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A PROSPECTIVE STUDY ON EVALUATION OF DRUG TREATMENT IN BRONCHOPNEUMONIA IN PAEDIATRICS IN GOVERNMENT MEDICAL COLLEGE HOSPITAL, TIRUPPUR

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ABSTRACT

Aim and Objectives: To carry out a prospective study on evaluation of drug treatment in bronchopneumonia in pediatrics in Government medical college hospital, Tiruppur to evaluate the Different drugs usage in bronchopneumonia and Drug utilization Pattern and its effectiveness in different age group of Paediatric Patients. **Methods:** A Prospective observational study was conducted within the sample of 50 patients who were selected from the pediatric department who were less than 12 years of age and the study was conducted over the period of 6 months. **Results and Discussion:** A Statistical analyses revealed that the patient who were not cured with commonly prescribed Antibiotics like ampicillin, gentamicin, cefotaxime, ceftriaxone and azithromycin as a initial and secondary treatments were treated with Piptaz [piperacillin/tazobactum] for possible therapeutic outcomes. **Conclusion:** Our study that the patients who doesnot show any improvement with initial and secondary treatment was treated with piperacillin+tazobactum [Piptaz] antibiotics whicg shows athe most appreciable outcomes.

KEYWORDS: Prospective study, Bronchopneumonia, Effectiveness, Antibiotics, Piptaz.

INTRODUCTION TO PNEUMONIA

Pneumonia is the inflammation of lung parenchyma due to pathogenic micro-organisms such as bacteria, viruses and fungi. Clinically, it is also defined as a condition typically associated

with fever, respiratory symptoms, and evidence of parenchymal involvement, either by physical examination or the presence of infiltrates on chest Radiograph. It is the single greatest cause of death in children worldwide, with an estimated 1.3 million deaths in 2011 and more than 90% occurring in developing countries.[1,2,3] It is responsible for 4% of deaths in newborns and 14% -of deaths in Pediatric patients.[4] The incidence of CAP is lower in developed countries: in the US it is about 35–40/1000/person-years in children < 5 years old, 20/1000 person-years in children 5–10 years old, and 10/1000 person-years in children > 10 years old. Despite this, approximately 50% of children with CAP < 5 years old, 20% between 5–10 years old, and 10% of children > 10 years old need to be hospitalized.[5]

INTRODUCTION TO BRONCHOPNEUMONIA

DEFINITION

It is acute inflammation of the bronchioles which is characterized by multiple foci of isolated consolidations that affects one or more pulmonary sites.[6] In bronchopneumonia, infection involves whole lung elements in the affected zone, including the bronchi, blood vessels, lymphatic's and lung parenchyma. Bacterial infections (Streptococci, Staphylococci or H. Influenza) of the lung often appear to be a primary event.[6,7] Its main determinants are age, gender, mode of birth, immunization, personal habits of mother, overcrowding, ventilation on ventilator, intubation, malnutrition, environmental factors, hospitalization, chronic lung diseases, passive smoking, genetic disorders like sickle cell anaemia, feeding, health education of parents and socio-economic status. According to other study reports, pre-maturity is one of the leading causes of broncho-pneumonia.[8] Incidence of pneumonia is strongly and consistently associated with young age. Children between 2 – 6 months of age are reported to be highly affected.[9,10]

CLASSIFICATION

There are several classification in pneumonias. They are;

1. On the basis of the anatomic region of the lung parenchyma involved, pneumonia are traditionally classified into 3 main types:

- Lobar pneumonia
- Bronchopneumonia (or Lobular pneumonia)
- Interstitial pneumonia

2. Based on the clinical settings in which infection, occurred pneumonia are classified under as under:

- Community acquired pneumonia
- Healthcare acquired pneumonia (including hospital acquired pneumonia)
- Ventilatorr – associated pneumonia

3. Based on etiology and pathogenesis, pneumonias are classsifed as under:

- Bacterial pneumonia
- Viral pneumonia
- Pneumonia from other etiologies.[11]

Table 1: Etiologic Agents Grouped By Age of The Patients.

