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A study on antibiotics used in pediatrics intensive care unit (Picu) at a tertiary care teaching hospital

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Abstract

Background: Antibiotics are chemical substances produced by various species of microorganisms and other living systems that are capable of inhibiting the growth of or killing bacteria and other microorganism. Among the very few remarkable events in the history of microbial diseases, antibiotic discovery is the one. With the advancement of scientific research, one is almost free from deadly infectious diseases and the surgery of medical science is no longer a desperate gamble with human life. This is primarily due to the antibiotic discovery. As a result of it people can live safely and healthily for a longer period. The meaning of the word antibiotic in Greek is “against life”.

Objectives: The objectives of this work is to study the use of antibiotics in paediatrics intensive care unit at a tertiary care hospital and to study the commonly used antibiotics in paediatrics intensive care unit based on age group also to observe the duration of antibiotics prescribed.

Materials and methods: It was a prospective observational study done over a period of six months (May 2017 to November 2017) in Rajah Muthiah medical college hospital, chidambaram, Tamilnadu. This study was approved from Institutional Human Ethics committee. A 100 samples were collected from the hospital to study the use of antibiotics used in patients of both gender and age group below 5 years admitted in PICU of RMMCH. Patients of age group below 5 years and those who are not willing is excluded.

Results: The results were obtained from 100 patients admitted at Pediatrics intensive care unit of RMMCH who were enrolled into the study after fulfilment of the selection criteria described above on obtaining consent from the same. Among the 100 patients, majority were male (64%) as compared to female patients (36%). Overall, 60 patients belongs to age group 0 to 1 year (12months) accounting for 60% of total. A total of 14 patients belongs to 1 to 2 years accounting for 14% of total. A total of 12 patients belongs to 2 to 3 years accounting for 12% of total. A total of 4 patients belongs to 3 to 4 years accounting for 4% of total. A total of 10 patients belongs to 4 to 5 years accounting for 10% of total patients included in this study.

Conclusion: Antibiotics resistance is one of the major threat and it is alarming that no newer antibiotics are available in research and development pipeline in recent years. According to WHO, india is one of the country where antibiotic resistance is predominant. Our study shows that maximum number of patients belongs to 0-1 years accounting for 60% of the total number patients admitted in the study population, 64% patients were male children and 36% were female children. In this study most commonly diagnosed disease condition is Lower respiratory tract infection. Out of 100 patients 60 patients ie, 60% were diagnosed with LRTI.

Keywords: Antibiotics, micro organisms, paediatrics, age wise distribution

Introduction

The recent progress made in the chemistry of natural products has also contributed to the development of the method now in use for the isolation of antibiotics. The period 1885 - 1939 may be considered as one in which the foundation was laid for the development of our knowledge of Antibiotics. The production of chemical agents came to be recognized as responsible for the inhibitory effect. These agents were at first designated as “lethal principles” and “Toxic Substances”. Their designation as “antibiotics” is only of recent origin. The first systematic search for, the study of, antibiotics, made by Gratia and -Dath about 1924, resulted in the discovery of Actinomycetin in strains of actinomycetes, and soil organisms. Actinomycetin was never used for the treatment of patients but was used to lyse cultures of bacteria for the production of vaccines. In 1929, Fleming published his observations on the effect of a fungal contaminant, identified at that time as penicillin rubrum but later as penicillin notatum, upon the growth of bacteria, Fleming designated the antibacterial product of the fungus as penicillin;

The foregoing observations, in the studies of mixed cultures carried out before 1939, amply illustrated the fact that numerous types of microorganisms, especially the bacteria, fungi and actinomycetes possess the capacity to inhibit the growth of other microorganisms. This inhibiting effect was shown to be due to the production of specific chemical substances later designated as antibiotics. A systematic search of antibiotic - producing microorganisms from soil was undertaken. In 1939 Dubos¹ isolated from soil a culture of bacillus brevis which produced two valuable antibacterial substances, now known as gramicidin and tyrocidin, that killed many gram positive bacteria. Soon afterwards Selman Waksman discovered streptomycin, a product of streptomyces griseus. Some 2000 antibiotic substances have been isolated and studied, of which about 50 are useful clinically. Several thousand antibiotic substances have been isolated and identified since 1940. Many of them are of no practical importance as yet, but a few have changed the entire concept of chemotherapy. The popularity of antibiotics is due to their ability to destroy many kinds of pathogens and to their relatively nontoxic properties to the host when given systemically. Few developments in the field of medicine have had as dramatic an effect as have antibiotics in the treatment of microbial infections.

