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Assessment of patient compliance with antibiotic treatment for lower respiratory tract infection in children

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Abstract

Background: Pediatrics is the science of child care and includes the preventive, promotive and curative care of children. Most children under the age of 5 die due to respiratory infections. Lower respiratory tract infections include pneumonia, bronchiolitis and bronchitis which are commonly treated by antibiotics. Patient compliance describes the extent to which the patient's behavior coincides with health care advice.

Objectives: The objective of this study was to collect the demographic details of the patients and determine the distribution of antibiotics in Lower Respiratory Tract Infection and to measure the percentage of patient compliance.

Materials and Methods: It was a prospective observational study, conducted in the Department of Pediatrics, Rajah Muthiah Medical College Hospital, Chidambaram for a period of six months (November 2017 to April 2018). The study was approved by Institutional Human Ethics Committee. A sample of 120 was collected who were diagnosed with lower respiratory tract infection. Demographic details of patients, patients prescribed with antibiotics (%), antibiotic distribution, route of administration, Antibiotic therapy regimen (%), Sequential antimicrobial therapy, patient compliance with SMAQ were recorded.

Results: During this study, 120 pediatric patients were enrolled in which majority were males (69%) than females (31%). Out of 120 prescriptions, 82.5% were prescribed with antibiotics and 17.5% were prescribed without antibiotics. Most of the patients were given Ceftriaxone (17.6%) and the least antibiotic given was Ofloxacin (0.6%). Out of 99 prescriptions, Mono therapies were mostly observed (55.5%), followed by Dual therapies (31.3%) have been observed. Only 20 patients were observed with Sequential Antimicrobial Therapy, in which 11 patients were observed with SAT of IV Clavum to oral (55%), 9 with SAT of Cefotaxime (45%). The patient compliance was measured using SMAQ, in which 64% were compliant.

Conclusions: The study shows that 36% of patients were not compliant towards the therapy, in which 40% of the patient discontinued their medication when they felt better. Patient compliance can be improved with a good relationship between the patient and provider. Antibiotics overuse and misuse emphasizes the need for health care professional's contribution towards the rational use of antibiotics and educating the patients and society.

Keywords: Pediatrics, LRTI, patient compliance, antibiotics, SMAQ, SAT, antibiotic resistance

Introduction

Pediatrics

The term Pediatrics is derived from the Greek word *pedopais*; *paidos* meaning "a child" or denoting to a child (*pedo*); *iatrike* meaning surgery or medicine that is treatment; & *ics* the suffix of a subject of science. Pediatrics is the science of child care and includes the preventive, promotive and curative care of children. Earlier, pediatrics dealt with the care of children up to the age of 12yrs;

Lower respiratory tract infections

Lower respiratory tract infection is the infection below the level of the larynx and may be taken to include pneumonia, bronchiolitis and bronchitis. The presentation of these conditions will depend on age, infecting organisms and site of infection. Essentially, it is the inflammation of the airways/pulmonary tissue, due to viral or bacterial infection, below the level of the larynx. Most children under the age of 5 die of one or more of the five common diseases among which is Respiratory infection.

Patient compliance in antibiotic treatment

Patient compliance is a crucial part in successful therapy. Patient compliance describes “the extent to which the patient’s behavior (including medication taking) coincides with medical or health care advice”. This form of non-compliance has been associated with:

- Treatment failure
- Relapses of the disease
- Emergence of bacterial resistance
- Deterioration of patient’s health
- Need for additional consultations
- Use of extra drugs
- Additional hospital admissions
- Increases in direct and indirect costs of management.

Causes of non-compliance during the antibiotic treatment

Antibiotic treatment on an outpatient basis is usually as short-term therapy. During its course, patients tend to make different mistakes than during the treatment of chronic conditions. The most common mistakes made by patients during antibiotic treatment:

- Failure to buy medicines or to file the prescription.
- Failure to start the therapy.
- Delay in starting therapy.
- Unintentional omission of single doses
- Conscious omission of single doses
- Regular change in frequency of doses
- Regular changes in time intervals between doses
- Periodic dose increases
- Prematurely stopping the therapy.

Methodology

Study type

Prospective observational study.

Study place

The study will be conducted in the department of pediatrics, Rajah Muthiah Medical College Hospital, Annamalai University, Annamalai Nagar, Tamil Nadu.

Study period

The study will be carried out for a period of six months (November 2017-April-2018).