Age Group	Frequent Pathogens (in Order of Frequency)
Neonates (<3weeks)	Group B streptococcus, E.Coli other gram negative bacilli, streptococcus pneumonia, haemophilus influenza.
3 weeks to 3 months	Respiratory syncytial virus, Rhino viruses, Para influenza viruses, S. Pneumonia, H influenza.
4 months to 4 years	Respiratory syncytial virus, Rhino viruses, Para influenza viruses, S. Pneumonia, H.Influenza, Mycoplasmpneumoniae, Group A streptococcus.
>5 years	S. Pneumonia, H.Influenza, Mycoplasmpneumoniae, legionella pneumophila.

Clinical manifestation of bronchopneumonia

Pneumonia is frequently presided by several days of symptoms of an upper respiratory tract infections typically rhinitis and cough**.** In viral pneumonia fever is usually present but temperatures are generally lower than the bacterial pneumonia. Tachypnoea is the most consistent clinical manifestation of pneumonia. Increased work of breathing accompanied by intercoastal, subcoastal and suprasternal retractions, nasal flaring and uses of accessory muscles is common. Severe infections may be accompanied by cyanosis and lethargy especially in infants.[21]

Bacterial pneumonia in adults and older children typically begin suddenly with high fever, cough and chest pain. Other symptoms that may be seen include drowsiness with intermittent periods of restlessness, rapid respirations, anxiety and occasionally delirium.

Early in the course of illness diminished breath sound, scattered crackles and rhonchi are commonly heard over the affected lung field. Abdominal pain is common in lower lobe pneumonia. The liver may seen enlarged because of downward displacement of diaphragm, secondary to hyper inflation of the lungs are super imposed congestive heart failure.[21]

On the basis of clinical features pneumonia can be classified as mild to very severe disease.

1. No Pneumonia – No fast breathing and no indicators of severe or very severe pneumonia
2. Pneumonia – Fast breathing E.g

2.1) Age below 2 months > 60 RR/Min

2.2) 2 – 12 months >50 RR/Min

2.3) 12 – 60 months >40 RR/Min

3. Severe pneumonia – Lower chest indrawing or nasal flaring and no signs of very severe pneumonia

4. Very severe pneumonia – Central cyanosis or not able to breastfeed or drink or convulsions or lethargy or unconsciousness.[22]

DIAGNOSIS OF BRONCHOPNEUMONIA

1. Laboratory tests are performed to identify the causal agent. Unfortunately there are no gold standards. Thus, the utility of most of these laboratory tests are imputed from consensus and expert opinion. The inclusions of these tests in the various settings are based on their availability and feasibility rather than on evidence that they will effect a change in management or follow-up. Complete white blood cell (WBC) and differential counts should be considered in patients with suspected pneumonia (level III evidence) in cases of bacterial pneumonia, the WBC count is usually increased, with a predominance of polymorph nuclear cells.[12,13] Leukocytosis can occur with infections due to adenovirus and influenza virus or with Mycoplasma infections. Leucopoenia can also be seen in viral infections; however, its presence in bacterial infections suggests severe or overwhelming infection.[14] Blood cultures should be performed in patients with suspected bacterial pneumonia or in those admitted to hospital because they may provide definitive proof of the cause. Results will be positive in 10% to 30% of patients with pneumonia.[15,16] Blood cultures do appear to have a low sensitivity, but they are still worth while in order to identify the causative pathogen. In bacterial endocarditis, the organism can be identified after the first 2 cultures.[17] With sepsis other than endocarditis, the sensitivity of 1, 2 and 3 cultures is 80%, 89% and 99%

respectively.[18] Thus, 2 blood cultures should be performed in patients in hospital with pneumonia. Each blood sample should be drawn using aseptic technique from a separate site suitably prepared with a skin disinfectant.[19] If a pathogen is isolated, susceptibility testing should be performed and the results used to adjust antimicrobial therapy accordingly. Bacterial cultures of samples from the nasopharynx and throat have no predictive value.[20] However, Gram staining and culture of sputum from older children and adolescents may be useful (level III evidence).Enzyme linked immune Absorbent assay (ELISA) or direct immunofluorescence can be considered in severe cases involving patients at risk of complications or for infection-control surveillance (level III evidence).Detection of Mycoplasma IgM by ELISA is a sensitive technique and should be considered for children aged 5 or more.[13]

2. Chest X-ray; Bronchopneumonia will usually show up as multiple patchy areas of infection, usually in both lungs and mostly at the lung bases.

3. Pulse oximetry is a simple, noninvasive test that measures the percentage of oxygen in the blood stream. The lower the number, the lower your oxygen level.

