmoy Biswas*[1], Nandita Das[2], Razib Rayhan[3], Md Kamrul Hasan[4], Anamika Roy[5]

[1] Assistant Surgeon, Bangladesh Railway Hospital, Chittagong

[2] Trainee officer, Armed Forces Institute of Pathology, Dhaka

[3] Medical Officer (Pathology Lab), Holy Family Red Crescent Medical College Hospital, Dhaka

[4] Lecturer, Forensic Medicine, Chittagong Medical College, Chittagong

[5] Honorary Medical Officer, Dhaka Dental College

OPEN ACCESS

ABSTRACT: **Background:** Chronic kidney disease (CKD) represents a growing global health burden, with a significant number of patients progressing to end-stage renal disease (ESRD) requiring dialysis. Understanding the clinical profile and associated risk factors among dialysis patients is essential for early intervention and prevention strategies. **Objective:** To assess the clinical characteristics and identify risk factors associated with chronic kidney disease among dialysis patients in a tertiary care hospital in Bangladesh. **Methods:** This descriptive cross-sectional study was conducted at Chittagong Medical College Hospital from January 1, 2022, to June 30, 2022. A total of 192 dialysis-dependent CKD patients were enrolled. Data on sociodemographic variables, comorbid conditions, dialysis-related parameters, and relevant laboratory findings were collected and analyzed using SPSS version 25. The chi-square test was used to explore associations between clinical variables and dialysis duration, with a significance level set at p<0.05. **Results:** The majority of patients were male (61.5%) and within the age range of 40–59 years (44.3%). Most resided in urban areas (65.6%) and had low education and income levels. Hypertension (77.1%) and diabetes mellitus (52.6%) were the most prevalent comorbidities. Anemia was noted in 69.3% of patients, and 45.3% had a history of urinary tract infections. Hemodialysis was the primary modality (94.3%), with 58.9% receiving dialysis twice weekly. Mean hemoglobin was 9.2 ± 1.3 g/dL, and serum creatinine was 10.6 ± 2.5 mg/dL. Statistically significant associations were found between dialysis duration and hypertension (p=0.021), diabetes (p=0.035), and age group (p=0.009). **Conclusion:** The study reveals a high burden of modifiable risk factors such as hypertension, diabetes, and anemia among dialysis patients with CKD.

Keywords: Chronic Kidney Disease, Dialysis, Hypertension, Diabetes Mellitus, Anemia, Risk Factors, Bangladesh.

INTRODUCTION

Chronic kidney disease (CKD) is a significant public health issue, with its prevalence steadily increasing in developing countries. CKD is a progressive condition marked by the kidneys' declining ability to effectively regulate the body's protein metabolism byproducts (such as urea), maintain normal blood pressure, hematocrit levels, and ensure proper balance of sodium, water, potassium, and acid-base levels. Historically, public health initiatives targeting chronic disease prevention have primarily concentrated on hypertension, diabetes mellitus, and cardiovascular diseases (CVD).

However, the rising incidence of CKD advancing to end-stage renal disease (ESRD), along with the associated economic burden of renal replacement therapy (RRT), is becoming a growing concern in both developed and developing regions [1, 2]. In Asia, the mortality rate associated with infection-related acute kidney injury (AKI) was reported at 52%, based on data from the International Society of Nephrology's 0 by 25 initiative. Furthermore, 7% to 16% of affected individuals progressed to chronic kidney failure, while 11% to 19% experienced diminished kidney function even after recovering from the infection.