Study recruitment procedures

- The recruitment of subjects will be carried out with the help of physician who has the knowledge of patient’s medical history.
- The subjects to be selected are the patients who will be treated as both outpatients and inpatients.
- The study procedure will be completely explained to the patients caretaker and a patient consent form will be collected from them.
- The patients included in the study will be selected based on inclusion and exclusion criteria.

Inclusion criteria

- Patients who were treated as both outpatients and inpatients for the diagnosis of Lower Respiratory Tract Infection.
- Patients of both the gender.
- Patients below 12yrs of age.

Exclusion criteria

- Patients who are not willing to participate.
- Patients other than Lower Respiratory Tract Infection.

Study method

1. Approval from the Hospital authorities and Institutional Human Ethics Committee.
2. The study method involves selection of patients based on the inclusion criteria.
3. Study of patient compliance using Simplified Medication Adherence Scale.
4. Interpretation of results.
5. Conclusion.
6. Report submission.
7. Collected data will be stored in department library for future reference in the form of thesis book.

Observations and results

Table 1: Gender-wise distribution

Gender	No. of Patients	Percentage (%)
Male child	83	69
Female child	37	31
Total	120	100

During this study 120 pediatric patients were enrolled in which majority of patients were males (69%) than females (31%).

Table 2: Age-wise distribution

Age Groups	No: of Patients	Percentage (%)
0-3years	83	69.2
3-6years	21	17.5
6-9years	10	8.3
9-12years	6	5

The age distribution of the study showed majority of patients with Lower Respiratory Tract Infections belonged to 0 – 3years age group, accounting for about 69.2%, whereas the least belonged to 9 – 12years age group, accounting for about 5%.

Table 3: Percentage of inpatients and outpatients

S. No	Patients	No. of Patients	Percentage (%)
1	In patients	103	85
2	Out patients	17	15
3	Total	120	100

Of the total 120 patients, 103 were Inpatients, accounting for about 85% and 17 were Outpatients, accounting for about 15%.

Table 4: Percentage of patients prescribed with antibiotics

S. No	Prescriptions	No. of Patients	Percentage (%)
1	With antibiotics	99	82.5
2	Without antibiotics	21	17.5
3	Total	120	100

Out of 120 prescriptions, 82.5% were prescribed with antibiotics and 17.5% were prescribed without antibiotics.

Table 5: Antibiotic distribution

S. No	Antibiotics given	No. of prescriptions	Percentage (%)
1	Ceftriaxone	32	17.6
2	Amikacin	30	16.5
3	Amoxicillin + Clavulanic Acid	28	15.3
4	Cefotaxime	21	11.5
5	Azithromycin	19	10.5
6	Ampicillin	19	10.5
7	Cefixime	16	8.8
8	Cefpodoxime	6	3.3
9	Ampicillin + Cloxacillin	4	2.2
10	Amoxicillin	3	1.6
11	Gentamycin	3	1.6
12	Ofloxacin	1	0.6

Out of 99 patients who were prescribed with antibiotics in our study, most of the patients were prescribed with Ceftriaxone (17.6%), Amikacin (16.5%) and Amoxicillin+Clavulanic acid

(15.3%). The least prescribed antibiotic was Ofloxacin (0.6%).

Table 6: Route of administration of antibiotics in inpatients (I.V. Antibiotics)

S. No	I.V. Antibiotics	No of Patients	Percentage (%)
1	Ceftriaxone	32	25
2	Amikacin	31	24.2
3	Cefotaxime	22	17.3
4	Amoxicillin+Clavulanic Acid	19	15
5	Ampicillin	17	13.2
6	Gentamycin	3	2.3
7	Ampicillin+Cloxacillin	3	2.3
8	Azithromycin	1	0.7

Out of the total 120 patients in our study, 103 were Inpatients, accounting for about 85.8% and 17 were Outpatients accounting for about 14.2%. Of these 103 Inpatients, only 76 were prescribed with I.V. antibiotics, accounting for about 73%. Mostly administered antibiotics through Intravenous

route were Ceftriaxone, accounting for about 25% and Amikacin, accounting for about 24.2%. Azithromycin was the least administered antibiotic through Intravenous route accounting for 0.70% respectively.