Materials and methods

It was a prospective observational study done over a period of six months (May 2017 to November 2017) in Rajah Muthiah medical college hospital, Annamalai University, Chidambaram, Tamil Nadu which is a 1400 bedded multi-speciality tertiary care university teaching hospital located in rural south India. This study was approved from Institutional Human Ethics committee. A 100 samples were collected from the hospital to study the use of antibiotics used in patients of both gender and age group below 5 years admitted in PICU of RMMCH. Patients of age group below 5 years and those who are not willing is excluded.

Data was collected from the total of 100 patients, who visited the department of pediatrics with during the study period. The subjects taken for study are aged below 5 years of both genders. Patient disease conditions and medications which patient is receiving for the particular disease are recorded and antibiotics given are noted. Prescription pattern of antibiotics are followed and most commonly used and least commonly prescribed medicines are also noted. To obtain patient data relevant to study from patient medical records, treatment chart or case sheet and patient care taker. Collection and tabulation of baseline data is done from the case sheets. Discharge medications and duration also noted with the help of Medical Records Department. The data collected is analyzed and the analyzed data is reported.

Results

Table 1: Age wise distribution of paediatric patients

Age group in years	Number of patients	Percentage
0 – 1	60	60%
1 – 2	14	14%
2 – 3	12	12%
3 – 4	4	4%
4 - 5	10	10%
Total	100	100%

The present study show that maximum number of patients (60) were between age group of 0 – 1 years.

The age distribution of study showing that the maximum number of patients being in 0 – 1 years, accounting for 60% of the total.

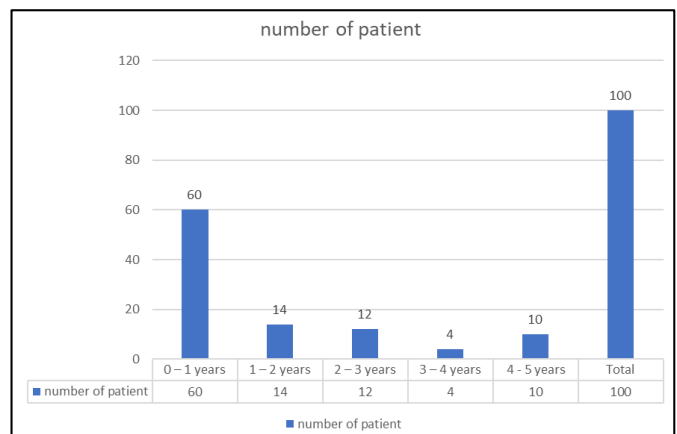


Fig 1: Age Wise Distribution of Paediatrics Patients

Table 2: Gender wise distribution

Gender	No. of patients	Percentage (%)
Male	64	64%
Female	36	36%
Total	100	100%

In the study population, 64% of patients were males children and 36% were females children

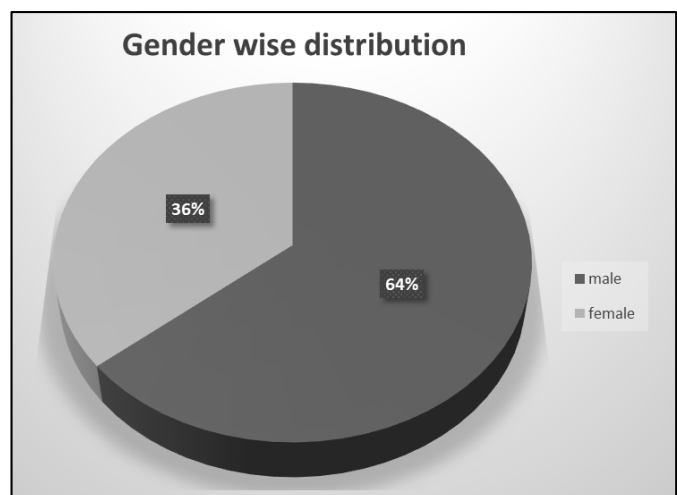


Fig 2: Gender wise distribution of patients

Disease Wise Distribution

In the present study, Most commonly diagnosed is LRTI, Out of 100 patients 60 (60%) had diagnosed with LRTI, 6 (6%) had diagnosed with heart disease, 6 (6%) had diagnosed with seizures, 6 (6%) had diagnosed with fever and 20 (20%) had diagnosed with other disease.

Table 3: Disease Wise Distribution

Types of diseases	No. of patients	Percentage
LRTI	62	62%
Cardio vascular diseases	6	6%
Seizures	6	6%
Fever	6	6%
Other	20	20%
Total	100	100%

The study shows that majority of diagnosed disease is LRTI.

