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Antibiotic Prescription Trends Among the Paediatric Population Admitted in Tertiary Care Hospitals of Rawalpindi

Sana Iqbal, Naila Azam*, Farooq Ikram, Shizan Hamid Feroz***, Abid Khan****, Waqas Ranjha*****

Department of Community Medicine, Armed Forces Post Graduate Medical Institute/National University of Medical Sciences (NUMS) Rawalpindi Pakistan, *Department of Community, Foundation University Islamabad, Pakistan, **Department of Paediatric, Combined Military Hospital/National University of Medical Sciences (NUMS) Rawalpindi Pakistan, ***Department of Anaesthesia, Combined Military Hospital/National University of Medical Sciences (NUMS) Rawalpindi Pakistan, ****Department of Anaesthesia, Pak Emirates Military Hospital/National University of Medical Sciences (NUMS) Rawalpindi Pakistan, *****Department of Surgery, Armed Forces Institute of Urology/National University of Medical Sciences (NUMS) Rawalpindi Pakistan

ABSTRACT

Objective: To demonstrate the antibiotic usage and trends among paediatric patients admitted to the tertiary care hospital of Rawalpindi.

Study Design: Cross-sectional analytical study.

Place and Duration of Study: Paediatric In-Patient Department of two Tertiary Care Hospitals, in Rawalpindi Pakistan, from May to Dec 2021.

Methodology: After rigorous inclusion and exclusion criteria, 395 admitted patients of the paediatric ward were included in the study from two tertiary care hospitals in Rawalpindi through simple random sampling.

Results: A total of 395 patients were included; the mean age was 3.35±4.07 months, ranging from 0 to 45 months. 132(33.4%) patients from Hospital-A and 263(66.6%) from Hospital-B. Out of 395 patients, 35(8.7%) patients were given no Antibiotic, 240(60.8%) were given one antibiotic, 84(21.3%) patients were given two antibiotics, 33(8.3%) patients were given three antibiotics and 3(0.9%) patients were given four antibiotics. Of 360, 340(94.4 %) were given IV antibiotics, and 20(5.6%) were advised oral antibiotics.

Conclusion: The youngest children received the most antibiotic prescriptions, progressively decreasing as they aged. irrational use of antibiotics is a significant risk factor to cause antimicrobial resistance.

Keywords: Antimicrobial resistance, Single and combination antibiotic use, Third-generation cephalosporin.

How to Cite This Article: *Iqbal S, Azam N, Ikram F, Feroz SH, Khan A, Ranjha W. Antibiotic Prescription Trends Among the Paediatric Population Admitted in Tertiary Care Hospitals of Rawalpindi. Pak Armed Forces Med J 2023; 73(3): 897-900. DOI: https://doi.org/10.51253/pafmj.v73i3.9189*

INTRODUCTION

Since the advent of antibiotics, healthcare undoubtedly has been revolutionized in achieving adequate infection control.[1] However, due to a lack of guidance regarding the appropriate use of antibiotics,[2] especially in developing countries, their irrational use can increase morbidity, mortality, medical expenses or patient cost, the economic burden on health care services and microbe antibiotic resistance.[3] Approximately half of the prescribed antibiotics are reported as irrational.[4,5] In many healthcare settings, the antibiotic prescribing rate is twice as much as the expected rate of antimicrobials needed.[6]

The absolute ramifications of antimicrobial resistance extend beyond increased health risks and have many public health consequences.[7] Estimates from the review on antimicrobial resistance (2016) suggest that 89% of deaths related to AMR in 2050 will occur in Africa and Asia.[8] Studies have reported that 50%-85% of children receive antibiotics unnecessarily prescribed for viral infections such as the common cold, which are the major contributor to the misuse or overuse of antibiotics.[9]

Pakistan is facing a pandemic of Antibiotic resistance due to the absence of scintillating monitoring of antibiotic prescribing and usage.[10] Most research has focused on patients' contribution to inappropriate use of medications due to over-the-counter availability and self-medication. At the same time, less attention has been paid to the role of professionals. The increase in antimicrobial resistance highlights the need to rationalise antibiotics used to treat infections. The study aims to determine the prescribing pattern of antibiotics in tertiary care hospitals of paediatric inpatients in Rawalpindi.

METHODOLOGY

The cross-sectional analytical study was conducted at the Department of Paediatrics at two Tertiary Care Hospitals, in Rawalpindi Pakistan, from May to December 2021. Ethical approval was obtained (RE: 223-AAA-ERC-AFPGMI) from the Armed Forces Post

Correspondence: Dr Sana Iqbal, Department of Public Health, Armed Forces Post Graduate Medical Institute, Rawalpindi Pakistan

Received: 21 Aug 2022; revision received: 20 Jan 2023; accepted: 24 Jan 2023

Graduate Medical Institute Institutional Ethical Review Board. The sample size was calculated using the WHO sample size calculator.

