IOSR Journal Of Pharmacy And Biological Sciences (IOSR-JPBS)
e-ISSN:2278-3008, p-ISSN:2319-7676. Volume 16, Issue 1 Ser. II (Jan. – Feb. 2021), PP 04-15
www.Iosrjournals.Org

Safety and Efficacy of Nebuliser Salbutamol and Antibiotics in Bronchopneumonia Patients of Pediatric Department of a Tertiary Care Hospital

D.Vinaykumar[1], M.Habibur Rahman[2], M.Hari prasad[3]
[1, 2, 3]*Pharma D Student, Dr.K.V Subbareddy College of Pharmacy, Dupadu, Kurnool, AP.*
Corresponding Author: M.Habibur Rahman

Abstract
Background: *To evaluate the safety of drug Salbutamol an antibiotic in bronchopneumonia patients in tertiary care hospital.*
Aim: *safety and efficacy of nebuliser Salbutamol and antibiotics in bronchopneumonia patients of pediatric department of a tertiary care hospital.*
Objectives: *The main objective is to study the safety and efficacy of nebuliser Salbutamol and antibiotics in bronchopneumonia in-patients attending the paediatric department. In this study safety can be measured by using Naranjo scale where as efficacy can be determined by measuring symptom relief.*
Materials and Methods: *The present Prospective and Retrospective observational study with subjects involved from inpatient General Medicine department at Government General Hospital. Kurnool. The subjects are selected on the basis of inclusion and exclusion criteria. Statistical analysis includes MS Excel and graphs, simple percentage.*
Results: *Out of 90 cases collected and analysed the majority of gender distribution was found to be on males with 47 (52%) followed by females 43 (48%) which is represented in table 1. Age distribution of total study was found to be below 1 year age 44 (49 %), followed by 1to 2 year of age 26 (29%), 9 (10%) of cases between 2 to 3 year of age, followed by 6 (7%) of cases between 3 to 4 year of age, 3(3%) of cases between 5 to 6 year of age, and 2 (2%) of cases between 4 to 6 year of age.*
Conclusion: -*The present study of safety and efficacy of nebuliser Salbutamol and antibiotics (Cephalosporins, Aminoglycosides, Quinolones) in bronchopneumonia patients of paediatrics department concludes that, male and females are equally caused by bronchopneumonia. In our study that the males 47 (52%) patient are more when compared to females 43(48%) patient. The mean age group that affected is below 1 year age. In our study we commonly find symptoms in patient with bronchopneumonia dyspnea, chest pain, sputum, cough, cold fallowed by fatigue in few cases.*
Key Words: *Naranjo scale, efficacy, Cephalosporins, Aminoglycosides, Quinolones*

Date of Submission: 23-01-2021 Date of Acceptance: 07-02-2021

I. Introduction

Bronchopneumonia is a type of pneumonia that causes inflammation in alveoli. It may trouble breathing because their airways gets constricted due to inflammation in their lungs and may not get enough breath. Bronchopneumonia is an infection that affects the air passages going into the lungs also known as the bronchus. This condition is mainly caused by bacterial infections, but it can also be caused by viral and fungal infections.

Etiology: Bronchopneumonia is a lower resperative track infection which is caused by **bacteria**, **virus** & **fungus** in this bronchopneumonia infection the major part of the infection is occur by TWO microorganisms they are1.Bacteria 2.Virus & rarely fungus[5].

1. **Bacteria**: The most common bacteria that cause bronchopneumonia is

a) Streptococcus pneumoniae (pneumococcus)
b) Haemophilus influenzae.Pseudomonas aeruginosa.
c) Escherichia coli.
d) Klebsiella pneumoniae.
e) Proteus species

a) Streptococcus pneumoniae: Streptococcus pneumoniae (pneumococcus) is a Gram-positive bacterium that is responsible for the majority of community-acquired pneumonia. It is most common infection that attacks in human resperative track.it is dangerous cause in bronchopneumonia an not only in this may also cause in

bronchitis, septicaemia, and meningitis. It is a alpha-hemolytic that it can break down red blood cells through the production of hydrogen peroxide (H2O2). The production of H2O2 bacterial infection can also cause damage to DNA, and kill cells within the lungs. Pneumococcal pneumonia causes fever and chills, coughs, difficulty breathing, and chest pain.

b) Hemophilus influenzae: Hemophilus influenza type b (Hib) is a bacteria responsible for severe pneumonia, meningitis and other invasive diseases almost exclusively in children aged less than 5 years. It is transmitted through the respiratory tract from infected to susceptible individuals. Hib also causes potentially severe inflammatory infections of the face, mouth, blood, epiglottis, joints, heart, bones, peritoneum, and trachea.

In infants and young children, Hib disease can be very serious. It can cause infections in different parts of the body - including the brain and lungs. These infections can lead to serious complications, and can even be deadly.

There are 2 types of vaccines that protect against Hib disease:

- The **Hib vaccine** protects children and adults from Hib disease
- The **DTaP-IPV/Hib vaccine** protects babies ages 2 through 18 months from Hib disease, tetanus, diphtheria, whooping cough, and polio.