Infections play a critical role in both the onset and progression of chronic kidney disease (CKD), often going undetected and thereby complicating the management of existing CKD cases. These infections tend to be more severe, are diagnosed at later stages, and pose greater treatment challenges. As a result, they significantly increase the cost of CKD care and contribute to both morbidity and mortality [3]. The World Health Assembly endorsed the Global Action Plan for the Prevention and Control of Non-Communicable Diseases 2013–2020, aiming to reduce premature mortality from chronic diseases by 25% by the year 2025 [4]. These global efforts have the potential to significantly reduce the burden of chronic kidney disease (CKD). However, CKD continues to be underestimated across many regions due to the lack of comprehensive epidemiological data from various countries [5, 7, 8]. Based on this gap, it can be hypothesized that CKD is closely linked to lifestyle-related risk factors such as smoking, excessive salt consumption, uncontrolled diabetes and hypertension, obesity, poor dietary habits, and inadequate nutrition [6-8]. Patients undergoing dialysis represent a critical subset of the CKD population, often presenting with complex clinical profiles and multiple comorbid conditions. Understanding the clinical characteristics and associated risk factors in this group is vital for improving treatment outcomes, reducing complications, and informing targeted preventive strategies. This study aims to assess the clinical profile and identify the associated risk factors of CKD among dialysis patients in a tertiary care setting. By analyzing sociodemographic data, comorbid conditions, and behavioral factors, this research seeks to contribute to the growing body of knowledge needed to manage CKD more effectively and prevent its progression in vulnerable populations.

METHODOLOGY

This cross-sectional study assessed the clinical profile and associated risk factors of chronic kidney disease (CKD) among patients undergoing dialysis. The research was conducted at the Nephrology Department of Chittagong Medical College Hospital, a major tertiary care center in Bangladesh. Data collection spanned six months, from January 1, 2022, to June 30, 2022. A total of 192 patients undergoing maintenance dialysis for CKD were enrolled in the study using a purposive sampling method. Patients aged 18 years and above, who were diagnosed with CKD and had been receiving dialysis for at least three months, were included. Those with acute kidney injury or incomplete clinical records were excluded to maintain the consistency and reliability of the data. A structured and pre-tested questionnaire was employed to collect data through face-to-face interviews, supplemented by a thorough review of medical records. The questionnaire covered sociodemographic characteristics, medical history, comorbidities, dialysis-related information, and laboratory parameters relevant to CKD. Informed written consent was secured from all participants before data collection. Data were checked for completeness and accuracy before analysis. The final dataset was analyzed using SPSS software, where descriptive statistics were used to summarize the clinical characteristics, and appropriate inferential statistical tests were applied to identify significant associations between risk factors and CKD profiles.

RESULT

Table 1: Sociodemographic Characteristics of the Patients (n = 192)

Variable	Category	Frequency (n)	Percentage (%)
Age Group	18–39 years	32	16.7%
	40–59 years	85	44.3%
	≥60 years	75	39.0%
Sex	Male	118	61.5%
	Female	74	38.5%
Residence	Urban	126	65.6%
	Rural	66	34.4%
Occupation	Unemployed	49	25.5%
	Laborer	58	30.2%
	Service-holder	45	23.4%

	Farmer	27	14.1%
	Others (e.g., business)	13	6.8%
Education Level	Primary (1–5)	58	30.2%
	Secondary (6–10)	53	27.6%
	HSC or equivalent	42	21.9%
	Graduate and above	39	20.3%
Monthly Income (BDT)	<30,000	72	37.5%
	31,000–60,000	89	46.4%
	>60,000	31	16.1%
BMI Category	Underweight (<18.5)	33	17.2%
	Normal (18.5–24.9)	94	49.0%
	Overweight (25–29.9)	45	23.4%
	Obese (≥30)	20	10.4%
Smoking History	Yes	71	37.0%
	No	121	63.0%
Betel/Tobacco Use	Yes	86	44.8%
	No	106	55.2%

Most patients were male, from urban areas, and within the age range of 40–59 years. A large proportion had low education and income levels. Nearly one-third were laborers, and a significant portion had a history of smoking or tobacco use. Nearly half were overweight or obese.