4. **CT scan**; provides detailed look over the lung tissues

5. Bronchoscopy; The lighted instrument can take a closer look at the breathing tubes and take samples of lung tissue, while checking for infection and other lung conditions.

Table 2: Treatment.

S.No	Diseased Condition	Drug Therapy	Dose
1	Mildly ill children (Does not require hospitalisation)	Amoxicillin	50 mg/kg TID for 3 days
2	Emergence of penicillin resistant pneumococci	High doses of Amoxicillin	80-90mg/kg/24 hr
3	Therapeutic alternative	Cefuroxime auxetil and Amoxicillin /Clavulanate	50 mg/kg/dose BD for 3days
4	School age children Causative agent : M.Pneumoniae or C.pneumoniae	Macrolides antibiotics (Azithromycin)	10-12mg/kg/day
5	Adolescents	Fluoroquinolones (Levofloxacin, Moxifloxacin)	8-10 mg /kg/day PO not to exceed 750 mg per day
6	Children who are fully immunized and not severely ill	Ampicillin or Penicillin G	50 mg/kg/dose BD for 3days
7	Children who are not fully immunized	Cefotaxime or ceftriaxone	50 mg/kg/dose BD for 3 days
8	Infection caused by staphylococcal pneumonia	Vancomycin or Clindamycin	10 mg /Kg/dose Q 6hrs 20mg/kg/day Q 6-8 hrs

The optimal duration of antibiotic treatment for pneumonia has not been well established in controlled studies. However, antibiotics should generally be continued until the patients has been afebrile for 72 hr, and the total duration should not be less than 10 days (or 5 days if Azithromycin is used). Shorter courses (5-7 days) may be effective, particularly for children managed on an outpatient basis, but further study is needed. In developing countries, oral zinc (10mg/day for <12 months old child, 20 mg for ≥12 months old child) reduces mortality among children with clinically defined severe pneumonia.[21]

NON PHARMACOLOGICAL TREATMENT

1. Nasal block to be treated with saline nasal drops as and when required, especially before feeds.
2. Ginger, honey, tulsiwith warm water beverages can be used as home remedies for cough.
3. Patients with respiratory distress to be nursed in semi-reclined posture at angle of about 30°.
4. Young infants should be nursed in comfortable position preferably in mother's lap.
5. Breastfeeding and small frequent feeds to be continued in children who do not have severe or very severe Pneumonia.[22]

MATERIALS AND METHODS

STUDY SITE

- The study site is to be conducted in pediatrics department of government medical college hospital, Tiruppur.

STUDY DESIGN

- This is a prospective observational study and is to be carried out in pediatrics department of Government Medical College Hospital, Tiruppur.

STUDY PERIOD

- The study is conducted over a period of 3 months from December 2019 – March 2020.

STUDY POPULATION

- The study population include the Patients of Government medical hospital, Tiruppur. A total of about 50 number of admitted cases were selected from Pediatric department.

STUDY PROCEDURE

- Prospective study is conducted on patient case sheet from Pediatric department of Government medical college hospital, Tiruppur.
- The relevant data's such as age, blood count, chest x ray, treatment etc were collected and entered in the performa.
- Then data's are analysed on the basis of drug utilization pattern and prevalence of disease to the community.

STUDY CRITERIA

INCLUSION CRITERIA

- Cases are referred from department of child health.
- Children less than age 12.
- Patients co morbidities and disease conditions.
- Patients immunized withpentavalent vaccine for Haemophilus influenzae type b

EXCLUSION CRITERIA

- Patients who are unwilling to undergo the study
- All adult patients
- Patients admitted in ICU, Emergency.

STATISTICAL ANALYSIS

- The Analysis of the data was done in a simple manner using Percentage calculations and Graphical representation of data in Ms Excel sheet.

RESULTS

1. AGE WISE CLASSIFICATION
2. GENDER WISE CLASSIFICATION
3. COMMON SYMPTOMS ASSOCIATED WITH DISEASE
4. LIST OF DRUGS USED IN INITIAL TREATMENT
5. LIST OF MEDICATIONS USED IN THE SECONDARY TREATMENT
6. DRUGS REPLACED WITH PIPERACILLIN/TAZOBACTUM

Table 3: Age Wise Classification.

