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EVALUATION OF PRESCRIPTION ERRORS IN CASE PEPTIC ULCER DISEASE IN DIFFERENT HEALTH CARE FACILITIES OF RAWALAKOT AZAD KASHMIR, PAKISTAN

Original Research

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ABSTRACT

Background: Peptic ulcer disease (PUD) is a common gastrointestinal condition arising from an imbalance between aggressive factors such as gastric acid and pepsin, and mucosal defense mechanisms. *Helicobacter pylori* infection and the chronic use of non-steroidal anti-inflammatory drugs (NSAIDs) are the leading etiological agents. If left untreated, PUD can result in serious complications including gastrointestinal bleeding, perforation, and gastric outlet obstruction. Appropriate diagnosis and rational prescribing are essential for effective disease management.

Objective: To evaluate prescription errors associated with peptic ulcer disease in Rawalakot, Azad Jammu and Kashmir, and to identify gaps in clinical documentation and drug therapy management.

Methods: This descriptive, cross-sectional study was conducted across multiple healthcare settings in Rawalakot, including CMH outpatient departments, private clinics, and pharmacies. Prescriptions were collected from patients aged 20 to 80 years diagnosed with PUD. A total of 200 prescriptions were gathered, from which 100 prescriptions specific to peptic ulcer disease were purposively selected for analysis. Each prescription was assessed using Medscape software to identify errors in dose, drug strength, frequency, duration, diagnostic test recommendations, and differential diagnosis documentation.

Results: Among the 100 prescriptions analyzed, errors were most prevalent in differential diagnosis (67%), followed by drug frequency (57%), duration of therapy (55%), diagnostic testing (63%), drug strength (44%), and dosage (30%). Only 33% of prescriptions accurately differentiated between gastric and duodenal ulcers, while 43% properly stated frequency and 45% correctly documented therapy duration. Just 56% had accurate drug strength, and 70% of doses were appropriate.

Conclusion: The findings highlight widespread prescription errors in the management of PUD, especially in diagnostic clarity and treatment planning. Enhanced prescriber education, pharmacist involvement, and standardized prescription protocols are recommended to improve patient safety and treatment outcomes.

Keywords: Anti-Ulcer Agents, Diagnosis, Differential, Drug Prescriptions, Helicobacter Infections, Non-Steroidal Anti-Inflammatory Agents, Peptic Ulcer, Proton Pump Inhibitors.

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INTRODUCTION

Peptic ulcer disease (PUD) remains a significant global health burden, affecting nearly 4 million people annually and resulting in substantial morbidity and healthcare costs. Traditionally attributed to heightened gastric acidity, stress, and dietary habits, PUD is now well-established to have two primary etiological drivers: infection with *Helicobacter pylori* and chronic use of non-steroidal anti-inflammatory drugs (NSAIDs) (1). The disorder is characterized by mucosal injury to the stomach, duodenum, or even esophagus, leading to a cascade of gastrointestinal disturbances. Although submucosal damage is less frequent, it may occur in severe cases, complicating the clinical picture and extending the healing time. *H. pylori* is a gram-negative, spiral-shaped bacterium that inhabits the gastric mucosa and has been implicated in the development of both gastritis and peptic ulcers. Its role in ulcerogenesis is multifactorial—ranging from direct mucosal injury to stimulation of inflammatory and immune responses. Individuals harboring *H. pylori* infection have a three- to four-fold increased risk of developing ulcers, with estimates suggesting that 10–20% of those infected will eventually develop a clinically relevant lesion (2,3). Furthermore, the infection is associated not only with peptic ulceration but also with chronic gastritis, atrophic changes, and gastric malignancy (4). However, the precise interplay between bacterial virulence factors, host immunity, and environmental cofactors remains incompletely understood. NSAIDs, on the other hand, compromise mucosal integrity primarily through inhibition of prostaglandin synthesis, leading to decreased bicarbonate and mucus production and impaired mucosal blood flow (5). Their widespread use, particularly among the elderly or patients with comorbidities, increases the risk of gastrointestinal complications, including ulceration, bleeding, and perforation. Although smoking, alcohol consumption, and stress have been suspected as contributors, their individual roles remain controversial and often serve as co-factors rather than primary etiological agents (6,7). PUD presents variably, with symptoms ranging from asymptomatic to severe pain, gastrointestinal bleeding, or life-threatening complications such as perforation and gastric outlet obstruction. NSAID-induced ulcers are often clinically silent, with GI bleeding being the first manifestation in some patients. Differences in symptomatology between gastric and duodenal ulcers are clinically relevant: while duodenal ulcers typically cause epigastric pain that improves with food, gastric ulcers tend to worsen postprandially, often within 15–30 minutes of ingestion. Classic signs include gnawing abdominal pain, bloating, nausea, dysphagia, melena, and unexplained weight loss (8).