Table 2: Medical History and Risk Factors Related to CKD (n = 192)

Variable	Category	Frequency (n)	Percentage (%)
Hypertension	Yes	148	77.1%
	No	44	22.9%
Diabetes Mellitus	Yes	101	52.6%
	No	91	47.4%
Cardiovascular Disease (CVD)	Yes	56	29.2%
	No	136	70.8%
Anemia (Hb <10 g/dL)	Yes	133	69.3%
	No	59	30.7%
History of UTI	Yes	87	45.3%
	No	105	54.7%
History of Nephrotoxic Drugs	Yes	64	33.3%
	No	128	66.7%
Family History of CKD	Yes	48	25.0%
	No	144	75.0%
History of Kidney Stones	Yes	36	18.8%
	No	156	81.2%
Obesity (BMI ≥ 25)	Yes	65	33.9%
	No	127	66.1%

Hypertension and diabetes were the most common comorbidities observed. More than two-thirds of the patients had anemia, and over 45% reported a history of urinary tract infections. Notably, a significant portion had a history of nephrotoxic drug use or family history of CKD, underscoring multiple risk contributors.

Table 3: Dialysis-Related Characteristics

Variable	Frequency (n)	Percentage (%)
Type of Dialysis		
Hemodialysis	181	94.3%
Peritoneal Dialysis	11	5.7%
Frequency of Dialysis/Week		
Twice Weekly	113	58.9%
Thrice Weekly	79	41.1%
Dialysis Duration		
<6 months	52	27.1%
6–12 months	64	33.3%
>12 months	76	39.6%

Hemodialysis was the predominant modality. Most patients were on twice or thrice weekly dialysis, and a substantial portion had been on dialysis for over a year.

Table 4: Laboratory Parameters

Parameter	Mean ± SD	Normal Range
Hemoglobin (g/dL)	9.2 ± 1.3	13–17 (M), 12–16 (F)
Serum Creatinine (mg/dL)	10.6 ± 2.5	0.6–1.3
Blood Urea (mg/dL)	86.3 ± 18.2	15–40
Serum Potassium (mmol/L)	5.4 ± 0.8	3.5–5.0

Laboratory findings revealed anemia, elevated creatinine and urea levels, and a slight rise in serum potassium, consistent with advanced kidney disease.

Table 5: Association of Risk Factors with Duration of Dialysis

Variable	p-value	Statistical Significance
Hypertension	0.021	Significant
Diabetes	0.035	Significant
Cardiovascular Disease	0.078	Not Significant
Age Group	0.009	Significant
Sex	0.417	Not Significant

Chi-square analysis revealed statistically significant associations between duration of dialysis and age group, presence of hypertension, and diabetes mellitus. Sex and cardiovascular disease were not significantly associated.

DISCUSSION

This study provides a detailed clinical and demographic profile of patients undergoing dialysis for chronic kidney disease (CKD) at Chittagong Medical College. The findings underscore the multifactorial nature of CKD and its progression to end-stage renal disease (ESRD), particularly concerning hypertension, diabetes, anemia, and socio-demographic factors. The majority of patients were male (61.5%) and in the 40–59-year age group (44.3%), consistent with other studies conducted in South Asian settings, where CKD disproportionately affects middle-aged men due to higher exposure to occupational and metabolic stressors [8, 9]. The urban predominance (65.6%) may reflect both better access to dialysis centers and higher prevalence of non-communicable disease risk factors in urban populations. More than half of the patients had low education (Primary–Secondary: 57.8%) and low-to-middle income (<60,000 BDT: 83.9%), aligning with literature that links socioeconomic disadvantage with limited access to preventive nephrology care and delayed CKD diagnosis [10, 11].