2. virus: the second most common micro-organism cause in bronchopneumonia are

a) Influenza (flu) A and B

b) Respiratory syncytial virus

c)coronaviruses

d) rhinoviruses

e) Para influenza viruses

a) Influenza (flu) A and B: Influenza commonly known as the flu is a respiratory infection caused by flu viruses. influenza B can only pass from human to human. Type B Similar to type A, influenza B is also highly contagious and can have dangerous effects on your health in more severe cases. Influenza B symptoms in respiratory track: cough, sore throat,runny nose. Influenza B causing diseases:

- Pneumonia
- Bronchopneumonia
- Bronchitis
- Respiratory failure
- Sepsis

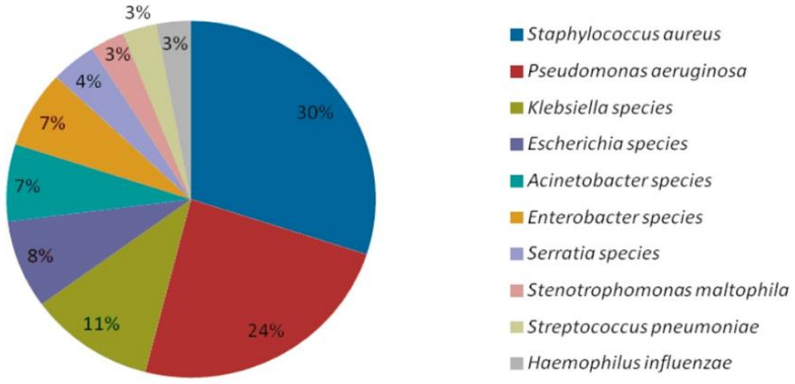
c) Respiratory syncytial virus: Respiratory syncytial (sin-SISH-ul) virus (RSV) is a major cause of respiratory illness in young children. The virus infects the lungs and breathing passages.RSV infections in premature babies, infants, and kids with diseases that affect the lungs, heart, or immune system, can lead to other, more serious illnesses such as pneumonia or bronchiolitis. Respiratory syncytial virus is highly contagious. It spreads through droplets containing the virus when someone coughs or sneezes. It also can live on surfaces and on hands and clothing. So people can get it if they touch something that's contaminated.

Symptoms of Respiratory Syncytial Virus:

- a stuffy or runny nose
- sore throat
- mild headache cough
- fever a general ill feeling
- a stuffy or runny nose

3) Fungus: this is the most rarely microorganism cause by the bronchopneumonia. And the organism or very less also to infect to human being. They are. 1) Coccidioidomycosis

Coccidioidomycosis is an infection usually caused by. inhaling the spores of either Coccidioides. immitis or Coccidioides posadasii fungi are found in the soil in certain geographic areas.



Causative Microorganism

PATHOPHYSIOLOGY:

Bronchopneumonia is an infection that affects the air passages going into the lungs also known as the bronchus. This condition is mainly caused by bacterial infections, but it can also be caused by viral and fungal infections. It is Constant exposure to contaminated air and frequent aspiration of nasopharyngeal flora make lung parenchyma susceptible to virulent micro-organisms. The most community bacteria in origin and often following viral upper respiratory tract infection in upper position of lower lobes are most microorganisms reach lower respiratory tract as inhaled and contaminated micro droplets. Complex interactions between virulence and quantum of aspirated or inhaled microorganisms. That arrive at lower respiratory tract integrity of defence barriers and host immunity status decide occurrence of pneumonia.

- The microorganism which enter into the lung. If the particle size is more the 100micro meter. it is not easy to inhaled.
- The particle larger than 10micro meter then they get trapped in nasal secretion.
- This all particles will increase the size due to humidification in trachea and they trapped major in bronchi
- The particle less than 5 micro meter reach the alveoli. This type of particles can transport bacterial inoculum of up to 100 micro meter. The microorganism is depend on bacterial size the diameter of most bacteria 1or more. Best ventilated therefore deposition of inhaled microorganisms is higher in these lobes.
- Inhalation pneumonia is most often due to microorganisms

(a) that can remain suspended in air so as to be transported far away
(b) survive long enough while in transit
(c) have a size less than 5 µm
(d) carry a high inoculum, and
(e) evade local host defence mechanisms. Infection by intracellular bacteria such as Mycoplasma pneumoniae, Chlamydophila and Coxiella burnetii occurs through contaminated aerosol inhalation rout.

Micro-organisms gain access to lower respiratory tract infection in several ways

The most common is by aspiration from the oropharynx & many pathogens are inhealed has contaminated droplets.

the hair turbinate's catch large in healed particles before they reaches the lower respiratory tract.

trachea bronchial tree traps particles where muco ciliary clearance an local anti bacterial factors either clear or kill the potential pathogen.

Macrophages are assisted by local proteins (protein A & D) once engulfed the pathogen even if they are not killed by macrophages.

The alveolar macrophages initiate the inflammatory mediators such as interleukin 1 and tumor necrosis factors results in fever.

Chemokines such as interleukin 8 and granulocytes stumulate the release of neutrophils and their attraction producing both peripheral leukocytosis and increased purulent secession.This lead to the production alveolar capillary leakage.