Complications affect nearly a quarter of patients and include bleeding, perforation, and pyloric obstruction. Bleeding is most commonly observed in older adults or those on combination drug regimens involving NSAIDs, corticosteroids, or anticoagulants. Anatomically, such bleeding typically arises near the ligament of Treitz and is clinically evident through hematemesis or melena (9). In cases of perforation, urgent surgical intervention is required. Gastric outlet obstruction, often secondary to chronic inflammation, fibrosis, or scarring, may result in symptoms like persistent vomiting, bloating, and early satiety. Less common but severe is ulcer penetration into adjacent organs, which may result in abscess formation or upper gastrointestinal hemorrhage (10). Diagnosis involves a combination of clinical evaluation and confirmatory tests. While routine blood tests lack diagnostic specificity, non-invasive investigations like the urea breath test and stool monoclonal antigen test offer high sensitivity for *H. pylori* detection, though they require cessation of proton pump inhibitors prior to testing to avoid false negatives (11). Serological tests, though unaffected by medications, cannot distinguish active from past infections and are limited in guiding treatment decisions (12). Endoscopy remains the gold standard, particularly in complicated cases or in patients presenting with alarm symptoms. Barium studies may still hold value in certain diagnostic contexts, although their use has waned due to the superior accuracy of endoscopy.

Treatment has evolved significantly, centering on acid suppression and bacterial eradication. Triple therapy, consisting of a proton pump inhibitor, amoxicillin, and clarithromycin for 14 days, is widely recommended; however, increasing resistance to clarithromycin has lowered its efficacy in many regions. Sequential therapy and quadruple regimens (either bismuth- or non-bismuth-based) offer improved eradication rates in resistant cases (13). Adjunctive therapies, including H2 receptor antagonists and mucosal protective agents like misoprostol and bismuth salts, remain part of the therapeutic arsenal, particularly in NSAID-induced ulcers or in patients unable to tolerate standard regimens. Emerging evidence also supports the role of herbal agents in PUD management. Compounds such as Korean red ginseng, *Allium sativum*, *Curcuma longa*, and *Zingiber officinalis* exhibit anti-inflammatory, antioxidant, and antimicrobial properties that may enhance mucosal defense mechanisms. However, concerns regarding drug-herb interactions and limited clinical data restrict their widespread use. Epidemiologically, the burden of PUD differs widely across regions due to variability in *H. pylori* prevalence, NSAID use, socioeconomic conditions, and healthcare access. In the United States, approximately 500,000 new cases are

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diagnosed each year, with *H. pylori* and NSAIDs accounting for 72% of cases (14). Similar patterns are noted globally, including in the United Kingdom, Australia, India, and Pakistan, with regional variations influenced by sanitation, healthcare infrastructure, and drug prescription practices. In Pakistan, the prevalence of *H. pylori* is particularly high, especially among lower socioeconomic groups and in rural settings, contributing significantly to ulcer disease burden. Notably, gastric ulcers appear to be more prevalent in some urban centers such as Hyderabad, with gender and age-related disparities in disease presentation. In light of the persistent burden and multifactorial nature of peptic ulcer disease, the objective of this study is to examine the etiological, diagnostic, and therapeutic dimensions of PUD with a focus on the interplay between *H. pylori* infection and NSAID usage, while also highlighting the regional epidemiological trends and current gaps in treatment efficacy.

