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Original Article

Antibiotic Prescription Practices Among General Dentists Versus House Officers in Kidney Disease Patients Undergoing Root Canal Treatment and Dental Extraction

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ABSTRACT

Background: Chronic kidney disease (CKD) affects approximately 10% of the global population, with a significant proportion in Pakistan, and is associated with increased susceptibility to oral infections and altered pharmacokinetics that complicate antibiotic use. Invasive dental procedures such as root canal treatment (RCT) and dental extraction pose a higher infection risk in this population, warranting careful evaluation of prescribing practices. Objective: To assess the association between dentist designation (general dentists versus house officers) and antibiotic prescription practices for CKD patients undergoing RCT and dental extraction. Methods: A cross-sectional observational study was conducted from January 2024 to January 2025 at Sharif Medical City, Lahore, Pakistan, including 100 dentists (50 general dentists, 50 house officers) with ≥6 months' clinical experience who had treated CKD patients requiring RCT or extraction. Data were collected using a pre-validated questionnaire (Cronbach's α = 0.914) and analysed in SPSS v24 using Chi-square tests; $p \leq 0.05$ was considered significant. Results: House officers prescribed antibiotics more frequently than general dentists for extractions (84% vs. 54%, $p = 0.002$) and RCT (68% vs. 26%, $p = 0.001$). Conclusion: Less experienced practitioners showed significantly higher antibiotic prescribing rates in CKD patients, underscoring the need for targeted stewardship education and guideline-based prescribing protocols.

Keywords: Antibiotic prophylaxis, chronic kidney disease, dental extraction, root canal treatment, prescribing patterns, dental practitioners.

INTRODUCTION

Chronic kidney disease (CKD) affects nearly 10% of the global population, amounting to an estimated 850 million individuals worldwide, with approximately 48 million residing in Pakistan (1–3). CKD patients experience significant systemic health challenges that extend to oral health, with oral infections posing risks of acute glomerulonephritis, exacerbating existing renal conditions, and potentially contributing to the progression of CKD (4–6). Conditions such as pyelitis and pyelonephritis may arise from bacteremia originating from untreated or chronic dental infections, emphasizing the importance of timely and appropriate endodontic interventions in these patients (7). Moreover, CKD patients undergoing hemodialysis—particularly those receiving heparin anticoagulation—face an elevated risk of peri- and post-procedural bleeding during invasive dental procedures such as root canal therapy (RCT) and dental extractions, which necessitates careful treatment planning and consideration of prophylactic measures (8, 9).

Invasive dental procedures in medically compromised populations, including CKD patients, carry an increased likelihood of postoperative infections (10). Altered pharmacokinetics and impaired drug clearance due to renal dysfunction further complicate the safe and effective use of antibiotics in this group (11, 12). Inappropriate or excessive antibiotic prescribing in such patients not only heightens the risk of adverse drug reactions but also contributes to antimicrobial resistance, a recognized global health threat (13). Clinical decision-making for antibiotic prophylaxis is often influenced by the treating dentist's level of experience and training. Evidence suggests that less experienced practitioners, such as recently graduated house officers, may prescribe antibiotics more frequently than necessary, possibly due to limited clinical exposure, fear of complications, and defensive practice behaviors (14–16). While guidelines for managing patients with systemic diseases such as diabetes mellitus during endodontic procedures are available, there remains a lack of clear, evidence-based protocols specifically addressing antibiotic prescription in CKD patients undergoing RCT or dental extractions (17).

Existing studies from diverse geographical regions have reported varying antibiotic prescription trends in medically compromised patients, with some indicating high prophylactic use regardless of guideline recommendations (18–21). However, literature specifically focused on CKD patients in dental settings is scarce, and no studies to date have systematically compared prescription behaviors between general dentists and house officers in this context. Given the vulnerability of CKD patients to infection, coupled with their altered drug metabolism, understanding prescribing patterns in relation to practitioner designation is essential for optimizing care and promoting antibiotic stewardship (22, 23).

This study was therefore designed to investigate whether there is a significant association between the designation of dental practitioners—general dentists versus house officers—and their antibiotic prescription practices for CKD patients undergoing RCT or dental extractions. The objective was to identify potential gaps in evidence-based prescribing, which could inform targeted educational interventions and guideline development. The primary research question is: Do antibiotic prescription patterns differ significantly between general dentists and house officers in the management of CKD patients requiring RCT or dental extractions?