Decreased compliance due to capillary leak increased secretion which cause hypoxemia, that lead to dyspnea.

The fluid present in the alveoli appears as pacths and it cause bronchopneumonia.

Pathology:

Stage of congestion	**Stage of red hepatisation**	**Stage of gray hepatization**	**Stage of resolution**
This stage represents early acute inflammatory response. Affected lobe becomes red and heavy due to vascular congestion. Copious proteinaceous fluid, abundant neutrophils and many bacteria can be seen in the alveoli. This stage lasts for 1 to 2 days.	Affected lobe becomes red, firm and acquires liver like consistency. Proteinaceous fluid transforms into fibrin strands with marked cellular exudates of neutrophils. Extravasation of red cells which give red colour to consolidated lung. This stage lasts for 2 to 4 days.	Affected lobe becomes dry, firm and gray due to lysed red cells. Neutrophilic cellular exudates decrease due to breakdown of inflammatory cells and macrophages are now seen. Microorganism load also reduces. This stage lasts for 4 to 7 days	Due to enzymatic action, fibrinous matter is liquefied and the lung aeration is re-established gradually. Macrophages are the major cells in the alveoli. There is progressive reduction of fluid and cellular exudates from the alveoli by way of expectoration and lymphatic drainage leading to normal lung parenchyma in over 3 weeks.

Clinical manifestation:

1) dyspnea
2) chest pain
3) fever
4) cold
5) fatigue
6) sputum

DIGNOSIS:

Physical examination

- Inspection: cyanosis, sub costal, intercostel retraction, tachypnea, nasal flaring.
- Auscultation: Wheezing sounds
- Precussion: dullness over a consolidation area.
- Palpitation

LABORATORY AND DIGNOSTIC TESTS:

- pulse oxymeter
- chest x- ray
- sputum culture
- blood examination
- bronchoscopy
- lung biopsy
- lung aspiration.

MANAGEMENT

GOAL OF THERAPY:

- Should maintain normal activities levels.
- Should maintain normal pulmonary function.
- Prevent chronic and trouble\some symptoms (cough, dyspenia, fatigue, cold, chest pain)
- Provide optimal pharmacotherapy with minimal are no adrs

NON PHARMAACOLOGICAL THERAPY:

1. GET VACCINATION
2. Provide adequate rest
3. Drink plenty of fluid ,especially water
4. Keep your child away from smoking
5. Frequently check temperature
6. Get sleep plently
7. Control of indoor air pollution and promotion of healthy environment.
8. Zinc supplementation
9. Keep the child away from people with symptoms of respiration infection
10. Practing good hygiene

TREATMENT:

β-lactam/β-lactamase inhibitors:

piperacillin-tazobactam – 4.5g iv
amoxiclav 125mg or 5ml
amoxicillin 250mg

ANTIPSEUDOMONAL CEPHALOSPORINS:

Cefixime 50mg /5ml
Ceftriaxone 75-100mg

ANTIPSUDOMONAL QUINOLONES:

ciprofloxacin-400mg iv
levofloxacin -750mg iv

AMINOGLYCOSIDS:

Amikacin -20mg/kg iv.
Vancomycin -500mg iv
Netilmicin -7mg / kg iv
Tobramycin-7mg / kg iv

BRONCHODILATOR:

Syp salbutamol 5ml tid.
Nebulization salbutamol.

II. Methods And Materials

The present Prospective and Retrospectiveobservational study with subjects involved from inpatient General Medicine department at Government General Hospital. Kurnool. The subjects are selected on the basis of inclusion and exclusion criteria. Statistical analysis include MS Excel and graphs, simple percentage.

Inclusion criteria:

1. Patients newly diagnosed with bronchopneumonia
2. Patients of age above 6 month year are included in our study.
3. Either gender is considered

Exclusion criteria:

1.Patients who are not willing to participate in the study.
2.Neonate have been excluded from the study.
3.Patients allergic to antibiotics and nebulisers
4. Patients are excluded who having diseases like respiratory distress syndrome and COPD.

Sample Size: 90

III. Results

GENDER DISTRIBUTION FOR TOTAL STUDY

Out of 90 cases collected and analysed the majority of gender distribution was found to be on males with 47 (52%) followed by females 43 (48%) which is represented in table 1