Table 7: Route of administration of antibiotics in inpatients (Oral antibiotics)

S. No	Oral Antibiotics	No. of Patients	Percentage (%)
1	Syp.Amoxicillin + Clavulanic Acid	16	22.9
2	Tab.Amoxicillin + Clavulanic Acid	13	18.5
3	Syp.Azithromycin	11	15.7
4	Syp.Cefixime	16	22.9
5	Susp.Cefpodoxime	6	8.6
6	Tab.Azithral	4	5.7
7	Amoxicillin Drops	2	2.9
8	Tab.Ampiclox	1	1.4
9	Cap.Amoxicillin	1	1.4

Of 103 inpatients, only 23 were prescribed with oral antibiotics accounting for about 26.3%. Mostly administered antibiotic through oral were Syp.Amoxicillin + Clavulanic acid and Syp.Cefixime accounting for about 22.9%

respectively. Least administered antibiotic through oral were Cap.Amoxicillin and Tab.Ampicillin + Cloxacillin accounting for 1.40% respectively.

Table 8: Route of administration of antibiotics in outpatients (Oral antibiotics)

S. No	Oral Antibiotics	No. of Patients	Percentage
1	Syp.Amoxicillin+Clavulanic Acid	2	40%
2	Syp.Azithromycin	1	20%
3	Tab.Amoxicillin+Clavulanic Acid	1	20%
4	Cap.Amoxicillin	1	20%

Out of 17 Outpatients, 5 were prescribed with antibiotics accounting for about 29.4% and remaining 70.6% were prescribed without antibiotics. Of 5 patients, 2 were prescribed with Syp.Amoxicillin+Clavulanic acid, accounting

for about 40% and remaining 20% were prescribed with Syp.Azithromycin, Tab.Amoxicillin+Clavulanic acid and Cap.Amoxicillin respectively.

Table 9: Mono therapy of antibiotics

S. No	Antibiotics	No. of Prescriptions	Percentage (%)
1	Amoxicillin + Clavulanic Acid	20	36.3
2	Cefotaxime	12	22
3	Ampicillin	10	18.2
4	Ceftriaxone	7	12.7
5	Azithromycin	3	5.4
6	Amoxicillin	1	1.8
7	Amikacin	1	1.8
8	Ampicillin + ClOxacillin	1	1.8

In Mono therapy, Amoxicillin+Clavulanic acid was the most frequently used antibiotic, accounting for about 36.3%. The least used antibiotics were Amoxicillin, Amikacin and

Ampicillin+Cloxacillin, accounting for about 1.8% respectively.

Table 10: Dual Therapy

S. No	Antibiotics	No. of Patients	Percentage (%)
1	CEFTRIAZONE+AMIKACIN	12	37
2	CEFOTAXIME+AMIKACIN	8	25
3	CLAVUM+CEFTRIAZONE	1	3.7
4	CLAVUM+AZITHROMYCIN	4	12.1
5	AMPICILLIN+GENTAMYCIN	1	3.7
6	AMPICILLIN+AMOXYCILLIN	1	3.7
7	CEFTRIAZONE+AZITHROMYCIN	1	3.7
8	CEFTRIAZONE+CEFPODOXIME	1	3.7
9	CEFOTAXIME+AZITHROMYCIN	1	3.7
10	CLAVUM+AMIKACIN	1	3.7

In Dual therapy, Ceftriaxone and Amikacin were most frequently prescribed, accounting for about 37%. The least prescribed were Clavum+Amikacin, Cefotaxime+Azithromycin,

Ceftriaxone+Azithromycin, Ampicillin+Amoxicillin, Ampicillin+Gentamycin, Clavum+Ceftriaxone accounting for about 3.70% respectively.

Table 11: Triple therapy

S. No	Antibiotics	No. of Patients	Percentage%
1	Ampicillin + Ceftriaxone+ Amikacin	3	30
2	Ampicillin + Azithromycin + Gentamycin	2	20
3	Ceftriaxone+Amikacin+Cefpodoxime	1	10
4	Ceftriaxone + Amikacin+ Azithromycin	2	20
5	Cefotaxime + Amikacin + Azithromycin	1	10
6	Clavum + Ceftriaxone + Amikacin	1	10

In Triple therapy, Ampicillin+Ceftriaxone+Amikacin were the most frequently prescribed, accounting for about 30%.

Table 12: Quadruple therapy

S. No	Antibiotics	No. of Patients	Percentage (%)
1	Ampicillin + Xone + Amikacin + Azithromycin	2	66.6%
2	Cefotaxime + Amikacin + Xone + Azithromycin	1	33.4%

In Quadruple therapy, Ampicillin+Ceftriaxone+Amikacin+Azithromycin were the commonly used therapy.

Table 13: Antibiotic therapy regimen

S. No	Type of Therapy	No. of Prescriptions	Percentage (%)
1	Mono therapy	55	55.5
2	Dual therapy	31	31.3
3	Triple therapy	10	10.2
4	Quadruple therapy	3	3

Out of 99 prescriptions, Mono therapies were mostly observed (55.5%), followed by Dual therapies (31.3%).