Inclusion Criteria: Patients of either gender aged 1 month to 12 years, admitted through the Emergency or Outpatient Department were included in the study.

Exclusion Criteria: The study did not include paediatric patients with some chronic or congenital illnesses. Moreover, any child with surgical intervention or accident/injury was excluded from the study.

Non-probability consecutive sampling technique was used. 2-bed numbers were randomly selected through a lottery method daily from the number of patients admitted in paediatric wards in the last twenty-four hours until the sample size was achieved.

The proforma was filled after informed consent and permission from the Medical Officer in charge and consultant paediatrician. Variables were developed according to standards and validated by research and paediatrics subject specialists. The collected data were checked for completeness and errors and analysed by using Statistical Package for Social Sciences version 23 and Microsoft Excel 2019. Mean±SD were calculated for numerical values. Frequency and percentages were calculated for categorical variables. All results were presented in the form of table and graph.

RESULTS

Three hundred ninety-five paediatric patients were included in the study. The mean age was 3.35 ±4.07 months, ranging from 0-45 months. 132(33.4%) patients from Hospital-A and 263(66.6%) from Hospital-B. Out of 395 patients, 35(8.7%) patients were not given any Antibiotic, 240(60.8%) were given one antibiotic, 84(21.3%) patients were given two antibiotics, 33(8.3%) patients were given three antibiotics and 3(0.9%) patients were given four antibiotics.

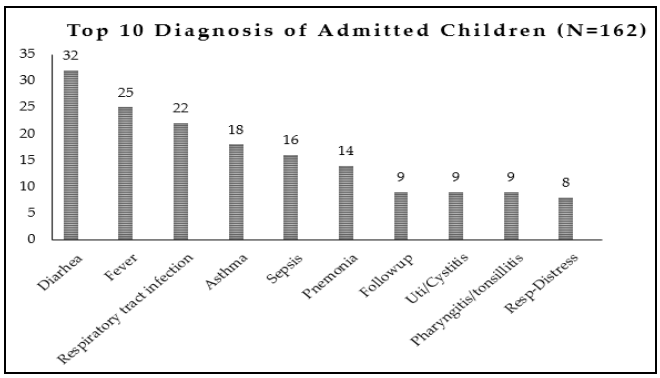

Figure: Top ten Diagnosis of Admitted Children in Two Tertiary Care Hospitals of Rawalpindi During Study Period

Out of 395 patients, 202(51.1%) had no diagnosis; the top 10 diagnoses for admitted children during this study duration of 162(41%) are shown in the Figure. Rest of the admitted patients, 31(7.9%) were for observation, for investigation, seizures, AVH and pain abdomen.

Out of 240(60.8%) single antibiotics, the most common antibiotic used among the hospitalized patients, included 127(32.2%) 3rd Generation Cephalosporins, followed by 39(9.9%) Quinolone, 18(4.6%) Penicillin, 19(4.8%) Macrolide, 15(3.8%) Beta-Lactamase, 8(2.0%) Penicillin, 6(1.5%) Sulzone and Glycopeptide and 2(0.5%). Out of 84(21.3), Combinations of Double Ab, the frequent antibiotic used, 24(6.1%) Amino+ Penicilin followed by 21(5.3%) Amino+Cephalo, 13 (3.3%) Cephalo+Macro 10(2.5%) Glycopeptide+Beta, 9(2.3%) Macro+Beta and 7(1.8%) Cephalo+Penicilin.

Table: Frequency Distribution of the Antibiotic and Diagnosis (n=240)

Antibiotic Name	n(%)	Diagnosis
Single Antibiotic		
3rd Gen Cephalosporin	127(32.2%)	ACGE/Fever
Penicilin	18(4.6%)	Sorethroat/Fever
Aminoglycoside	8(2.0%)	UTI
Quinolone	39(9.9%)	ACGE/Pain Abdomen
Beta Lactamase	15(3.8%)	Fever
2nd Gen Cephalosporin	2(0.5%)	Nil
Macrolide	19(4.8%)	ARI/Asthma
Sulzone	6(1.5%)	Tonsilitis
Glycopeptide	6(1.5%)	Nil
Total	240(60.8%)	-
Combination of Double Ab (N=84) Max Given till 12 Months		
Amino+Penicilin	24(6.1%)	Sepsis/resp distress
Amino+Cephalo	21(5.3%)	Urosepsis
Cephalo+Macro	13(3.3%)	Phyringitis
Glycopeptide+Beta	10(2.5%)	Sepsis/Fever
Macro+Beta	9(2.3%)	Pneumonia/Asthma
Cephalo+Penicilin	7(1.8%)	Sorethroat
	84(21.3%)	
Combination Of Triple Antibiotic		
Sulzone+Oxyzoladinone+Beta Lactamase	18(4.6%)	Sepsis
Cephalosporin+Aminoglycoside+Macrolide	9(2.3%)	Resp Distress
Penicillin+Aminoglycoside+Beta Lactamase	4(1.0%)	Fever
Polymyxin+Quinolone+Glycopeptide	2(0.5%)	Nil
	33(8.4%)	
Combination Of Four Antibiotic		
Quinolone+Oxyzolodinone+Beta Lactamase+Polymyxin	4(1.0%)	Sepsis/Infection