Table 1: Gender distribution for total study

GENDER	NUMBER	PERCENTAGE %
MALE	47	52
FEMALE	43	48

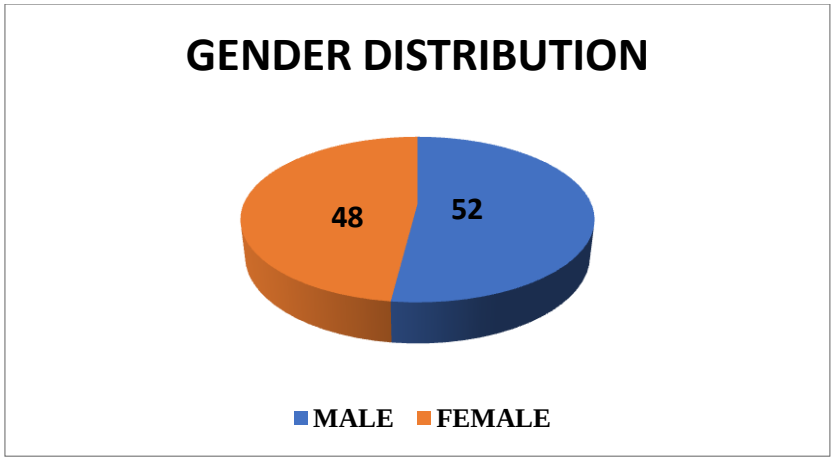


Figure 1: Gender distribution for total study

AGE DISTRIBUTION FOR TOTAL STUDY

Age distribution of total study was found to be below 1 year age 44 (49 %),followed by 1to 2 year of age 26 (29%),9 (10%) of cases between 2 to 3 year of age, followed by 6 (7%) of cases between 3 to 4 year of age, 3(3%) of cases between 5 to 6 year of age, and 2 (2%) of cases between 4 to 6 year of age. which is represented in table 2

AGE	NUMBER	PERCENTAGE%
<1	44	49
1 to 2	26	29
2 to 3	9	10
3 to 4	6	7
4 to 5	2	2
5 to 6	3	3

Table 2.Age distribution of total study

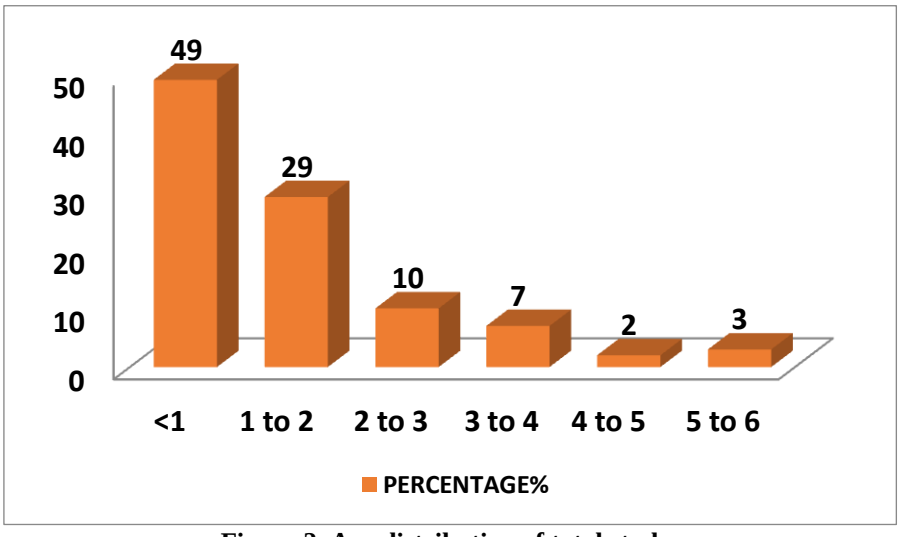


Figure 2. Age distribution of total study.

AGE DISTRIBUTION IN FEMALES

Among 90 cases the highest patient suffering with bronchopneumonia of age distribution of total study in females was found to be below 1 year age 22 (51.1%),followed by 1 to 2 year age 12 (27.9%),4 (9.4%) between 3 to 4 year age ,3 (7%) between 2 to 3 Year age, a similar percentage 1 (2.3%) was observed between the age group 4 to 6 and 5 to 6. which is represented in table 3 and figure 3.

FEMALE AGE	NUMBER	PERCENTAGE
<1	22	51.1
1 to 2	12	27.9
2 to 3	3	7
3 to 4	4	9.4
4 to 5	1	2.3
5 to 6	1	2.3

Table 3. Age distribution in females

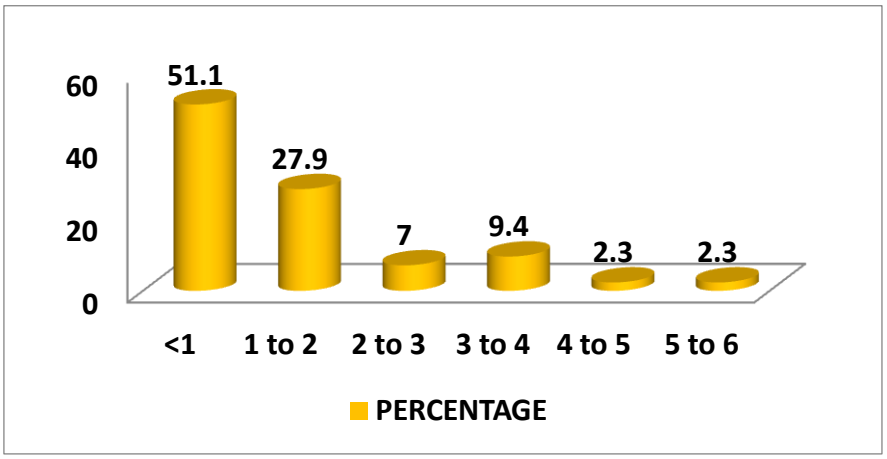


Figure 3. Age distribution in females.

