Studying Clinical Feature, Diagnosis, Investigation and Drug Management in Children Suffering from Acute Respiratory Infection in Children Hospital, Benghazi

Wahengbam PS[1*], Elshebani Asma[2], Muftah EL Feituri[3], Najat L. Gazali[4], Abdelhamid A. Shaki[4], Mohamed M Alferjani[4], Ibrhim MM Elomami[5]
[1]Faculty of Medicine, Majmaah University Libya
[2]Infectious Diseases, Faculty of Public Health, Benghazi University Libya
[3]Dept. of Environmental Health, Benghazi University Libya
[4]Benghazi University Paediatric Medicine ward of Children Hospital, Benghazi
[5]Dept. Anatumy Benghazi University Libya

Abstract: The study was done to see the clinical features, Diagnosis, investigation and management with specific to Drug management of Acute Respiratory Infection in children. The study was a prospective Cohort study conducted in Children Hospital, Benghazi, during January, 2010 to June, 2010 in 200 children admitted in Medicine Ward were taken as study subject and followed up to the discharge from the hospital. Age and Gender distribution in ARI Children were in the age group of below 1 year with 9.00% in Male and 11.00% in female, followed by 15.00% and 19.00% male and female children in the age group of 1-2 years. Age group of 2-3 years were 6.00% in male and 6, 50% in female, Age group 3-4 and 4-5 years children were 5.00%, 4.00% in male and 4.00% and 3.00% in female children respectively. The youngest child was of 40 days old after birth admitted with ARI with decline pattern of ARI above age group above 5 years in this study. Weight group 2.5- 3.5 Kg in the under one year were the highest number of ARI cases followed by 15.00% in weight group of 5-8 Kg in the age group of 1-2 years children. Height measurements next to weight for age are also one of the important anthropometric measurements taken in the paediatric age group for monitoring growth and development. 21.00% normal height was in the age group of 1-2 years and normal heights are also suffering from ARI in almost uniform percentage. Symptoms of more than one symptom. 91.50%, 46.50% and 42.00% were having symptoms of cough, fever and dyspnoea respectively, followed by cyanosis, vomiting, sputum, wheeze, convulsion and weight loss etc. Fast pulse rate and respiratory rate in ARI children were 146.33 ± 68.59 bt/minute and 47.82 ± 19.65 per minute respectively. Chest finding are positive to 19.50%. 2.00% children were having abnormal valvular murmer heart sound and another 2.00% were also having hepatomegaly and ascites. 0.50% children were having febrile convulsion. Haemoglobin levels were in the range from 7.8 to 13.6 mg/dl and T.L.C.s was in the range from 8.60 to14.30x10^3. ESR level were high (56.81 ± 32.74).15 children (31.91%) out of 47 children had X-ray chest and were having signs of pneumonia in the X-ray chest. Sputum cultures were positive in 8 out of 16 children tested for culture sensitivity. Gastric aspirate of one child out of 4 children was positive to culture. 13.00% children accepted oral, 59.38% of children out of 64 breast feeding children were fed by breast milk. Majority of them 53.00% had I.V. fluids and I.V. line in the initial hospital days. Duration of Hospital stay was 6 ± 4.83 days. Respiratory spasm patient were symptomatically managed with bronchodilators in the form of inhaler or injections. Cough mixtures, Mucolytics, Corticosteroids and antipyretics etc were given according to the need. Antibiotics were given as per W.H.O. protocol mostly and also as per culture report etc. Most of the antibiotics were given individually or in combination for minimum 5-7 days and extended up to 10-14 days according to the severity of ARI children. The Drugs, dose, Schedule were properly monitored by doctors and nurses once the drugs are dispensed from the pharmacy.
Keywods: Respiratory Infection, Children, Drug management, Diagnosis.

INTRODUCTION

Acute respiratory infections (ARI) are the most common illnesses in childhood, comprising as many as 50% of all illnesses in children less than 5 years old and 30% in children aged 5 – 12 years. The World Health Organization (W.H.O.) estimates that one in three newborn infant deaths is due to ARI. Mortality from ARI generally decreases with age [1, 2] The incidence of ARIs in children aged less than 5 years is estimated to be 0.29 and 0.05 episodes per child-year in developing and industrialized countries respectively, which translates into 151 million and 5 million new episodes each year, respectively. Most cases occur in India (43 million), China (21 million), Pakistan (10 million), Bangladesh, Indonesia and Nigeria (56 million each). Acute respiratory infections are responsible for 8.2% of the world's total burden of childhood morbidity. They account for 19% of all deaths in children under the age of five [2,4]. During the six year period from 1975 to 1980, Pediatric Hospital 35,488 sick children under 12 years of age were admitted for inpatient treatment; More than 30% of those who recovered were admitted with ARI and more than 10% of expired cases were with ARI [5]. ARIs commonly include sore throat, runny nose, nasal congestion, headache, low grade fever, facial pressure, sneezing, cough, Rhinitis, Pharyngitis and Tonsillitis. ARIs also include: Influenza, Bronchitis, Pneumonia, and their complications. Onset of the symptoms usually begins 1-3 days after the exposure to a microbial pathogen leading to various types of ARIs. The main etiological agents responsible for ARIs in children include bacterial species and viral species [3].