AGE GROUP	NO.OF PATIENTS	PERCENTAGE %
≤12 months	8	16%
1- 6years	21	42%
7-12 years	21	42%

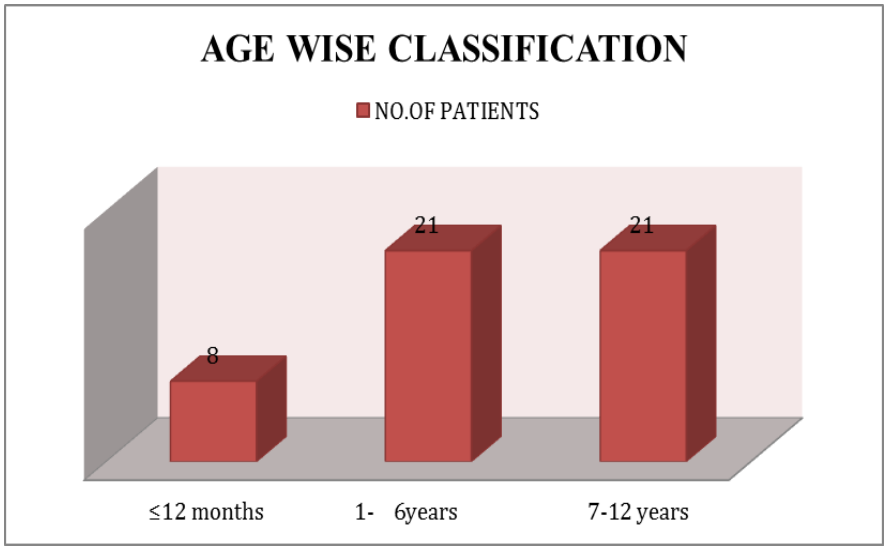

Fig no. 1: Shows the age wise classification of childrens with bronchopneumonia in the department of Pediatric ward.

Table 4: Gender Wise Classification.

AGE GROUP	NO. OF MALE PATIENTS	NO. OF FEMALE PATIENTS
≤12 months	3	5
1 – 6 years	10	11
7 – 12years	12	9

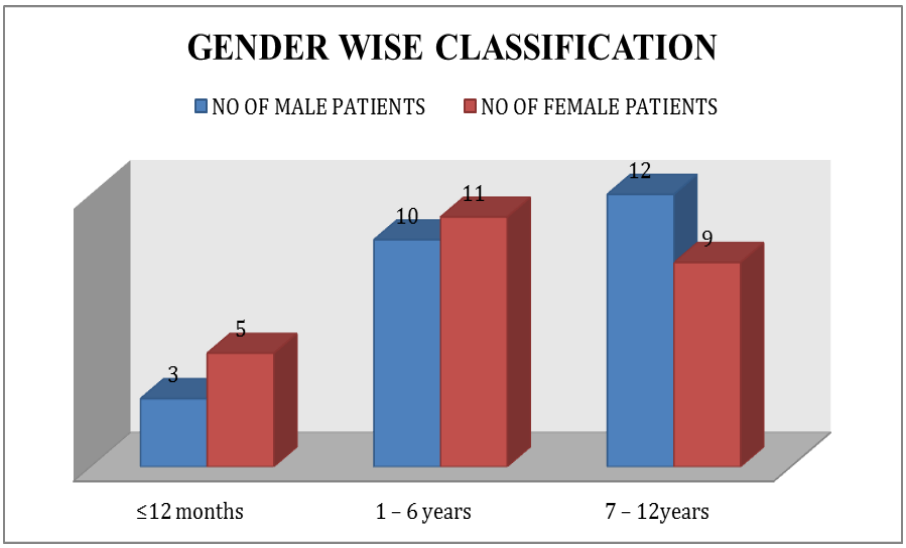

Fig no. 2: Shows the gender wise classification in the pediatric population.

Table 5: Common Symptoms Associated With Disease.

