ANTIBIOTICS FOR PNEUMONIA: WHO- CLINICAL CRITERIA AND THE INDIVIDUAL CHOICE

Pediatrics

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ABSTRACT

To determine the antibiotics used for pneumonia and study its duration for treatment .To evaluate age and sex wise distribution and assess the average duration of hospital stay with specific antibiotic used for treatment and the occurrence of disease in vaccinated and unvaccinated children. Material &Methods- This hospital based observational study was conducted in tertiary care hospital in Nagpur which included children between 2 months -5yrs diagnosed as pneumonia conducted from 1 March 2016-28 February 2017.Results- Total of 138 subjects were enrolled. Amoxyclav (52%) was the commonest antibiotic used. Boys were more affected and the commonest age group involved was 2 to 12 Months. The average duration of hospital stay in all three groups was 5 days. The occurrence of disease was more in children who were unvaccinated for pneumococcal vaccine.

KEYWORDS:

Antibiotics, Pneumonia.

INTRODUCTION

The leading global cause of childhood mortality and morbidity is pneumonia. Annually, the clinical pneumonia episodes worldwide is estimated to be 120–160 million causing 14 million hospitalizations and almost one million deaths in children aged below five years [1, 2]. Although respiratory viruses are the most common pathogens associated with childhood pneumonia, most deaths are attributed to Haemophilus influenzae type b and Streptococcus pneumonia [3]. The diagnosis can be based on the history and physical examination results, in children with fever with respiratory signs and symptoms. Chest radiography and culture are helpful for diagnosis and confirmation about the causative pathogen (8). Antibiotics have reduced pneumonia-related mortality and morbidity .Nevertheless, several knowledge gaps exist for optimal length of treatment required and prescribing antibiotics for pneumonia. These limitations are evident in both international and national guidelines, which have had to rely upon expert opinion and weak levels of evidence from a small number of clinical trials with substantial methodological limitations [4–7]. A good example of these difficulties is the range of recommendations provided on treatment duration for uncomplicated pneumonia [5, 6].This raises several questions for healthcare workers when determining how long they should be giving antibiotics to a child with pneumonia. Several factors are considered when both choosing antibiotic to treat a suspected case of bacterial pneumonia and determining how long it should be given. These include: (i) clinical presentation and severity; (ii) assumed bacterial aetiology based upon the child's age, vaccination status, underlying co-morbidities and the local pathogen antibiotic susceptibility profiles; and (iii)cost, availability, tolerability, and ease of administration(e.g. frequency and palatability) of the chosen agent that may influence treatment adherence.

Aim and Objectives of the Study:-
The study was conducted with following objects in mind:
1. To determine the antibiotics used for pneumonia and study its duration for treatment.
2. To evaluate age and sex wise distribution.
3. To assess the average duration of hospital stay with specific antibiotic used for treatment
4. To assess the occurrence of disease in vaccinated and unvaccinated children.

Hypotheses
• Mono therapy for short duration (5 to 7 Days), is effective for treatment in children suffering from pneumonia

Material & Methods:
1. Place of Study: This study was conducted at central India Nagpur (Maharashtra) Period of Study: 1st March 2016 – 28th Feb 2017 (12 Months)

2. **Inclusion Category**
1) Children between the age of 2 months – 5 years diagnosed as Pneumonia were included in the study.
2) Children between the age of 2 months - 5 years diagnosed as pneumonia and started on injectable antibiotics were included.

3. **Exclusion**
1) Incomplete case records of children with pneumonia were also excluded

4. **Sample size:** Data was collected from the case records of patients diagnosed as pneumonia admitted and treated in NKPSIMS & Lata Mangeshkar Hospital Nagpur ,were included in the study (N=138)

5. **Study Design:** Cross sectional study (Observational Study)

Methodology
1. Demographic, clinical and laboratory data were collected as per proforma and entered in Micro-excel sheet.
2. Diagnosis of pneumonia was based on WHO ARI program along with lab (culture positive) and radiological findings (x ray chest).
3. The collected data was categorized into 3 groups:

GROUP A	CLINICAL (WHO CRITERIA)
GROUP B	CLINICAL +RADIOLOGICAL + CULTURE POSITIVE
GROUP C	CLINICAL +RADIOLOGICAL

Statistical Analysis
The obtain data were statistically analyzed by applying descriptive (Mean, Standard Deviation, ANOVA) of significance of mean differences in term of various variable. We have entered all data in Microsoft Excel and further Statistical Analysis was done with the help of QI-Macros 2014 Software.
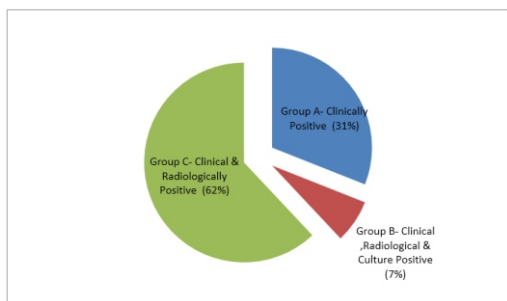
OBSERVATIONS AND RESULTS
The total no of 138 cases 62% were clinical and radiologically positive followed by 31% clinically positive and 07% which were clinical radiological and culture positive (See table no. 1:1)