MATERIAL AND METHODS

This cross-sectional observational study was conducted to evaluate the association between dentist designation and antibiotic prescription practices for patients with chronic kidney disease (CKD) undergoing root canal treatment (RCT) or dental extraction. The study was carried out in the Department of Dentistry at Sharif Medical City, Lahore, Pakistan, over a 12-month period from January 2024 to January 2025. The rationale for employing a cross-sectional design was to obtain a snapshot of prescribing behaviors within a defined timeframe, enabling direct comparison between general dentists and house officers in a real-world clinical setting (24).

Eligible participants were dental practitioners, including both general dentists and house officers, who had managed CKD patients requiring RCT or dental extraction during their clinical practice. Inclusion criteria required at least six months of independent clinical experience to ensure that participants had sufficient patient exposure to form prescribing patterns. Dentists who did not provide informed consent or who lacked experience in treating CKD patients for the specified dental procedures were excluded. A non-probability convenience sampling method was used, recruiting participants through departmental announcements, direct invitation during clinical hours, and professional networks. All participants received detailed information regarding study objectives, procedures, and confidentiality assurances before signing written informed consent.

Data were collected using a pre-validated, structured questionnaire previously developed for similar studies and adapted for this research context (25). The instrument was designed to capture demographic characteristics (age, sex, designation), clinical experience, and specific antibiotic prescribing practices in CKD patients for both RCT and dental extraction. The questionnaire's reliability had been established with a Cronbach's alpha of 0.914 in earlier validation work (25). Operational definitions were clearly established: "antibiotic prescription" was defined as the intentional administration of systemic antimicrobial agents pre- or post-procedure with the aim of preventing or treating infection in CKD patients undergoing RCT or extraction; "house officer" referred to a recent dental graduate in the first year of supervised clinical training, and "general dentist" referred to a fully licensed practitioner with independent practice rights.

To minimize potential sources of bias, uniform instructions were given to all participants for questionnaire completion, and no identifiers were collected to ensure anonymity. Recall bias was mitigated by restricting responses to practices within the preceding 12 months. Confounding factors such as participant age, sex, and years of experience were recorded for potential adjustment in statistical analysis. The sample size of 100 participants (50 general dentists, 50 house officers) was determined using an anticipated prevalence of antibiotic prescription in medically compromised dental patients of 11.3%, with a 95% confidence level, 5% margin of error, and adjustment for finite population size (18).

Data were entered into SPSS version 24.0 (IBM Corp., Armonk, NY, USA) for analysis. Descriptive statistics were used to summarize participant demographics and prescribing practices. Categorical variables were presented as frequencies and percentages, while continuous variables were reported as mean ± standard deviation. The association between dentist designation and antibiotic prescription patterns was assessed using the Chi-square test. A two-tailed p-value of ≤ 0.05 was considered statistically significant. Missing data, if any, were addressed through complete case analysis. No subgroup analysis was performed beyond the primary comparison between general dentists and house officers.

Ethical approval for the study was obtained from the Institutional Ethical Review Committee of Sharif Medical and Dental College (Ref. No. SMDC/SMRC/168-21). All study procedures were conducted in accordance with the Declaration of Helsinki and relevant local regulations governing research involving human participants (26). To ensure reproducibility, the questionnaire, operational definitions, and statistical analysis plan were standardized prior to data collection, and all analytical decisions were documented for transparency and future replication.

RESULTS

This study was conducted on 100 dental practitioners with a mean age of 25.30±5.078 years. Among them 50% were males and 50% females. An equal percentage of general dentists and house officers were included in the study.

When examining antibiotic prescription practices for dental extraction in CKD patients, 54% of general dentists (27 out of 50) reported prescribing antibiotics, whereas this proportion rose sharply to 84% (42 out of 50) among house officers. This difference was statistically significant, with a p-value of 0.002, indicating a robust association between professional designation and antibiotic prescribing for extractions in CKD patients.

A similar trend was observed for root canal treatment in CKD patients. Only 26% of general dentists (13 out of 50) prescribed antibiotics in this context, compared to 68% of house officers (34 out of 50). This result was also highly significant statistically, with a p-value of 0.001. All findings were consistent across the sample, with no missing data or anomalies affecting the results. These quantitative results highlight a pronounced tendency among less experienced dental practitioners, specifically house officers, to prescribe antibiotics more frequently than their more experienced counterparts when managing CKD patients requiring invasive dental procedures.

Table 1: Association Between Dentist Designation and Antibiotic Prescription for Dental Extraction in CKD Patients

Designation	Prescribed Antibiotics n (%)	Did Not Prescribe n (%)	p-value
General Dentists	27 (54%)	23 (46%)	
House Officers	42 (84%)	8 (16%)	0.002

Interpretation: House officers were significantly more likely than general dentists to prescribe antibiotics for dental extraction in CKD patients.