SYMPTOMS	NO OF PATIENTS (N=50)
BREATHING DIFFICULTY	45/50
FEVER +/-CHILLS	40/50
COUGH WITH MUCUS	30/50
CHEST PAIN / ABDOMINAL PAIN	10/50

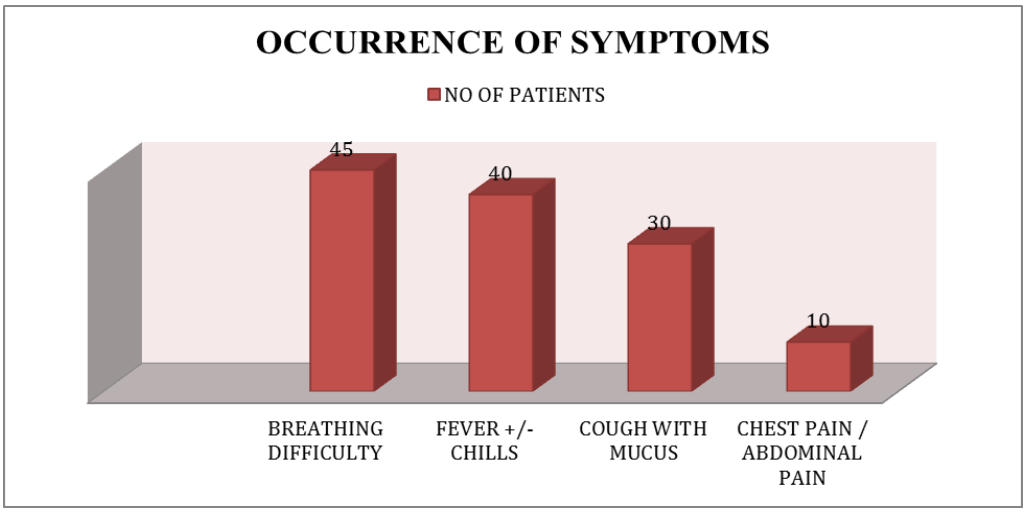

Fig no. 3: Shows the most common symptoms that occurs for the patients.

Table 6: List of Drugs Used In Initial Treatment.

AGE GROUP	ANTIBIOTICS PRESCRIBED	NO OF PATIENTS	NO OF PATIENTS CURED	PATIENT SHOWS RESISTANT
≤ 12 Months	AMPICILLIN AND GENTAMYCIN	8	4	4
1-6 Years	AMPICILLIN AND GENTAMYCIN	21	15	6
7-12 Years	AMPICILLIN AND GENTAMYCIN	21	8	13

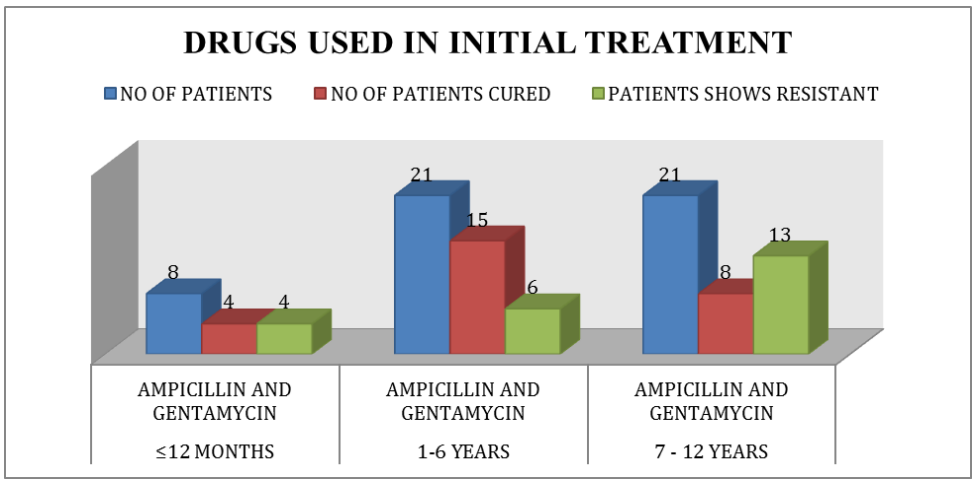

Fig no 4: Shows that the total number of antibiotics prescribed during Initial therapy.

Table 7: List of Medications Used In The Secondary Treatment.