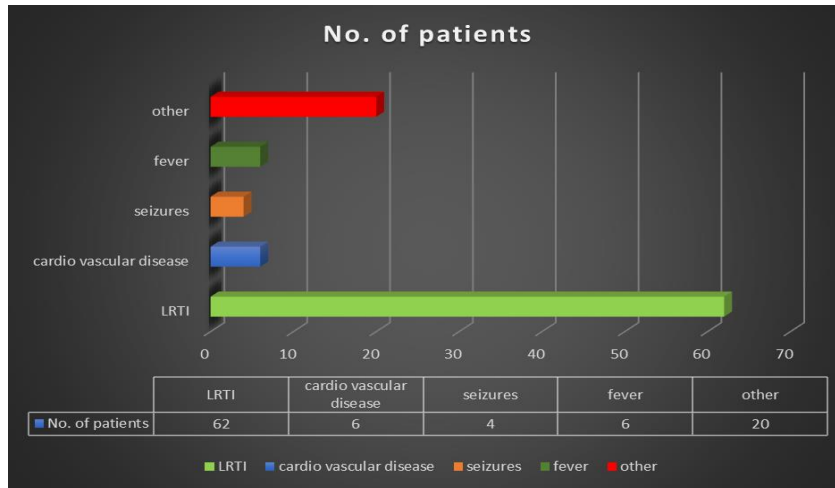


Fig 3: Disease Wise Distribution of Patients

Prescribing Pattern of Antibiotics

In our present study ceftriaxone was the most commonly prescribed antibiotic, followed by amikacin, followed by

amoxicillin + clavunic acid. Vancomycin, cefixime, tobramycin and moxifloxacin are least commonly prescribed.

Table 4: Prescribing Patterns of Antibiotics

Antibiotics	No. of patients	Percentage (%)
amikacin	32	35.94%
ampicillin	10	11.2%
cefotaxime	14	15.6%
ceftriaxone	46	51.68%
amoxicillin+ clavunic acid	32	35.94%
doxycycline	8	8.98%
vancomycin	2	2.24%
cefixime	2	2.24%
azithromycin	20	22.46%
metronidazole	4	4.48%
tobramycin	2	2.24%
gentamicin	4	4.48%
moxifloxacin	2	2.24%

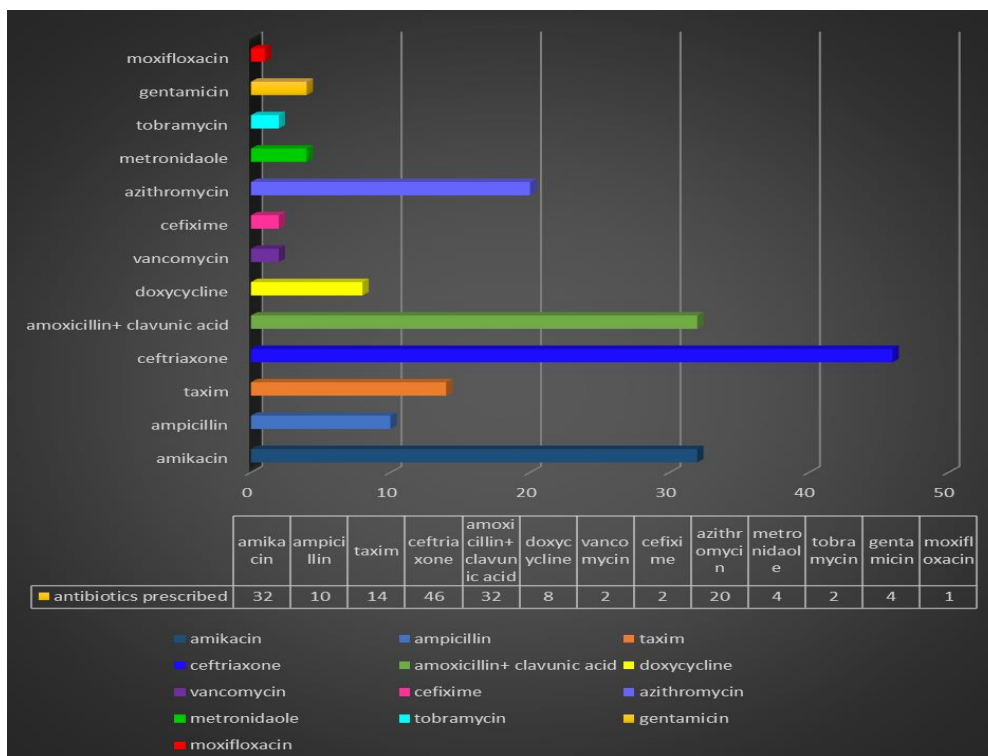


Fig 4: Prescription Pattern of Antibiotics

Route of Administration

In the present study most of the drugs are given parenterally, Out of 175 drugs prescribed 146 83.42% drugs are given parenterally and 29 16.57% drugs are given orally.