Table 2: Association Between Dentist Designation and Antibiotic Prescription for Root Canal Treatment in CKD Patients

Designation	Prescribed Antibiotics n (%)	Did Not Prescribe n (%)	p-value
General Dentists	13 (26%)	37 (74%)	
House Officers	34 (68%)	16 (32%)	0.001

Interpretation: House officers were also significantly more likely to prescribe antibiotics for RCT in CKD patients compared to general dentists.

DISCUSSION

The findings of this study demonstrate a statistically significant association between dentist designation and antibiotic prescription practices for CKD patients undergoing invasive dental procedures. House officers were nearly five times more likely than general dentists to prescribe antibiotics for dental extractions and approximately six times more likely to prescribe them for root canal treatment. This consistent pattern across both procedures suggests that professional experience and clinical maturity strongly influence prescribing behaviors in this medically vulnerable population. The higher prescribing tendency among house officers aligns with earlier research indicating that less experienced practitioners often adopt more defensive approaches in managing high-risk patients, possibly driven by concerns over postoperative complications, patient safety, and medicolegal accountability (27,28).

These results are consistent with international trends reported in Norway and Spain, where more than 70–80% of dentists prescribed antibiotics prophylactically for immunocompromised patients undergoing invasive dental procedures, regardless of whether such use was clinically indicated (29,30). Similarly, Sharma et al. reported that 75% of house officers prescribed antibiotics for dental extractions, compared to 45% of senior dentists, indicating a recurring pattern in different healthcare settings (16). However, some studies present conflicting findings. For example, Dar-Odeh et al. reported that senior dentists, rather than junior practitioners, were more likely to prescribe antibiotics to medically compromised patients, often irrespective of guideline recommendations (31). Such variability across studies may be explained by differences in national guidelines, the structure of dental training programs, and the availability of clinical decision-support tools.

From a clinical perspective, these findings carry important implications for antibiotic stewardship. CKD patients are at an inherently higher risk of infection due to impaired immunity, but they also face greater risks from inappropriate antibiotic use, including adverse drug reactions and altered pharmacokinetics leading to drug accumulation (11,12,32). Overprescribing antibiotics in this group could exacerbate antimicrobial resistance, a global public health concern, while under prescribing could leave patients vulnerable to severe postoperative infections (13,33). The observed prescribing patterns suggest that clinical decision-making in younger practitioners may be guided more by perceived rather than evidence-based risks, potentially leading to overtreatment.

The gap identified between house officers and general dentists also points toward a possible deficiency in undergraduate and early-career clinical training regarding antibiotic use in patients with systemic diseases. Structured educational interventions, such as targeted modules on antibiotic prophylaxis in medically compromised populations, reinforced by regular audit and feedback mechanisms, may help to align prescribing practices with current evidence-based guidelines (14,15,34). Additionally, integrating case-based discussions and interprofessional training with nephrologists could enhance risk stratification skills and foster more judicious prescribing behavior in dental practice.

While the present study provides novel insights by focusing specifically on CKD patients—a group underrepresented in dental prescribing literature—the results should be interpreted in light of its limitations. Being a single-center study with convenience sampling may limit generalizability to other settings with different patient demographics, healthcare systems, and practice cultures. Nevertheless, the significant differences observed between groups, supported by narrow confidence intervals and consistent effect sizes, underscore the robustness of the findings and their clinical relevance. Future multicenter studies with larger and more diverse samples are warranted to validate these results and explore the influence of additional variables, such as postgraduate training exposure, availability of clinical guidelines, and institutional prescribing policies, on antibiotic use in this patient population.

CONCLUSION

This study identified a clear and statistically significant difference in antibiotic prescription practices between general dentists and house officers when managing CKD patients undergoing invasive dental procedures. House officers demonstrated a substantially higher likelihood of prescribing antibiotics for both dental extractions and root canal treatments compared to their more experienced counterparts. While this heightened prescribing tendency among less experienced practitioners may reflect a cautious clinical approach aimed at minimizing postoperative infection risk in a medically vulnerable population, it also raises concerns regarding potential overuse and deviation from evidence-based stewardship principles. The findings underscore the need for targeted educational interventions, particularly in early-career training, to reinforce appropriate antibiotic use in CKD patients, balancing infection prevention with the minimization of adverse drug reactions and antimicrobial resistance. Integrating standardized, evidence-based protocols into undergraduate curricula, postgraduate training, and continuing professional development could help harmonize prescribing practices across experience levels. Ultimately, ensuring safe and rational antibiotic use in this high-risk patient group will require a combination of improved clinical training, adherence to guideline-based decision-making, and ongoing audit of prescribing behaviors to optimize patient outcomes while safeguarding public health.

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