Age Group	Drugs Prescribed	No of Drugs Prescribed	Patients Cured	Patients Shows Resistant
≤ 12 MONTHS	CEFOTAXIME AND AMIKACIN	4	1	3
1-6 YEARS	CEFOTAXIME AND AMIKACIN AZITHROMYCIN	6	4	2
7-12 YEARS	AZITHROMYCIN AND CEFOTAXIME AND AMIKACIN	13	8	5

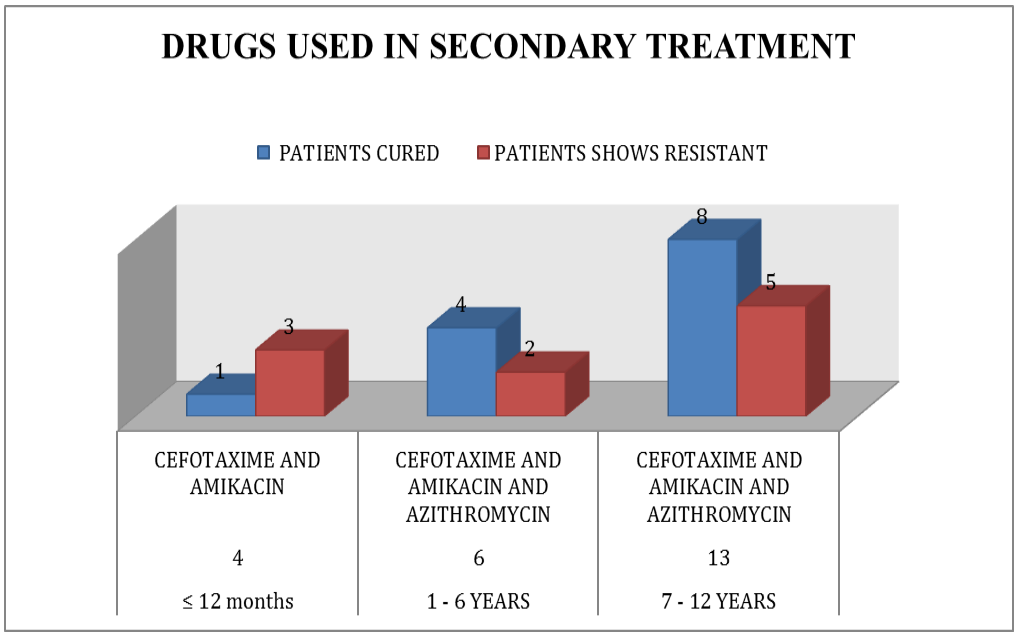

Fig no. 5: Shows that the list of medications prescribed in the secondary treatment.

Table 8: Drugs Replaced with Piperacillin/Tazobactum.

AGE	DRUGS PRESCRIBED	TOTAL NUMBER OF PATIENTS	NO OF PATIENTS CURED	NO OF PATIENTS SHOWS RESISTANT	CURATION RATE %
≤12 MONTHS	CEFOTAXIME AND AMIKACIN	3	3	0	30%
1-6 YEARS	CEFOTAXIME AND AMIKACIN AND AZITHROMYCIN	2	2	0	20%
7-12 YEARS	AZITHROMYCIN AND CEFOTAXIME AND AMIKACIN	5	5	0	50%

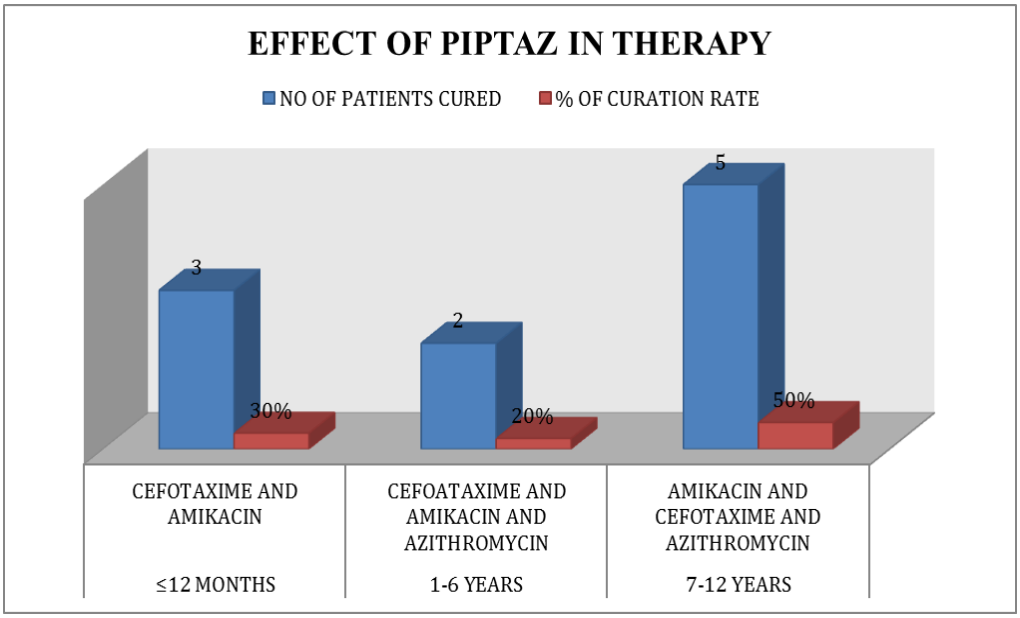

Fig No. 6: Shows that the number of patients cured when piptaz is replaced in therapy.