METHODS

This study was designed as a descriptive, cross-sectional investigation aimed at evaluating prescription patterns and identifying common errors in the pharmacological management of peptic ulcer disease (PUD). The target population included male and female patients aged between 20 and 80 years who were diagnosed with PUD and had received prescriptions from gastroenterologists and physicians in various clinical settings across Rawalakot. Patients presenting with unrelated medical conditions or prescriptions not involving PUD were excluded from the study to maintain diagnostic specificity and focus. Prescriptions were collected through direct visits by the researchers to the Gastroenterology Ward and Outpatient Department of the Combined Military Hospital (CMH) Rawalakot, as well as to private physician clinics, local pharmacies, and other healthcare facilities in the region. A total of 200 prescriptions were gathered through this purposive sampling approach. From this initial pool, 100 prescriptions that met the strict inclusion criteria—clearly indicating a diagnosis of peptic ulcer disease—were purposively selected for detailed evaluation. The final sample was determined based on diagnostic relevance and data completeness to ensure methodological clarity and validity. Each prescription was thoroughly reviewed for key parameters including the accuracy of the drug dose, frequency, strength, and duration. Additional variables assessed included whether appropriate diagnostic investigations—such as endoscopy, urea breath test, or stool antigen test—were indicated, and whether the differential diagnosis between gastric and duodenal ulcers was properly documented. The identification of errors was guided by standard pharmacological references and evidence-based clinical guidelines. The data analysis was conducted using Medscape's drug interaction and dose-checking tool to validate prescription appropriateness. While Medscape was instrumental in identifying potential dosing or drug selection errors, it is important to note that this tool alone is insufficient for comprehensive statistical analysis. Ethical considerations were observed throughout the study following approval from Institutional Review Board (IRB), furthermore ethical standards were maintained, particularly in the process of collecting prescriptions from patients. The primary aim of this methodological approach was to systematically assess the quality of prescriptions issued for PUD and to identify gaps in rational drug use, with the broader goal of informing healthcare professionals and improving prescribing practices in similar clinical settings.

RESULTS

A total of 100 prescriptions for peptic ulcer disease were evaluated to identify and quantify prescription errors across various pharmacological and clinical parameters. The assessment revealed that 30% of prescriptions contained incorrect dosage, while 70% reflected accurate dosing practices. Evaluation of drug strength showed that 44% of prescriptions involved errors, with only 56% having correctly prescribed drug strengths, indicating a substantial deviation from recommended therapeutic standards. In terms of drug administration frequency, 57% of the prescriptions exhibited errors, while 43% adhered to standard frequency guidelines. Similarly, analysis of treatment duration revealed that 55% of prescriptions had incorrect duration of therapy, and only 45% were within appropriate limits. This represents a significant gap in adherence to established clinical protocols. Differential diagnosis for distinguishing between gastric and duodenal ulcers was absent or incorrectly documented in 67% of the reviewed prescriptions, leaving only 33% as adequately documented. Moreover, diagnostic tests essential for confirming peptic ulcer disease, such as endoscopy or non-invasive *Helicobacter pylori* testing, were either missing or inaccurately recommended in 63% of the prescriptions, with just 37% indicating proper diagnostic evaluation. These findings underscore pervasive inconsistencies in prescription writing and documentation among healthcare providers managing peptic ulcer disease in the region. Collectively, the data reflect a high prevalence of prescribing errors, particularly in diagnostic clarity and therapeutic regimen planning, with implications for treatment efficacy and patient safety.

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Table 1: Errors related to Dose and Drug strength

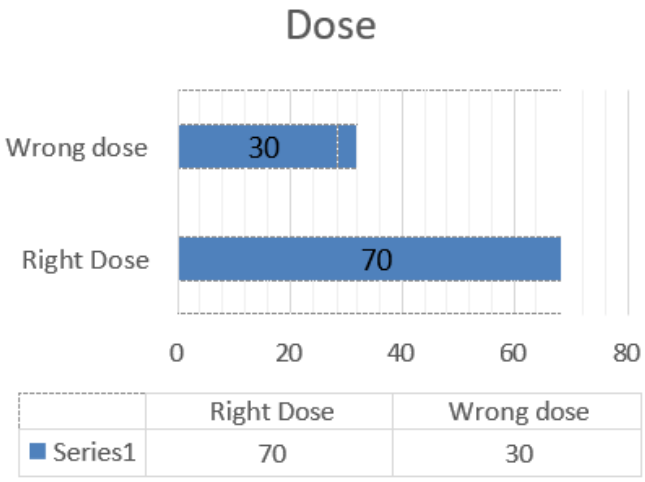
Error	% Of Errors
Dose	30%
Drug Strength	**44%**