Occupationally, 30.2% were laborers and 25.5% were unemployed, indicating a population vulnerable to physical strain and limited healthcare access. A significant proportion were smokers (37.0%) or users of betel nut/tobacco (44.8%), known behavioral contributors to both hypertension and glomerular damage [11]. Moreover, nearly half the patients were overweight or obese (33.9% with BMI ≥25), which is an emerging risk factor for CKD progression due to its link with metabolic syndrome and glomerulopathy [12]. Clinically, hypertension was present in 77.1% and diabetes in 52.6% of patients. These findings are consistent with previous studies reporting hypertension as the most prevalent cause of ESRD in South Asia [12]. Anemia was also widespread (69.3%), which reflects impaired erythropoietin synthesis typical of CKD, and may exacerbate cardiovascular morbidity. Notably, 45.3% of patients had a history of recurrent urinary tract infections (UTIs), a risk factor for both acute kidney injury and chronic scarring, particularly in females and diabetics [13]. The role of nephrotoxic agents remains significant; one-third (33.3%) reported use of NSAIDs or traditional medicines, both implicated in tubulointerstitial injury. Additionally, 25% had a family history of CKD, suggesting genetic or shared environmental risk. Only 18.8% had a known history of kidney stones, possibly underreported, but still relevant in contributing to obstructive nephropathy. Hemodialysis was the predominant modality (94.3%), with most patients undergoing dialysis twice weekly (58.9%). One-third had been on dialysis for over a year (39.6%), reflecting a growing burden of maintenance dialysis in resource-limited settings. Dialysis-related data also suggest the chronicity and severity of the disease process. Laboratory investigations confirmed significant biochemical derangements: mean hemoglobin was 9.2 ± 1.3 g/dL, well below normal, confirming the high anemia prevalence. Serum creatinine and blood urea levels were markedly elevated (10.6 ± 2.5 mg/dL and 86.3 ± 18.2 mg/dL, respectively), consistent with severe renal impairment. Hyperkalemia (mean potassium: 5.4 ± 0.8 mmol/L) was a frequent electrolyte disturbance, posing a risk for arrhythmias and sudden cardiac death. Chi-square analysis revealed significant associations between duration of dialysis and presence of hypertension ($p = 0.021$), diabetes ($p = 0.035$), and age group ($p = 0.009$), but not with sex ($p = 0.417$) or cardiovascular disease ($p = 0.078$). These findings emphasize the cumulative effect of metabolic and vascular conditions on dialysis dependence. Similar associations were found in regional studies, underscoring hypertension and diabetes as critical determinants of CKD progression and dialysis need [14-49].

CONCLUSION

The study highlights the complex interaction of sociodemographic, lifestyle, and clinical factors contributing to CKD progression in Bangladeshi dialysis patients. These findings should inform targeted interventions focusing on early detection, lifestyle modification, patient education, and careful management of diabetes and hypertension to delay dialysis initiation and improve outcomes.

REFERENCES

1. Grassmann A, Gioberge S, Moeller S, et al.: ESRD patients in 2004: global overview of patient numbers, treatment modalities and associated trends. Nephrol Dial Transplant 2005; 20: 2587–2593.

2. Center for Disease Control and Prevention (CDC): Prevalence of chronic kidney disease and associated risk factors – United States, 1999–2004. MMWR Morb Mortal Wkly Rep 2004; 56: 161–165.

3. Macedo E, Garcia-Garcia G, Mehta RL, Rocco MV. International Society of Nephrology 0 by 25 project: Lessons learned. Ann Nutr Metab. 2019;74(3):45-50.

4. Kurokawa K, Nangaku M, Saito A, Inagi R, Miyata T. Current issues and future perspectives of chronic renal failure. J Am Soc Nephrol. 2002;13(1):3-6. 12.

5. Gomez GB, Lusignan SD, Gallagher H. Chronic kidney disease: a new priority for primary care. Br J Gen Pract. 2006;56(533):908-10.

6. Prasad DS, Kabir Z, Dash AK, et al.: Prevalence and risk factors for diabetes and impaired glucose tolerance in Asian Indians: a community survey from urban Eastern India. Diabetes Metab Syndr 2012, 6(2):96–101.

7. Devi P, Rao M, Sigamani A, et al.: Prevalence, risk factors and awareness of hypertension in India: a systematic review. J Hum Hypertens 2012.