DISCUSSION

Throughout this study we discussed the most effective antibiotic for the patients with age less than 12 years old. These studies used to determine the age wise classification among the total number of 50 patients in the pediatric ward of government medical college hospital Tiruppur. These pediatric populations were susceptible to many diseases and drug related problems. So overall study is done to check the most appropriate and effective antibiotic among all.

In this study a total number of around 50 patients were in the sample. In this patients ≤12 months category there were around 8 peoples (male 3 & female 5) followed by 21 patients in the 1 to 6 years category of which (male 10 & female 11) and 21 patients in the 7 to 12 years category of which male 12 & female 9 in it.

Fig no.3 In our study there exists some common symptoms experienced by the patients that includes Breathing difficulty for 45 patients and, Fever and Chills for 40 patients followed by Cough with mucus to 30 patients and Chest pain / Abdominal pain to 10 patients.

Fig no.4 Shows the Antibiotic Ampicillin and Gentamycin are prescribed for the 8 patients in the ≤12 months category of which 4 were cured and remaining 4 shows resistance to the drug followed by Amikacin and Gentamycin were prescribed for 21 patients in the 1 to 6 years age group of which 15 were cured and 6 shows resistance to the drug therapy and in the 7 to 12

years age group category Gentamycin and Amikacin were prescribed to 21 patients of which 8 patients were cured and 13 shows resistance to the therapy.

Fig no.5 Shows the Antibiotic Cefotaxime and Amikacin were prescribed for 4 patients in the ≤12months category of which 3 shows resistance and 1 cured followed by Cefotaxime and Amikacin and Azithromycin were given to 6 patients in the 1 to 6 years category in that 4 were cured and 2 shows resistance and in the 7 to 12 years category Azithromycin and Cefotaxime and Amikacin were given to an account of 13 patients in which 8 were cured and 5 shows resistance.

Fig no.6 Shows that the positive outcome when the peoples who shows resistant to various antibiotics in the previous list are neutralised with the introduction of Piptaz in therapy. Whereasin the ≤ 12 months category Cefotaxime and Amikacin were given for 3 patients followed by Cefotaxime and Amikacin and Azithromycin were given for 2 patients in the 1 to 6 years category and in the 7 to 12 years category Azithromycin and Amikacin and Cefotaxime were given to 5 patientswith the curation rate of 30%,20%,50% respectively when Piptaz is replaced in the therapy.

From these above listed antibiotics, patients who were taken Piptaz experiencing more improvement and faster recovery rate in the therapy.

CONCLUSIONS

The worldwide burden of bronchopneumonia has been decreased over the past few decades and is largely due to use of pneumococcal Immunization among country peoples. Commonly viruses caught most in younger age group childrens, while M. pneumonia is anonymously found in school aged children. Streptococcus pneumonia and other 7 bacteria's remain as an important root cause for Bronchopneumonia in all age groups and is increasingly associated with some complications. Although recent guidelines on the optimal treatment for Bronchopneumonia has been published with the aim of optimizing the antibiotic prescriptions in pediatric bronchopneumonia.

As per the standard treatment guidelines for pediatric patients they are co-ordially treated with penicillin and aminoglycosides antibiotics based on the symptoms of the patient conditions as mentioned in the initial treatment protocol. If any patient shows resistance towards the initial treatment then the cephalosporin group of antibiotics were prescribed

along with macrolides and aminoglycosides antibiotics. Patients who doesn't shows any improvement with above mentioned treatment then they were treated along with Piperacillin/Tazobactum [Piptaz]group of antibiotics as it shows most promisable outcomes in our treatment.

Our study shows the patient who develops resistant to any of other antibiotics are more sensitive to pipercillin / tazobactum (piptaz).

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