Table no. 1:1- Group wise distribution of cases

Group A (n=44)	**31%**
Group B (n=09)	**07%**
Group C (n=85)	**62%**
n (138)	

% percentage

Figure no.1:1- Group wise distribution of cases
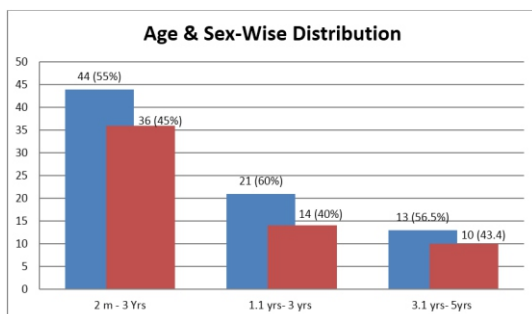

% percentage

Boys predominance was noted in all the three age group and the disease was more prevalent in age group of 2 months - 1 year (55%). (See table no. 1:2)

Table no.1:2- Age and Sex –wise distribution

Age Group	Sex –Wise Distribution	
	Boys	Girls
2 Months -1Years (n=80)	44 (55%)	36 (45%)
1.1Years - 3 Years (n=35)	21 (60%)	14 (40%)
3.1Years -5Years (n=23)	13 (56.5%)	10 (43.4%)

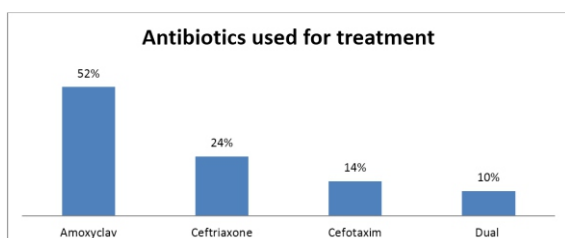% percentage

Figure no.1:2- Age and Sex –wise distribution

% percentage

It was observed that monotherapy was initated in maximum number of cases and commonest antibiotic used was amoxyclav(52%) followed by ceftriaxone(24%) , cefotaxim(14%) and dual 10% (amoxyclav +Amikacin). (See table no.1:3)

Sino.	Antibiotics	Percentage
1	Amoxyclav	52%
2	Ceftriaxone	24%
3	Cefotaxim	14%
4	Dual	10%

% percentage

Figure no.1:3- Antibiotics used for treatment

% percentage

Most of the patients as mentioned received monotherapy with average duration of five days as compared to average duration of 8 days in patients who received dual therapy. Dual therapy was started in patient who were critically ill, which explain their prolong hospital stay and duration of antibiotic treatment. The antibiotics used as monotherapy were Amoxyclav (P- value 0.720), Ceftriaxone (P- value 0.763), Cefotaxim (P- value 0.837), Dual (P- value 0.495), All antibiotic used total An Analysis of variance showed that the F ratio 1.928 is smaller than the F crit value 3.035 .The F crit (3.035) is the critical value as extracted from the f-distribution in statistical tables based on two values of degrees of freedom df of 2 and 19. P > 0.05 non- significant at 0.05 level (Means are same). (See table no. 1:4)

Table no. 1:4- ANOVA: Single Factor -Duration of Antibiotic Prescribed

Sino	Antibiotic	Group	Total Score Mean (m)	Standard Division (SD)	*F*	P-Value	F crit	Significant Level
1	Amoxyclav	Group A	3	5.62	0.329	0.720	3.070	Non-significant at P>0.05
		Group B	2.70	5.88				
		Group C	3.04	1.11				
2	Ceftriaxone	Group A	5	1.2	0.273	0.763	3.385	Non-significant at P>0.05
		Group B	4.66	1.06				
		Group C	4.81	0.36				
3	Cefotaxim	Group A	5.95	0.86	0.178	0.837	3.168	Non-significant at P>0.05
		Group B	5.81	1.16				
		Group C	6.04	1.22				
4	Dual	Group A	7.66	2	0.730	0.495	3.521	Non-significant at P>0.05
		Group B	8	0.66				
		Group C	8.33	1				
5	Total	Group A	4.51	6.15	1.928	0.148	3.035	Non-significant at P>0.05
		Group B	3.86	6.92				
		Group C	4.60	4.26				