AGE DISTRIBUTION IN MALES

A total 90 cases was collected in that 47 cases of males were observed and analysed. The majority of age distribution of total study in males was found to be below 1 year age 22 (47%),followed by 1 to 2 year age 14 (29.8%),5 (10.6%) between 3 to 4 year age ,3 (6.3%) between 2 to 3 year age ,2 (4.2%) between 4 to 6 year age, and 1(2.1%) between 5 to 6 year age. which is represented in table 4 and figure 4.

MALE AGE	NUMBER	PERCENTAGE
<1	22	47
1 to 2	14	29.8
2 to 3	3	6.3
3 to 4	5	10.6
4 to 5	2	4.2
5 to 6	1	2.1

Table 4. Age distribution in males.

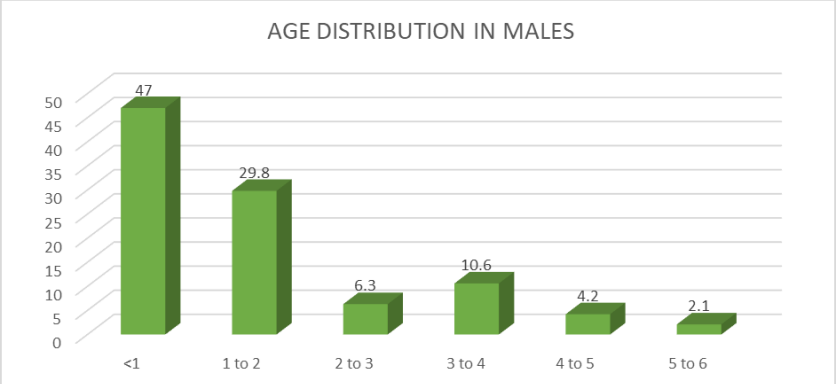


Figure 4. Age distribution of total study in males.

LOCALITY DISTRIBUTION OF TOTAL STUDY

locality distribution of total study was done. majority of the cases were observed in Kurnool locality 40 (44.4),followed by 18 (20%) from other locality, followed by 15 (17%) from Anantapur locality, followed by 11 (12%) from Atmakur locality, and 6 (6.6%) from Nandikotkur. which is represented in table 5 and figure 5

LOCALITY	NUMBER	PERCENTAGE
Kurnool	40	44.4
ANANTAPUR	15	17
ATMAKUR	11	12
NANDIKOTKUR	6	6.6
OTHER	18	20

Table 5. locality distribution of total study.

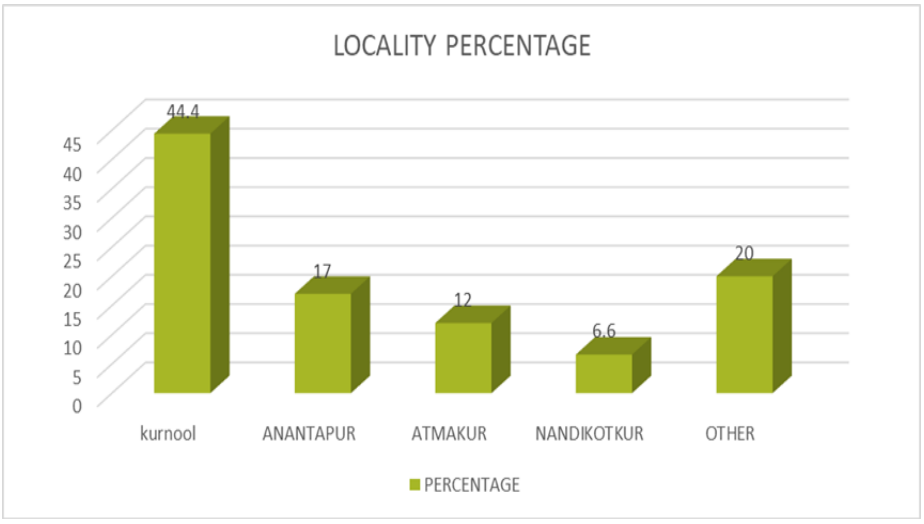


Figure 5. Locality distribution of total study.

ASSESSING SYMPTOM BEFORE TREATEMENT

A total of 90 cases was collected and analyzed treatment evaluation was characterized between before treatment and after treatment. A total of 5 symptoms was dyspnea, chest pain , cold , sputum ,fatigue.Included treatment(Before treatment) and a total scoring for symptoms was (15) in which mild1 moderate2 moderate severe3 severe4 very severe5.

An average score was calculated into 4 groups, based on symptoms which is appeared in patient. The majority of cases were observed in 0.5-0.8 average score group 58 (64%), followed by 0.9-1.2 average score group 17 (19%),8 (9%),between 0.1-0.4 average score group, and 7 (8%) between 1.3-1.6 average score group. which is represented in table 6 and figure 6.