Table 14: Sequential antimicrobial therapy

S. No	Iv To Oral Antibiotics Given	No: Of Prescriptions	Percentage (%)
1	Inj. Clavum To Oral Clavum	11	55
2	Inj. Cefotaxime To Oral Cefi Xime	9	45

Only 20 patients were observed with Sequential Antimicrobial Therapy, in which 11 patients were observed

with SAT of IV Clavum to oral (55%), 9 with SAT of Cefotaxime (45%).

Table 15: Sequential antimicrobial therapy

Iv To Oral Antibiotics	No. of Prescriptions	No. of Days Given As Iv	Mean	No:of Days Given As Oral	Mean
Inj. Clavum To Oral Clavum	2	3	3.27	5	3.54
	2	1		3	
	2	4		3	
	1	4		5	
	1	3		4	
	1	6		2	
	1	2		3	
	1	5		3	
Inj. Cefotaxime To Oral Cefixime	1	4	2.8	5	4
	1	1		4	
	1	4		3	
	1	4		4	
	2	2		4	
	3	3		4	

The above table-15 shows that the mean of number of days for the SAT of Clavum administered through intravenous was observed as 3.27 days and by orally was 3.54days. The mean

number of days for the SAT of Cefotaxime administered through intravenous was observed as 2.8 days and by orally was 4 days.

Table 16: Measuring patient compliance with smaq

S. No	Smaq Questionnaire	No. of Patients	%	No. of Patients	%
		YES		NO	
1	Do you ever forget to take your medicine?	11	20	42	80
2	Are you careless at times about taking your medicine?	37	70	16	30
3	When you feel better, do you sometimes stop taking your medicine?	21	40	32	60
4	If sometimes you forget to take medicines at correct interval?	8	15	45	85

The above table-16 shows that the patient compliance was measured using SMAQ, in which 64% were compliant.

Discussion

An attempt was made to assess the patient compliance with antibiotic treatment for Lower Respiratory Tract Infections in children in Pediatric wards. A total of 120 patients were enrolled in the study of which patients between 4 weeks to 12 years of age were taken into the study. Patients were enrolled in the study irrespective of their gender and majority of patients were male (69%). 0-3 years age group were more affected by Lower respiratory tract infections, accounting for about 69.2%. Both inpatients (85%) and out patients (15%) were enrolled in the study. Only 99 patients were prescribed with antibiotics (82.5%). Mostly prescribed antibiotics were Ceftriaxone (17.5%) which belongs to β-lactamase antibiotics. Route of administration of antibiotics in both in patients and out patients were enrolled in this study. In inpatients, 76 were administered with I.V. antibiotics (73.4%) and 23 with oral antibiotics (26.3%). Mostly administered antibiotics through intravenous route was Ceftriaxone (25%) and mostly prescribed oral antibiotics were Amoxicillin+Clavulanic acid (22.9%) and Cefixime (22.9%). Route of administration of antibiotics were also observed in outpatients in which only 5 patients were prescribed with oral antibiotics and the most frequently used oral antibiotics was Amoxicillin+Clavulanic acid (40%). Different types of antibiotic regimen used for the treatment of Lower respiratory tract infections were studied out of which Mono therapy (55.5%) was frequently used. Sequential Antimicrobial Therapy of Amoxicillin+Clavulanic acid and Cefotaxime were also observed in 20 patients which accounted for 55% and 45% respectively. The mean of

number of days for the SAT of Amoxicillin+Clavulanic acid was observed as 3.27 and by orally was 3.54. The mean of number of days for the SAT of Cefotaxime administered through intravenous was observed as 2.8 and by orally was 4. Patient compliance in Lower respiratory tract infections with antibiotic treatment were also measured using SMAQ for inpatients with antibiotic therapy (n=53), which shows that 36% of the patients are not compliant to the therapy, in which 40% of the patient discontinue their medication when they feel better.

Conclusion

- The study shows that 36% of patients were not compliant towards the therapy, in which 40% of the patient discontinued their medication when they felt better and lead to major misuse of antibiotics.
- Patient compliance can be improved with a good relationship between the patient and provider.
- Usually antimicrobial resistance occurs naturally over time through genetic changes. This process is accelerated by the misuse and overuse of antimicrobials. Antibiotics are overused and misused in many places.
- This emphasizes the need for health care professional’s contribution towards the rational use of antibiotics and educating the patients and society.

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