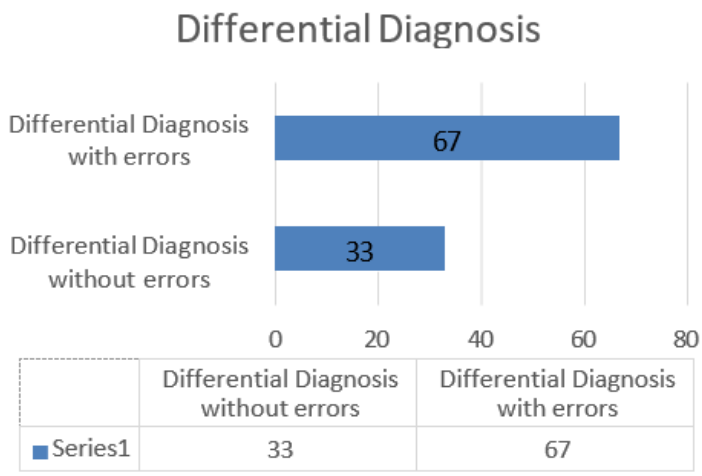
Table 2: Errors related to Duration of therapy and differential diagnosis:

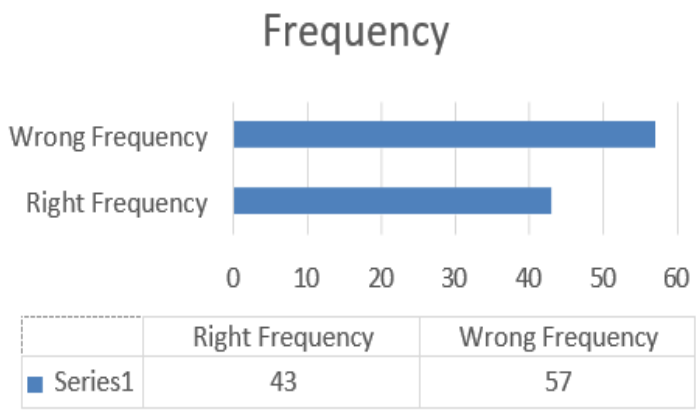
Error	% Of Errors
Duration of Therapy	55%
Differential Diagnosis	**67%**

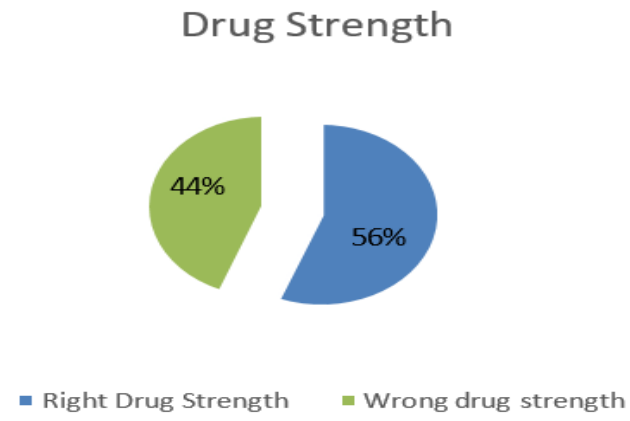
Table 3: Prescription Errors to frequency and diagnostic tests

Error	% Of Errors
Frequency	57%
Diagnostic test	**63%**









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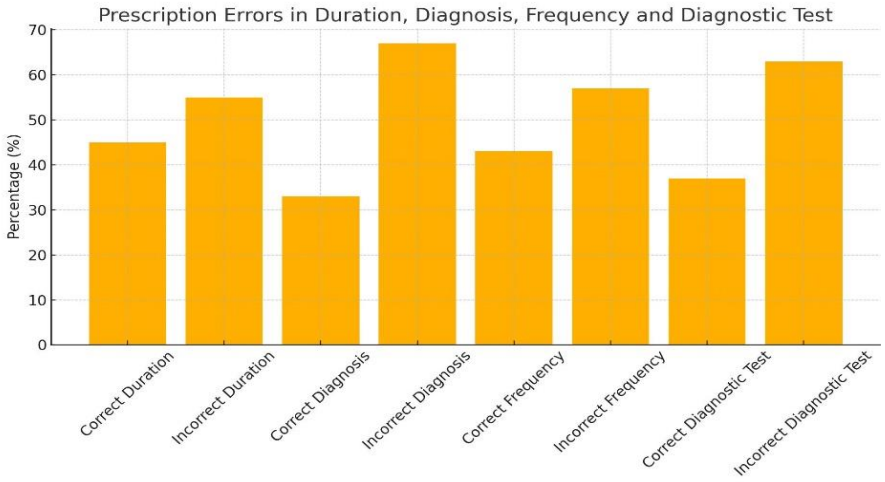

Figure 1 Prescription Errors in Duration, Diagnosis, Frequency and Diagnostic Test