SCORE AS %BEFORE TREATEMENT	NUMBER	PERCENTAGE
0.1-0.4	8	9
0.5-0.8	58	64
0.9-1.2	17	19
1.3-1.6	7	8

Table 6. Before treatment average score

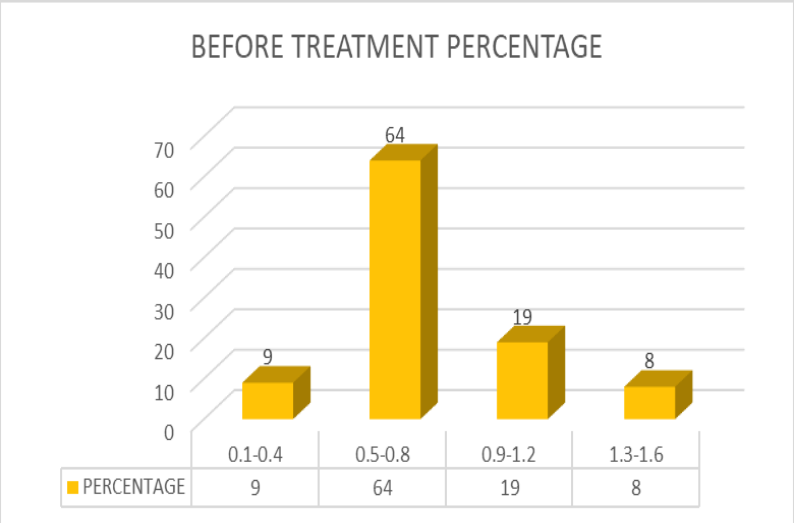


Figure 6. Before treatment average score group.

ASSESSING SYMPTOM AFTER TREATEMENT

A total of 90 cases was collected and analysed treatment evaluation was characterized between before treatment and after treatment. A total of 5 symptoms was dyspnea, chest pain, cold, sputum, fatigue.Included treatment(After treatment) and a total scoring for symptoms was (15) in which mild1 moderate2 moderate severe 3 severe 4 very severe 5.

An average score was calculated into 4 groups, based on symptoms which is appeared in patient. The majority of cases were observed in 0.1-0.4 average score group 85 (94.4%), followed by 5 (5.6%) between 0.5-0.8 average score group. a similar percentage 0 (0%) was observed between the average score group 0.9-1.2 and 1.3-1.6. which is represented in table 7 and figure 7.

SCORE AS %BEFORE AFTER TREATMENT	NUMBER	PERCENTAGE
0.1-0.4	85	94.4
0.5-0.8	5	5.6
0.9-1.2	0	0
1.3-1.6	0	0

Table 7. After treatment average score

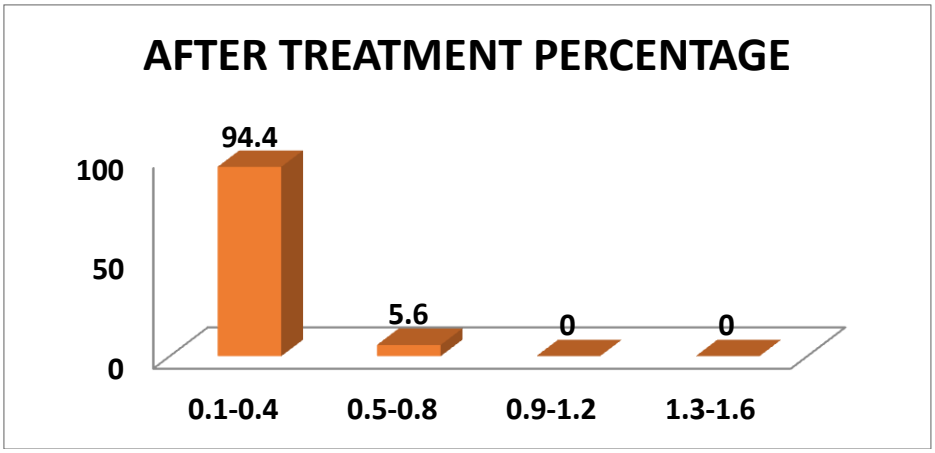


Figure 7. After treatment average score.

ADVERSE DRUG REACTION

A total of 90 cases were collected in that 15 cases of adverse drug reaction were observed and analysed. The majority of adverse drug reaction was found to be diarrhoea (53.3%), followed by erythema (26.6%), followed by arrhythmia (13.5%), and Hypokalemia (6.6%). which is represented in table 8 and figure 8.