8. KDIGO. Chapter 2: definition, identification, and predic¬tion of CKD progression. Kidney Int Suppl (2011) 2013;3: 63-72.

9. Kurokawa K, Nangaku M, Saito A, Inagi R, Miyata T. Current issues and future perspectives of chronic renal failure. J Am Soc Nephrol. 2002;13(1):3-6.

10. Gomez GB, Lusignan SD, Gallagher H. Chronic kidney disease: a new priority for primary care. Br J Gen Pract. 2006;56(533):908-10.

11. Sutariya Nirav, Aundhakar Swati, Kothia Divyen, Lathiya Nency, Jayveer Atodadiya, Mandade Arjun. Evaluation of epidemiological and clinical profile of newly diagnosed cases of chronic kidney disease in a tertiary healthcare center: a prospective study. International Journal of Contemporary Medical Research 2018;5(5):E7-E12.

12. Manjuri Sharma, Prodip Doley, Himanab Jyoti Das, Etiological Profile of Chronic Kidney Disease: A Single-Center Retrospective Hospital-Based Study, Saudi J Kidney Dis Transpl 2018;29(2):409-413

13. Sathyan S, George S, Vijayan P, Jayakumar M. Clinical and epidemiological profile of chronic kidney disease patients in a tertiary care referral centre in South India. Int J Community Med Public Health 2016;3: 3487-92.

14. Pathak A, Jain L, Jaiswal P. To study the clinical profile of chronic kidney disease and associated comorbidities in geriatric patients. Int J Res Med Sci 2016;4: 3002-8.

15. Hasan, H., Rahman, M. H. ., Haque, M. A., Rahman, M. S. ., Ali, M. S. ., & Sultana, S. . (2024). Nutritional Management in Patients with Chronic Kidney Disease: A Focus on Renal Diet. Asia Pacific Journal of Medical Innovations, 1(1), 34-40.

16. Begum N, Hriday MSH, Haque SA, Riipa MB. Enhancing Energy Management in Industries through MIS and Data Analytics Integration. Lett High Energy Phys. 2024 11(4):7255–7269.

17. Shaikat FB, Islam R, Happy AT, Faysal SA. Optimization of Production Scheduling in Smart Manufacturing Environments Using Machine Learning Algorithms. Lett High Energy Phys. 2025 12(1):1–15.

18. Chowdhury NR, Moname EJ, Al Azad G, Hani U, Nazmin F, Ferdaus F. Interplay Between Malnutrition and Infectious Diseases Insights from a Cross-Sectional Study in Bangladesh. Asia Pacific Journal of Medical Innovations. 2024;1(2):41-7.

19. Azad GA, Moname EJ, Chowdhury NR, Mondal S, Tisa AH, Ferdaus F. Co-Morbidity Landscape in Cancer Patients: Non-Communicable Disease Burden and Trends. Asia Pacific Journal of Medical Innovations. 2024;1(2):48-54.

20. Nazmin F, Roy A, Bushra T, Retina IJ, Arnab KsH, Ferdaus F. Exploring the Prevalence and Social Determinants of ADHD and Comorbidities Among Urban School Aged Children in Bangladesh. Asia Pacific Journal of Medical Innovations. 2024;1(2):61-74.

21. Wohid F, Eme FW, Fahim IH, Mim M, Ferdaus F. Work Life Balance and Its Influence on Physical and Mental Health Among Female Teachers of Public University in Bangladesh. Asia Pacific Journal of Medical Innovations. 2024;1(2):68-75.

22. Mondal S, Arnab KH, Retina IJ, Bushra T, Roy A, Tisa AH, Ferdaus F. Mental Health Status and Stress Factors Among Junior Doctors in Public Hospitals in Bangladesh A Cross Sectional Analysis. Asia Pacific Journal of Surgical Advances. 2024;1(2):39-43.