DISCUSSION

The findings of this study highlighted a concerning prevalence of prescription errors in the management of peptic ulcer disease (PUD) within healthcare settings of Rawalakot, AJK. The most notable issue was the incorrect or missing differential diagnosis in 67% of prescriptions, underscoring a gap in clinical documentation practices. This observation aligns with global concerns that diagnostic uncertainty or documentation lapses can lead to suboptimal treatment outcomes. Accurate distinction between gastric and duodenal ulcers is critical as it influences therapeutic decisions, yet this element remains poorly addressed in a significant number of clinical encounters. Prescription errors related to drug frequency (57%) and duration of therapy (55%) were also prominent. Inaccuracies in these parameters may compromise treatment efficacy and increase the likelihood of complications such as ulcer recurrence, gastrointestinal bleeding, or drug resistance (14,15). These findings are in agreement with previous research suggesting that deviations in drug timing and therapy length are among the most common medication errors observed in outpatient and inpatient care. Similarly, 44% of prescriptions had incorrect drug strength, and 30% contained incorrect dosing, indicating a lack of adherence to standardized dosing protocols (16). These types of errors are especially critical in the management of acid suppression therapy, where subtherapeutic or excessive dosing may result in treatment failure or adverse effects (16,17).

Errors related to the omission or misstatement of diagnostic testing, reported in 63% of prescriptions, further reflect clinical oversight. Despite the availability of highly sensitive and specific tests such as the urea breath test, stool antigen assay, and endoscopy, their integration into routine diagnostic workflows appears inconsistent. This has direct implications on the identification and eradication of *Helicobacter pylori*, the primary etiological factor for peptic ulcers globally (18). Prior literature has emphasized the importance of accurate diagnostic confirmation to tailor treatment strategies and avoid unnecessary antibiotic exposure or inappropriate therapy duration (19). From an epidemiological perspective, the regional data correspond with broader trends observed globally. In the United States alone, an estimated 500,000 new cases of PUD occur annually, with *H. pylori* and NSAID usage being the leading contributors. Similar observations have been made in the UK, Australia, and South Asia, including Pakistan, where *H. pylori* prevalence remains disproportionately high, particularly in lower socioeconomic regions (20). The demographic findings from Rawalakot also align with prior studies conducted in cities like Karachi and Hyderabad, where peptic ulcer cases were more prevalent among younger adults, particularly females, and gastric ulcers were more frequently reported than duodenal ulcers.

A strength of the current study was its real-world evaluation of prescriptions directly obtained from diverse healthcare points such as hospital outpatient departments, physician clinics, and local pharmacies. This broadened the representativeness of the data and offered a more comprehensive insight into regional prescribing practices. Furthermore, the use of a standardized medication verification platform (Medscape) added validity to the error-checking process. Additionally, reliance solely on Medscape for analysis restricted the scope of statistical evaluation, and the study lacked stratification of errors by patient age, gender, healthcare facility, or prescriber type. Furthermore, the cross-sectional nature of the research and the non-random selection of prescriptions introduced potential sampling bias.

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Future studies should incorporate electronic medical record audits, multi-center collaborations, and stratified statistical analyses to yield more generalizable and actionable findings. Despite these limitations, the study underscores a pressing need for prescription review protocols, prescriber education, and clinical audit systems aimed at minimizing errors in peptic ulcer management. Enhanced integration of diagnostic testing, clearer documentation of ulcer type, and adherence to standard treatment guidelines—including triple therapy or sequential regimens depending on regional *H. pylori* resistance patterns—are essential to optimizing patient outcomes. Further research is warranted to evaluate the clinical impact of such prescription errors on ulcer healing rates, recurrence, and complication development.

CONCLUSION

This study concludes that prescription errors in the management of peptic ulcer disease remain a significant concern, particularly in relation to improper diagnosis documentation, medication dosing, and inappropriate treatment planning. The findings highlight the crucial role of pharmacists as integral members of the healthcare team, not only in dispensing medications but also in reviewing prescriptions, counseling patients, and guiding physicians on evidence-based drug use. Strengthening pharmacist-physician collaboration and implementing routine prescription audits can help minimize medication-related errors, ultimately enhancing patient safety and treatment outcomes. The study emphasizes the urgent need for system-level interventions to ensure that patients receive safe, accurate, and effective care for peptic ulcer disease.

AUTHOR CONTRIBUTION

Author	Contribution
Musaffa Niaz*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Khan Bilal Imtiaz	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Seemab Altaf	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Zunash Ishaq	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Muhammad Usman Khan	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Jawad Zahir*	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published
Izhar Ullah	Contributed to study concept and Data collection Has given Final Approval of the version to be published

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