ADVERE DRUG	NUMBER	PERCENTAGE
DIARRHOEA	8	53.3
ERYTHEMA	4	26.6
RESPIRATORY DISTRESS	1	6.6
SEIZURES	2	13.5

Table 8. Adverse drug reaction

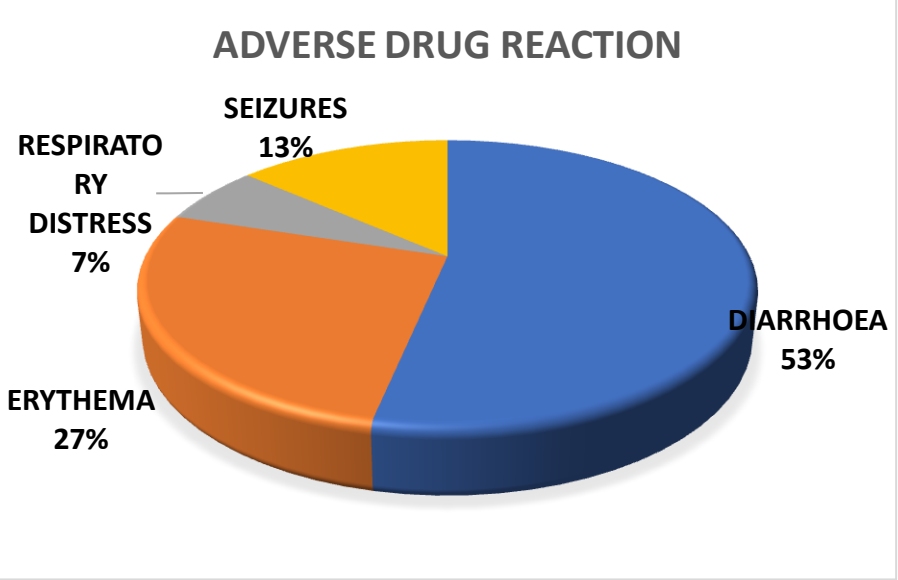


Figure 8. Adverse drug reaction

IV. Discussion

The present study was prospective observational, assessing the efficacy of antibiotics (Cephalosporins, Aminoglycosides, Quinolones) and nebulization in bronchopneumonia patients. In our study that the males 47 (52%) patient are more when compared to females 43(48%) patient, but in e tal.,[1]Svjetlana Loga Zec study shows males are more when compared to females patient because of gender difference and study population. Age distribution of total study was found to be below 1 year age 44 (49 %),followed by 1to 2 year of age 26

(29%),9 (10%) of cases between 2 to 3 year of age, 6 (7%) of cases between 3 to 4 year of age, 3(3%) of cases between 5 to 6 year of age, and 2 (2%) of cases between 4 to 6 year of age our results are similar when compared with results et al[25]., Evangeline Obodai with age distribution of 5 to 6 year.Among 90 cases the highest patient suffering with bronchopneumonia of age distribution of total study in females was found to be below 1 year age 22 (51.1%),followed by 1 to 2 year age 12 (27.9%),4 (9.4%) between 3 to 4 year age ,3 (7%) between 2 to 3 Year age, a similar percentage 1 (2.3%) was observed.A total 90 cases was collected in that 47 cases of males were observed and analysed. The majority of age distribution of total study in males was found to be below 1 year age 22 (47%),followed by 1 to 2 year age 14 (29.8%),5 (10.6%) between 3 to 4 year age ,3 (6.3%) between 2 to 3 year age ,2 (4.2%) between 4 to 6 year age, and 1(2.1%) between 5 to 6 year age.locality distribution of total study was done. majority of the cases were observed in Kurnool locality 40 (44.4),followed by 18 (20%) from other locality, followed by 15 (17%) from Anantapur locality, followed by 11 (12%) from Atmakur locality, and 6 (6.6%) from Nandikotkur. A total of 90 cases was collected and analysed treatment evaluation was characterized between before treatment and after treatment. A total of 5 symptoms was dyspnea, chest pain, cold, sputum, fatigue.Included treatment and a total scoring for symptoms was (15) in which mild1 moderate2 moderate severe3 severe4 very severe5. An average score was calculated into 4 groups, based on symptoms which is appeared in patient. The majority of cases were observed in 0.5-0.8 average score group 58 (64%),followed by 0.9-1.2 average score group 17 (19%),followed by 8 (9%),between 0.1-0.4 average score group, and 7 (8%) between 1.3-1.6 average score group.An average score was calculated into 4 groups, based on symptoms which is appeared in patient. The majority of cases were observed in 0.1-0.4 average score group 85 (94.4%), followed by 5 (5.6%) between 0.5-0.8 average score group percentage 0 (0%) was observed between the average score group 0.9-1.2 and 1.3-1.6.A total of 90 cases was collected in that 15 cases of adverse drug reaction were observed and analysed. The majority of adverse drug reaction was found to be diarrhoea (53.3%), followed by erythema (26.6%),followed by seizures(13.5%),and respiratory distress(6.6%)our results are similar when compared with resultset al[21]., A Evan S diarrhoea erythema 2% arrhythmia Hypokalemia 4% was observed.

V. Conclusion

The present study of safety and efficacy of nebuliser Salbutamol and antibiotics (Cephalosporins, Aminoglycosides, Quinolones) in bronchopneumonia patients of paediatrics department concludes that, male and females are equally caused by bronchopneumonia. In our study that the males 47 (52%) patient are more when compared to females 43(48%) patient. The mean age group that affected is below 1 year age.in our study we commonly find symptoms in patient with bronchopneumonia dyspnea, chest pain, sputum, cough, cold fallowed by fatigue in few cases. Age distribution of total study was found to be below 1 year age 44 (49 %) followed by 1 to 2 year of age 26 (29%), 9 (10%) of cases between 2 to 3 year of age, 6 (7%) of cases between 3 to 4 year of age, 3(3%) of cases between 5 to 6 year of age, and 2 (2%) of cases between 4 to 6 year of age. In our study we observed 15 cases of adverse drug reaction in teritary care hospital. The majority of adverse drug reaction is diarrhoea (53.3%), followed by erythema (26.6%),followed by seizures (13.5%),and respiratory distress (6.6%). All children with bronchopneumonia should be in bed at least one week with a normal room temperature. This time should be extended for the severe cases and those with persisting cough and the child should get recover before getting discharge from the hospital.