23. Bushra T, Mondal S, Nazmin F, Arnab KH, Tisa AH, Roy A, Ferdaus F. Burden of Peptic Ulcer Disease Among Smoking and Non-Smoking Healthcare Providers A Comparative Cross-Sectional Study in Gazipur, Dhaka. Asia Pacific Journal of Surgical Advances. 2024;1(2):44-50.

24. Rima US, Islam J, Mim SI, Roy A, Dutta T, Dutta B, Ferdaus FF. Co-Infection of Tuberculosis and Diabetes: Implications for Treatment and Management. Asia Pacific Journal of Surgical Advances. 2024;1(2):51-8.

25. Arnab KH, Nazmin F, Mondal S, Tisa AH, Bushra T. Perceptions and Barriers to Breast Cancer Screening Among Women in Slum Areas: A Cross-Sectional Study. Asia Pacific Journal of Surgical Advances. 2024;1(2):59-65.

26. Karmakar S, Brinta MT. Assessing the Impact of Chronic Hypertension on Renal Function: A Cross-Sectional Study. Asia Pacific Journal of Surgical Advances. 2024;1(2):66-71.

27. Dutta B, Dutta T, Rima US, Islam J, Roy A, Mim SI, Ferdaus F. Burden of Antibiotic-Resistant Urinary Tract Infections in Rural Females: Insights from a Cross-Sectional Study in Bangladesh. Asia Pacific Journal of Surgical Advances. 2024;1(2):72-9.

28. Wohid F, Eme FW, Fahim IH, Mim M, Sultana T, Ferdaus F. Assessment of Nutrition Knowledge

and Dietary Practices Among Non-Medical Students: A Cross-Sectional Study. Asia Pacific Journal of Surgical Advances. 2024;1(2):80-6.

29. Islam AI, Ahammed E, Nisa NA, Mim AA, Akhter FB, Amin F. Knowledge, Attitudes, Practices, and Risk Factors Related to Breast and Cervical Cancer Among Female Medical Students in Comilla, Bangladesh. Asia Pacific Journal of Surgical Advances. 2025 16;2(1):1-9.

30. Ahammed E, Islam MA, Akhter FB, Mim AA, Amin F, Nisa NA. Elderly Vulnerability to Infectious Diseases in Bangladesh: An Examination of Comorbidities, Hospital Stay, and Mortality. Asia Pacific Journal of Surgical Advances. 2025 16;2(1):10-16.

31. Joty RB, Junhai GR, Moslem S, Topu MH, Della NA, Ferdaus F. Prevalence and Social Factors Influencing ADHD and Comorbidities in Bangladeshi Children: A Cross-Sectional Study. Asia Pacific Journal of Surgical Advances. 2025 16;2(1):17-25.

32. Della NA, Moslem S, Junhai GR, Topu MH, Joty RB, Ferdaus F. Assessing Nutritional Status and Health Outcomes of Children in Saline-Prone Areas: A Comprehensive Study. Asia Pacific Journal of Surgical Advances. 2025 17;2(1):26-32.

33. Junhai GR, Topu MH, Joty RB, Moslem S, Della NA, Mahmud MR, Morshed R, Ferdaus F. Epidemiology of Gallbladder Stones in Youth: Prevalence, Risk Factors, and Contributing Variables. Asia Pacific Journal of Surgical Advances. 2025 17;2(1):33-40.

34. Islam RZ, Tasnim F, Howlader B, Sifuddin M, Parveen K. Risk Factors, Health-Seeking Behavior, Attitudes, and Knowledge Regarding Cervical Carcinoma Among Rural Women in Bangladesh. Asia Pacific Journal of Surgical Advances. 2025 17;2(1):41-46.

35. Sakib N, Khan AR, Parveen K, Karmakar S, Setu SR. Evaluation of Nutritional Status and Contributing Factors in Young Children: A Comprehensive Study of Growth, Health, and Socioeconomic Influences in Khulna's Kindergarten Schools. Asia Pacific Journal of Surgical Advances. 2025 17;2(1):47-54.