Out of 33(8.4) combinations of triple AB, the majority antibiotic used 18(4.6%) Sulzone+Oxyzoladinone +Beta Lactamase followed by 9(2.3%) Cephalosporin +Aminoglycoside+Macrolide, 4(1.0%) Penicillin+ Aminoglycoside+Beta Lactamase & 2(0.5%) Polymyxin +Quinolone+Glycopeptide. About 4(1.0%) patients were given combination of four AB Polymyxin+ Quinolone+Glycopeptide. The frequency of antibiotics and diagnosis are shown in the Table.

DISCUSSION

Judicial use of antibiotics is essential in lowering the incidence of AMR.[11] Regular monitoring and disseminating consumption data to prescribers and decision-makers is a first step in raising awareness of the necessity of prudent antibiotic usage.[12] According to the results of the current study, an undesirable trend that contributes to antimicrobial resistance is the high rate of antibiotic prescriptions in children.[13] This study shows the most frequent admission due to gastroenteritis and respiratory tract infection, which are still the most frequent cause of mortality in developing countries like Yemen, Mongolia, Uzbekistan, Philippines, Pakistan and India.[14]

The youngest children received the most antibiotic prescriptions, progressively decreasing as they aged. This finding was consistent with another study done in Burkino Fuso.[15] According to estimates from the past, antibiotic prescription in children under the age of two varies greatly geographically, with South Asia having the highest use,[10] courses per child year) and Brazil and South Africa having the lowest use (one course per child year).[16] Previous study has shown that While metronidazole was the most frequently prescribed class for treating diarrhoea in Bhaktapur, Haydom, and Naushahro Feroze, diarrhoea bouts were most frequently treated with macrolides in Dhaka and Loreto. Penicillin and sulfonamides were mainly used to treat the episodes in Fortaleza and Venda. Most locations only seldom utilised fluoroquinolones to treat diarrhoea; Dhaka and Vellore in South Asia were the sites where they were used most often.[16] This study has shown that the most commonly used antibiotic for gastroenteritis is 3rd generation cephalosporin. Ali s *et al*. demonstrated that Despite having negative findings from blood and stool cultures, Ceftriaxone was erroneously administered as first-line treatment during admission and again at discharge in a tertiary care hospital in Karachi.[17]

Ceftriaxone was shown to be the first-line antibiotic most commonly administered between admission and discharge in our study. Hospitals are favourable environments for the evolution of resistant pathogens because of incorrect and extended antibiotic usage. Antimicrobial resistance to Ceftriaxone has been on the rise recently. Significant findings included 100% resistance of Klebsiella bacteria to Ceftriaxone and a rise in E. coli, Acinetobacter, Pseudomonas, and Staphylococcus aureus resistance to Ceftriaxone,[18] shown in the study done in paediatric intensive care unit of two tertiary care hospitals of Islamabad.

Antibiotics are advised by international recommendations for treating children's diseases for acute lower respiratory tract infections and diarrhoea with bloody stools, but not for upper respiratory infections and non-bloody diarrhoea.[18] The average quantity of antibiotics administered per prescription in Pakistan is above 70%, according to a WHO assessment of Asian nations to examine prescribing trends.[19] A prevalent issue the world is currently dealing with is antibiotic resistance, which poses a constant danger to the efficient prevention and treatment of illnesses. Self-medication and the overuse of antibiotics are the primary contributory causes to the severity of the problem, which has worsened, particularly in developing nations.

ACKNOWLEDGEMENT

We sincerely thank all our family members, friends, teachers and colleagues for their unflinching support.

CONCLUSION

Our study observed that antibiotic prescribing is prevalent in our research of children in two tertiary care hospitals in Rawalpindi, Pakistan. In order to comprehend the possibility of antibiotic resistance formation and create a sensible antibiotic use programme, it will be crucial to continue monitoring antibiotic usage in this scenario and others like it.

Conflict of Interest: None.

Authors Contribution

Following authors have made substantial contributions to the manuscript as under:

SI & NA: Data acquisition, data analysis, data interpretation, approval of the final version to be published.

FI & SHF: Study design, drafting the manuscript, critical review, approval of the final version to be published.

AK & WA: Concept, critical review, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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