Acknowledgement

It is a proud and privileged honour for us to express our heartful thanks and gratefulness to all individuals who lend a hand for us directly or indirectly throughout this project work.

It is the immense pleasure to express our gratitude and deepest appreciation to our institutional guide **Dr.K.Kusmakumari, PharmD,** Assistant Professor, Department of Pharmacy Practice, who braced us with his innumerable and valuable suggestions and continued guidance during the entire project work.

We express our sincere thanks and deep sense of gratitude to our hospital guide **Dr.S.Srilatha M.D** (Paediatric), Assistant Professor, Kurnool Medical College, Kurnool for exhilarating encouragement, valuable guidance and suggestions throughout the entire project work with his full patience.

We express our prerogatives and soulful thanks to our adept principal **Dr. G. Nagarajan, M Pharm, Ph. D.,** Professor, Department of Pharmaceutical Chemistry, for providing this great opportunity to carry out our dissertation project work and possible guidance for completion of this thesis work.

We thank our **Honourable Chairman Dr. K. V. Subba Reddy, Correspondent K. Vijayalakshmi, Dr. KVSR Institute of Pharmacy**, from the bottom of our hearts for providing us all the facilities and support needed for our dissertation project work.

To commence with, we pay our obeisance to **GOD,** the almighty to have bestowed upon us the good health, courage, inspiration, zeal and the light throughout our dissertation work.

Finally, we would like to thank everyone who were important throughout the study for successful completion, as well as expressing our apologies for whom we could not mention personally one by ones.

References

[1]. Svjetlana Loga Zec, Kenan SelmanovicNatasa Loga Andrijic, Azra Kadic, LamijaZecevic, LejlaZunic . Evaluation of drug treatment bronchopneumonia at the pediatric clinic in Sarajevo. Medarh journal. Apr15(2016); vol.70, pagno:171-18.

[2]. Francesco Blasi, Stefano Alibeti Francesco Blasi, Stefano Aliberti, Maria Pappalettera, Paolo Tarsia.100 years of respiratory medicine. Elsiver journal. (2007); vol.101, pagno:875-881

[3]. Kurt Olsen, Juanita Lozano Ian C. Michelow, Kurt Olsen, BS Juanita Lozano, Nancy K. Rollins, Lynn B. Duffy. Epidemiology and clinical characteristics of community- acquired pneumonia in hospitalized children. Pediatricsjournals.apr (2004) _vol.113,pagno:701-706

[4]. Cynthia Boschi-Pinto, ZrinkaBiloglav Igor Rudan,KimMulhollandd& Harry Campbelle Epidemiology and ethology of childhood pneumonia. Bulletin of the World Health Organization journals.14 jan(2008);vol.86,pagno:408-414

[5]. Thomas M , John Segreti, Lala Dunbar, Richard Player, Richard Kohler, Rex Williams, Clare Kojak, And Arkady Rubin. A multicenter, randomized study comparing the efficacy and safety of intravenous and/or oral levofloxacin versus ceftriaxone and/or cefuroxime axetil in treatment of adults with community-acquired pneumonia.Anti microbial agents chemother journal.sept(1997); vol.41,pagno:1965–1972

[6]. Catia Cilloniz , Ignacio Martin-Loeches , Carolina Garcia-Vidal , Alicia San Jose and Antoni Torres.Microbialetiology of pneumonia: epidemiology, diagnosis and resistance patterns.International journal of molecular science.16 December (2016);vol.17,pagno;1-12

[7]. OrinS.Levine, KatherineL.O'Brien, MariaDeloria-Knoll, DavidR.Murdoch, DanielR.Feikin, AndreaN.DeLuca, Amanda J. Driscoll, Henry C. Baggett, W.Abdullah Brooks, Stephen R. C. Howie, Karen L. Kotloff ; The pneumonia etiology research for child health project: a 21st century childhood pneumonia etiologystudy.Supplement journals. (2012);vol.54,pagno:93-99

[8]. EvropiTheodoratou, Sue Johnson, ArnoupeJhass, Shabir A Madhi, Andrew Clark, Cynthia Boschi-Pinto, Sunil Bhopal, Igor Rudan, and Harry Campbell ; The effect of haemophilus influenzae type b and pneumococcal conjugate vaccines on childhood pneumonia incidence, severe morbidity and mortality.International Journal of Epidemiology. (2010);vol.39,pagno:172-183

D.Vinaykumar, et. al. "Safety and Efficacy of Nebuliser Salbutamol and Antibiotics in Bronchopneumonia Patients of Pediatric Department of a Tertiary Care Hospital." *IOSR Journal of Pharmacy and Biological Sciences (IOSR-JPBS)*, 16(1), (2021): pp. 04-15.