36. Islam RZ, Das S, Harun JB, Das N, Ferdaus F. Comparative Analysis of Serum Creatinine and Albuminuria as Biomarkers for Diabetic Nephropathy in Young Patients with Type 2 Diabetes. Asia Pacific Journal of Surgical Advances. 2025 17;2(1):55-62.

37. Sharmin Z, Mumu KF, Tura FA, Huda SA, Dutta S. Influence of Food Hygiene Practices on Diarrheal Incidence Among Children of Working Mothers in Gazipur District, Bangladesh. Asia Pacific Journal of Surgical Advances. 2025 17;2(1):63-71.

38. Schreiber R. Exploring Novel Biomarkers for Predicting Response to Combination Immunotherapy and Chemotherapy in Lung Cancer. Pacific Journal of Oncology & Immunotherapy. 2024 31;1(1):13-21.

39. van der Burg SH. Evaluating the Effectiveness of Cancer Vaccines in Treating Metastatic Melanoma Using Immune Modulation. Pacific Journal of Oncology & Immunotherapy. 2024 Dec 31;1(1):22-30.

40. Uddin N, Hill TC. Predictive Modeling of Surgical Outcomes in Minimally Invasive Spine Surgery. Pacific Journal of Spine & Neurosurgery. 2024 Dec 31;1(1):4-12.

41. Rahman M, Tarik M, Stefan G. Correlation of Inflammatory Markers and Post-Surgical Complications in Spine Surgery: A Multicenter Cohort Study. Pacific Journal of Spine & Neurosurgery. 2024 Dec 31;1(1):31-8.

42. Parveen M, Sharmin S, Yeasmin F, Hasan H. Nutritional Modulation of Potassium Intake in Warfarin-Treated Patients: A Clinical Assessment. Naogaon Medical College Journal. 2024. 31;1(1):25-35

43. Adhikari EH. Advanced MRI Mapping Using Diffusion-Weighted and T2 HASTE Sequences in Placenta Accreta Spectrum Disorders: Histopathological and Surgical Correlation Analysis. Pacific Journal of Advanced Obstetrics & Gynecology. 2022 Dec 31;1(1):30-8.

44. Smith RP. Impact of Laparoscopic Ovarian Drilling on Anti-Müllerian Hormone, Ovulatory Function, and Folliculogenesis in Clomiphene-Resistant Polycystic Ovary Syndrome Patients. Pacific Journal of Advanced Obstetrics & Gynecology. 2022 Dec 31;1(1):21-9.

45. Sunny M, Bulbul KA, Khan MN, Rashid M, Rahman MA, Kaisar M. Relationship of LDL and HDL Among Patients Suffering Acute Myocardial Infarct. Pacific Journal of Cardiovascular Innovations. 2025 Jun 1;3(1):4-8.

46. Curtis LH. Longitudinal Assessment of Left Ventricular Global Longitudinal Strain and NT-proBNP in Predicting Heart Failure with Preserved Ejection Fraction. Pacific Journal of Cardiovascular Innovations. 2023 Dec 31;1(1):20-7.

47. Haque, A., Rahman, S., Hasan H., Clinical Correlation Between Preoperative Nutrition Status and AVF Surgical Outcome in Chronic Kidney Disease (CKD) Stage 5 Patients. Naogaon Medical College Journal. 2024 1; (1); 15-24

48. Mumu KF, Huda SA, Tura FA, Dutta S, Sharmin Z. Mobile Device Dependency and Its Association with Eye Disorders and Mood Changes in Children: A Cross-Sectional Analysis. Asia Pacific Journal of Surgical Advances. 2025 17;2(1):71-80.

49. O'Callaghan-Gordo C, Shivashankar R, Anand S, et al. Prevalence of and risk factors for chronic kidney disease of unknown aetiology in India: secondary data analysis of three population-based cross-sectional studies. BMJ Open 2019;9: e023353.