ORIGINAL RESEARCH

Prescribing pattern of antibiotics among postoperative patients admitted for gynaecological and orthopaedic surgeries

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ABSTRACT

Background: Antibiotics have been widely employed for both the prevention and management of infections since the introduction of penicillin in the 1920s. This groundbreaking discovery, along with subsequent advancements, has profoundly altered medical practices and contributed to a substantial reduction in infection-related mortality rates. Consequently, the current study was undertaken to examine the prescribing patterns of antibiotics in postoperative patients who were admitted for gynaecological and orthopaedic surgeries. **Material and methods:** The current investigation involved a comprehensive review of the medical records of all patients aged 18 and older who were admitted to the gynaecology (n=50) and orthopaedic (n=50) departments. The data gathered included patient demographics such as age, reasons for surgical procedures, and details regarding the antibiotics prescribed, which encompassed dosage, duration, and method of administration. To ascertain the average number of antibiotics prescribed, the total count of antibiotics administered was divided by the number of case records examined. Furthermore, the study classified the antibiotics into categories of single-agent therapies, multidrug regimens, and fixed drug combinations, with results presented in both numerical and percentage formats. **Results:** A total of 50 patients were enrolled from the gynaecology ward and an additional 50 from the orthopaedic ward. The average age of patients in the gynaecology ward was 35.2 years, while those in the orthopaedic ward had a mean age of 42.8 years. In the gynaecology ward, the most frequently prescribed antibiotics included Ceftriaxone, Amoxicillin, and Amoxicillin combined with clavulanic acid. Conversely, in the orthopaedic ward, the predominant antibiotics prescribed were Amoxicillin with clavulanic acid, Amoxicillin, Cefuroxime, and Ceftriaxone. **Conclusion:** Understanding antibiotic prescribing patterns is essential for the development and implementation of localized antibiotic prescribing guidelines, which can effectively combat antibiotic resistance.

Keywords: Antibiotic, Gynaecological, Orthopedics

INTRODUCTION

Antimicrobial drugs are one of the most widely utilized drug classes globally. Evidence shows that approximately one-third of the hospital admissions are being managed with antibiotic prescription during the course of treatment in the hospitals.[1,2] Infectious diseases are one of the entities causing significant morbidity and mortality worldwide. Resistant microorganisms are becoming more prevalent in the recent past and standing out to be a major threat in health care settings. Poverty, increasing infectious disease burden, accessibility to antibiotics with ease and injudicious use of antimicrobials are a few of the contributing factors for the increasing incidence of resistant microorganisms in India.[3]With negligible amount of newer antibiotics being developed, appropriate use of already available antibiotics has become the most crucial aspect to prevent the emergence of drug-resistant organisms.[4]Evidence has shown that resistant microorganisms have significant impact on health care system in terms of patient burden by increasing both mortality and morbidity and causing economic burden to a significant level.[5]

Antimicrobial resistance (AMR) refers to the adaptive changes in bacteria, viruses, fungi, and parasites that render them resistant to antibiotics that were once effective. This development poses significant challenges in managing infections, increasing the likelihood of disease spread, serious health issues, and death. Research has shown that numerous pathogens, such as Acinetobacter species, Pseudomonas species, Escherichia coli, Klebsiella pneumoniae, Salmonella enterica, Staphylococcus aureus, and Streptococcus pneumoniae, have acquired resistance to commonly utilized antimicrobial treatments.[4- 6]

Antimicrobial resistance (AMR) remains a critical challenge to global public health. Continuous monitoring and research into antimicrobial prescribing behaviors across various sectors are vital for producing data that can guide effective stewardship initiatives. The current study revealed that a greater percentage of females (60.9%) received antibiotic prescriptions in comparison to males (39.1%). This finding aligns with previous research, indicating that female patients may be more frequently prescribed antibiotics than males. Consequently, this study was undertaken to examine the prescribing patterns of antibiotics among postoperative patients who were admitted for gynecological and orthopedic surgeries.

MATERIAL AND METHODS

This investigation aimed to evaluate the prescribing patterns of antibiotics in postoperative patients who underwent gynecological and orthopedic surgeries. The study involved a review of the medical records of all patients aged 18 and older admitted to the gynecology (n=50) and orthopedic (n=50) departments. The data collected included patient demographics, reasons for surgical procedures, and details regarding the antibiotics prescribed, such as dosage, duration, and administration route. The average number of antibiotics prescribed was calculated by dividing the total number of antibiotics given by the number of case records reviewed. Additionally, the antibiotics were classified into categories of single-agent therapies, multidrug regimens, and fixed drug combinations, with results presented in both numerical and percentage formats. All findings were documented in a Microsoft Excel spreadsheet and analysed statistically using SPSS software.

RESULTS

A total of 50 patients were enrolled from the gynaecology ward and an additional 50 from the orthopaedic ward. The average age of patients in the gynaecology ward was 35.2 years, while those in the orthopaedic ward had a mean age of 42.8 years. In the gynaecology ward, the most frequently prescribed antibiotics included Ceftriaxone, Amoxicillin, and Amoxicillin combined with clavulanic acid. Conversely, in the orthopaedic ward, the predominant antibiotics prescribed were Amoxicillin with clavulanic acid, Amoxicillin, Cefuroxime, and Ceftriaxone.