Table 5: Route of Administration

Route of administration	Number of drugs
Parenteral	146
Oral	29
Total	175

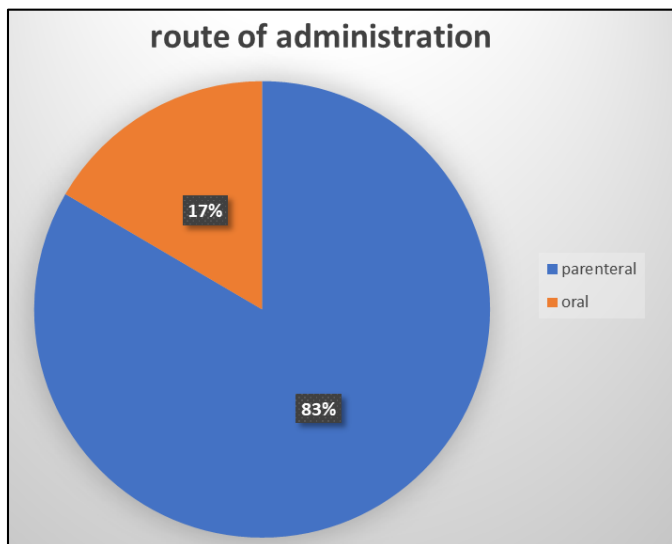


Fig 5: Showing Route of Administration.

Duration of antibiotic prescribed

The present study shows that vancomycin was prescribed for long duration of 9days and cefixime was prescribed for shortest duration of 1 day on an average.

Table 6: Antibiotics prescribed and its average duration of therapy

Antibiotics	No. of days prescribed	Average duration of therapy
amikacin	108	3 days
ampicillin	32	3 days
cefotaxime	66	5 days
ceftriaxone	170	4 days
amoxicillin+ clavulanic acid	6	3 days
doxycycline	34	4 days
vancomycin	18	9 days
cefixime	2	1 day
azithromycin	62	3 days
metronidazole	12	3 days
tobramycin	10	5 days
gentamicin	12	3 days
moxifloxacin	4	4 days

Conclusion

Antibiotic resistance is one of the major threat and it is alarming that no newer antibiotics are available in research and development pipeline in recent years. Newer disease are emerging and we are handicapped with shortage of antibiotics with shortage of antibiotics. According to WHO, India is one of the country where antimicrobial resistance is predominant. The rational use of antibiotics delays the development of drug resistance by microbes. Antibiotics are over used, particularly for minor infections, misused for self-limiting viral infections

and under used due to financial constraints.

In the project an attempt was made to study the use of antibiotics in Pediatric intensive care unit of RMMCH. Hence keeping above consideration, we have carried out a prospective observation study in department of pediatrics, Rajah Muthiah medical College Hospital, Annamalai university, Annamalai nagar, tamil nadu, a 1400 bedded multi-speciality tertiary care teaching hospital for 6 months; between may 2017 to November 2017. Patients admitted in PICU in pediatrics department satisfying the inclusion and exclusion criteria.

A total of 112 patients were enrolled for the study and 9 patients discontinued from the study. For convenience we have selected 100 patients for study.

The age distribution of study showing that the maximum number of patients belongs 0-1 years accounting for 60% of the total number of patients admitted. In the study population, 64% of the patients were male children and 36% were female children.

In the present study, most commonly diagnosed disease is LRTI. Out of 100 patients 60 (60%) were diagnosed with LRTI, 6 (6%) were diagnosed with heart disease, 6 (6%) were diagnosed with seizures, 6 (6%) were diagnosed with fever and 20 (20%) were diagnosed with other diseases. In our present study ceftriaxone was the most commonly prescribed antibiotic (51.68%), followed by Amikacin (35.94%), and [Amikacin+ clavulanic acid] (35.94%), vancomycin, cefixime, tobramycin and moxifloxacin are least commonly prescribed.

Since we have carried out study in pediatric intensive care unit, most of the drugs are given parenterally. Out of 175 drugs prescribed 146 (83.42%) drugs are given parenterally and 29 (16.57%) drugs are given orally. The present study shows that vancomycin was prescribed for long duration of 9 days and cefixime was prescribed for shortest duration of one day on an average. We have observed that in most of the patient empirical treatment have been given for LRTI, they have prescribed. However it would be more appropriate if antibiotics are prescribed based on antibiotic sensitivity pattern.

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