There was no significant change in duration of hospital stay in either of the monotherapy groups which included Amoxyclav(P- value 0.116), Ceftriaxone (0.751) ,Cefotaxim (P- value 0.238), which constitutes to average duration of 5 days. In dual therapy average stay was 8.5 days (P-value 3.521) .It was prolonged because these patients were seriously ill. (See table no. 1:5)

Table no1:5 - ANOVA: Antibiotic used and duration of hospital stay

Sino	Antibiotic	Group	Total Score Mean (m)	Standard Division (SD)	F	P-Value	F crit	Significant Level
1	Amoxyclav	Group A	3.5	6.023	2.190	0.116	3.070	Non- significant at P>0.05
		Group B	2.70	5.881				
		Group C	3.61	1.544				
2	Ceftriaxone	Group A	4.54	0.872	0.289	0.751	3.385	Non- significant at P>0.05

		Group B	4.66	1.066				
		Group C	4.81	0.363				
3	Cefotaxim	Group A	4.60	2.339	1.474	0.238	3.168	Non-significant at P>0.05
		Group B	5.45	1.472				
		Group C	5.08	1.901				
4	Dual	Group A	5.11	2.61	2.480	0.110	3.521	Non-significant at P>0.05
		Group B	6	1.33				
		Group C	4.33	0.75				
5	Total	Group A	4.09	4.34	1.588	0.207	3.035	Non-significant at P>0.05
		Group B	3.65	5.84				
		Group C	4.22	1.80				

It was observed that in each diagnostic group that is Group A(33.6%),Group B(33%) and Group C (41.1%),the occurrence of disease was comparatively more which included both age (2-12 months) and vaccination status as per UIP which does not include pneumococcal vaccine. (See table no. 1:6)

Table no.1:6- Vaccination Status

Groups	AGE	UIP	IAP
Group A (N=44)	2mnth-1yr	16(36.36%)	10(22.72%)
	1.1-3yrs	8(18.18%)	5(11.36%)
	3.1-5 yrs	4(9%)	1(2.27%)
Group B (N=9)	2 mnth-1yrs	3(33.33%)	2(22.22%)
	1.1-3yrs	1(11.1%)	0
	3.1-5yrs	3(33.33%)	0
Group C (N=85)	2 mnth-1 yr	35(41.1%)	14(16.4%)
	1.1-3yrs	14(16.4%)	7(8.2%)
	3.1-5 yrs	13(15.2%)	2(2.3%)

UIP- Universal Immunization schedule-, IAP- Indian academic of pediatrics Immunization schedule

DISCUSSION

Present study showed that 138 subjects were enrolled. Amoxyclav (52%)was the commonest antibiotic used. Boys were more affected and the commonest age group involved was 2months -12months.There was no significant change in average duration of hospital stay in all three groups . The occurrence of disease was more in children who were unvaccinated for pneumococcal vaccine.

In a Cochrane review, Lodha et al (2013) examined antibiotics for community-acquired pneumonia in children and provided recom mendations for countries with high case fatalities due to pneumonia in children without underlying morbidities and where point of care tests for identification of aetiological agents for pneumonia are not available. Twenty-nine trials, which enrolled 14 188 children, comparing multiple antibiotics were included. Iit concluded that oral amoxicillin for children with severe pneumonia without hypoxaemia was recommended in an ambulatory setting. For children hospitalised with severe and very severe CAP, penicillin/ampicillin plus gentamicin is superior to chloramphenicol. The other alternative drugs for such patients are co-amoxiclav and cefuroxime (9).

The Canadian Pediatric Society practice points (2015) recommend that outpatients with lobar or broncho-pneumonia be treated with oral amoxicillin. Patients who require hospitalization but do not have a life-threatening illness should usually be started empirically on intravenous ampicillin. Empiric therapy with a third-generation cephalosporin is recommended for children who experience respiratory failure or septic shock associated with pneumonia. Ceftriaxone or cefotaxime are recommended for beta-lactamase-producing H. influenzae and high-level penicillin-resistant pneumococcus. (10)

Conclusion
1. Monotherapy for 5 days duration is effective in most children suffering from pneumonia.
2. Dual therapy should be considered in critically ill patients with pneumonia .
3. Blood culture in patients with pneumonia should be emphasised to better understand the common causative pathogen and its sensitivity .
4. Emphasis on early vaccination against Haemophilus influenzae type b and Streptococcus pneumonia infection should be done.

Delimitation of the research
- Limited sample size
- Areas based research

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