Table 1: Frequency of antibiotics prescribed in gynaecology ward

Antibiotic	Number	Percentage
Ceftriaxone	22	44
Ceftriaxone with sulbactam	5	10
Gentamycin	7	14
Amikacin	13	26
Tinidazole	6	12
Amoxycillin and clavulanic acid	19	38
Amoxycillin	25	50

Table 2: Frequency of antibiotics prescribed in orthopaedic ward

Antibiotic	Number	Percentage
Ceftriaxone	15	30
Cefixime	6	12
Ceftriaxone with sulbactam	7	14
Gentamycin	15	30
Amoxycillin and clavulanic acid	20	40
Amoxycillin	14	28
Cefuroxime	17	34

DISCUSSION

Over usage of AMs and emergence of resistant organisms had shown proportionate relationship with each other and the regions with higher rate of antibiotic usage have shown the higher rate of antibiotic resistance compared to the regions with the lower rate of antibiotic usage.[7] There is a need for improving the antimicrobial prescription practice by giving feedback on the antimicrobial usage to the prescribers to improve the patient care, to reduce the financial burden on the hospitals and to combat the spread of resistant microorganisms through multidisciplinary approach. Utilization of antimicrobials is a double-edged sword, where

rationale use will ensure cure of disease but irrational utilization may add to patient's health and financial miseries. Inappropriate prescription of AMs causes both increased expenditure on medical management along with increased morbidity and mortality by contributing to increased adverse drug reactions (ADRs) and the emergence of drug resistance to the available drugs.[8,9]Many studies in the recent past have also reported inappropriate use of the AMs and shown the importance of evaluating antimicrobial utilization and its impact on improving prescription patterns in healthcare settings.[10-12]

By the year 2050, projections indicate that antibiotic resistance may lead to approximately 10 million fatalities annually across the globe, with an estimated 2 million of these deaths occurring in India.[13] India ranks among the largest consumers of antibiotics worldwide, and contrary to the global trend of declining infectious diseases, the utilization of antibiotics in the country continues to escalate. Between 2000 and 2015, antibiotic consumption in India surged by 103%, surpassing that of any other nation.[14] This increase can be attributed to the persistent burden of infectious diseases, enhanced access to antibiotics, and instances of misuse.[15]

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The study by Raci G et al[16]focusedat utilization pattern of antimicrobials (AMs) in a tertiary care hospital in northern India.A prospective observational study was conducted over a period of one year in seven departments of a tertiary care hospital in hilly Himalayan region. Aim of the study was to analyze the AM utilization pattern using World Health Organization (WHO) indicators and instruments.A total 700 prescriptions were analyzed in the present study. Injectable antibiotics (71%) followed by oral (29%) were most commonly prescribed. Beta lactams (79%) were the most frequently used antibiotic class. Most commonly prescribed AM was Ceftriaxone (30%). Majority of the time AMs were given empirically (44.8%), where most common indication was respiratory infections (42%). Culture and sensitivity tests were done for guiding curative therapy in 34.71% cases. The average duration of patient hospital stay was 8.81 days in the study population. The mean duration of prescribed antimicrobial treatment was 5.12 days. On an average 1.93 AMs were prescribed per patient. AMs were prescribed by International nonproprietary name (INN) in 62.19% of the admissions. The most common AM related adverse drug reaction was gastritis (96%) and skin rash (4%) with Amoxicillin + clavulanic acid being the most common causative agent. Total antimicrobial consumption was 148.24 DDD/100 bed days with Medicine department showing the highest consumption (36.25/100 bed days).The present study is the first and largest antimicrobial utilization study in the hilly Himalayan region of northern India. Our study found an urgent need for improvement of prescribing patterns, patient care indicators and strict adherence to standard guidelines.

Skender K et al[17] compared and presented the patterns and trends of antibiotic prescription over 10 years for orthopedic inpatients in a teaching (TH) and a non-teaching hospital (NTH) in Central India. Data were gathered from orthopedic inpatients (TH-6446; NTH-4397) utilizing a prospective cross-sectional study methodology. The analysis focused on comparing patterns based on the indications for and corresponding antibiotic treatments, mean Defined Daily Doses (DDD)/1000 patient-days, and adherence to the National List of Essential Medicines India (NLEMI) as well as the World Health Organization Model List of Essential Medicines (WHOMLEM). Antibiotic prescriptions were evaluated separately for both operated and non-operated inpatients. Linear regression analysis was employed to assess the temporal trends in antibiotic prescribing, both overall through DDD/1000 patient-days and categorized by antibiotic groups. The data revealed that third-generation cephalosporins constituted the most frequently prescribed class of antibiotics (TH-39%; NTH-65%), with fractures identified as the predominant indication (TH-48%; NTH-48%). A significant majority of operated inpatients (TH-99%; NTH-97%) received pre-operative prophylactic antibiotics. In contrast, non-operated inpatients were also prescribed antibiotics (TH-40%; NTH-75%), despite a limited number presenting with infectious diagnoses (TH-8%; NTH-14%). Adherence to the NLEMI was found to be lower (TH-31%; NTH-34%) compared to adherence to the WHOMLEM (TH-65%; NTH-62%) across both hospitals. The mean DDD/1000 patient-days was significantly higher in the TH (2658) than in the NTH (162). Over a decade, total antibiotic prescribing exhibited an upward trend (TH-β = 3.23; NTH-β = 1.02). A considerable proportion of inpatients received antibiotics without definitive infectious indications. Overall, adherence to both the NLEMI and WHOMLEM was suboptimal in both institutions, with antibiotic usage increasing over the ten-year period, particularly in the TH compared to the NTH.The need for developing and implementing local antibiotic prescribing guidelines is emphasized.[20]

CONCLUSION

Understanding antibiotic prescribing patterns is essential for the development and implementation of localized antibiotic prescribing guidelines, which can effectively combat antibiotic resistance.

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