Bacterial pneumonia is estimated to cause more than one-third of the 2 million deaths due to ARIs, especially in developing countries and is one of the most important bacterial pathogens of infancy and early childhood. Hospitalization rates from severe illness can be as high as 3 per 1000 for 6 to 23 months old children and as high as 9 per 1000 for children younger than 6 months [6]. Among the viral ARIs, Respiratory syncytial virus (RSV), Human para influenza viruses, influenza virus were responsible even in 2002. Another recently identified corona virus is the severe acute respiratory syndrome (SARS) spread in late 2002 and in the spring of 2003 to some 30 countries within Asia, Europe and North America. Influenza virus and Para influenza virus are highly contagious and transmitted via aerosols and droplets from the respiratory tract of infected children by direct contact, through coughing or sneezing, or by hands contaminated with respiratory secretions 30-50% of which are complicated and about 0.3% of which require hospitalization [7]. Nosocomial or hospital-acquired pneumonia is a major public health problem. Pneumonia is the second most common type of all nosocomial infections, with an associated case fatality rate of 20% - 50% [8]. A control program was initiated by W.H.O. for ARIs that focused on cases managed by health workers, Paramedical staff, Pharmacist and Health Volunteers.

Simple case management procedures have been designed for diagnosis and treatment of such infections in situations without any laboratory and radiological facilities. Controls of ARI are still a major public health problem in developing countries [2].

The Aim of the present research was to study the general pattern of Clinical features, Diagnosis, Investigations in general and its Management in specific in Acute Respiratory Infections in children admitted in hospital.

MATERIALS AND METHODS

Type of study and study design

The study was a prospective type of cohort study

Place of study

The study was conducted in Children Hospital, Benghazi

Period of study

The study was done during January, 2010 to June, 2010

Study subjects

200 children admitted in Medicine Ward of Children Hospital, Benghazi, suffering from Acute Respiratory Infection (ARI) of age ≤ 12 years admitted during the study-period were taken as study-subjects.

Collection of data

The pretested Performa was designed from the case history file and in accordance with the requirements of aim and objectives of the study. Necessary permission for this study was sought from the authority including the treating doctors. Formal consent of the parents of pediatric patients was taken for the study and they were assured of maintaining the confidentiality of the study.

Analysis

Data were analyzed with the help of SPSS. Number, percentage, mean and standard deviation were analyzed for the interpretation of results.

Limitation of study

Duration was only for six months instead of one year. Rates and ratios could not be calculated due to unavailability of admitted statistics related to total population.

RESULTS

The Study was conducted in Children Hospital, Benghazi, Libya on the 200 children age's ≤ 12 years admitted in Medical ward due to Acute Respiratory Infection (ARI) during the period from January 2010 to June 2010 on a prospective cohort study. Results were analysed and presented in Tabular and Graphical presentation as follows:

Table-1: Age and Gender distribution in Children suffering from Acute Respiratory Infection

Age In years	Male or female			
	Male (n=95)		Female (n=105)	
	No.	Percentage	No.	Percentage
<1	18	9.00	23	11.50
1-2	30	15.00	38	19.00
2-3	12	6.00	13	6.50
3-4	10	5.00	8	4.00
4-5	8	4.00	6	3.00
5-6	4	2.00	5	2.50
6-7	3	1.50	4	2.00
7-8	3	1.50	2	1.00
8-9	1	0.50	2	1.00
9-10	3	1.50	2	1.00
10-11	2	1.00	1	0.50
11-12	1	0.50	1	0.50
Total(n=200)	95	47.50	105	52.50

Table (1) showed the Age and Gender distribution in Children suffering from Acute Respiratory Infection. Majority of ARI cases were in the age group of below 1 year with 9.00% in Male and 11.00% in female, followed by 15.00% and 19.00% male and female children in the age group of 1-2 years. Age group of 2-3 years were 6.00% in male and 6,50% in female, Age group 3-4 and 4-5 years children were 5.00%, 4.00% in male and 4.00% and 3.00% in female children respectively. The youngest child was of 40 days old after birth admitted with ARI. A decline in the cases of ARI was seen above age group above 5 years children in this study.

Table-2: Distribution in Children suffering from Acute Respiratory Infection according to Weight and Age

Age in years	Weight in Kilograms						
	< 2.5	≥2.5-<3.5	≥3-<5	≥5-<8	≥8-<10	≥10.0-<12	≥12
≤ 1 (n=41)	1(0.50%)	33(16.50%)	7(3.50%)	-	-	-	-
>1- ≤ 2 (n=68)	-	3(1.50%)	26(13.00%)	30(15.00%)	9(4.50%)	-	-
>2-≤ 3 (n=25)	-	-	-	5(2.50%)	12(6.00%)	8(4.00%)	-
>3-≤ 4 (n=18)	-	-	-	-	-	-	18(9.00%)
>4-≤ 5 (n=14)	-	-	-	-	-	-	14(7.00%)
>5-≤ 6 (n=9)	-	-	-	-	-	-	9(4.5%)
>6-≤ 7 (n=7)	-	-	-	-	-	-	7(3.5%)
>7-≤ 8 (n=5)	-	-	-	-	-	-	5(2.5%)
>8-≤ 9 (n=3)	-	-	-	-	-	-	3(1.5%)
>9-≤ 10 (n=5)	-	-	-	-	-	-	5(2.5%)
>10-≤ 11 (n=3)	-	-	-	-	-	-	3(1.5%)
>11-≤ 12 (n=2)	-	-	-	-	-	-	2(1.00%)

Table (2) showed the distribution in Children suffering from ARI according to Weight and Age. Decrease body weight and slow in the growth and developments in age group of less than one year and 1-2 years were in large admitted with ARI cases. Weight for age is a direct indicator of Growth and developments and for calculation of drug administration. 16.50% of weight group 2.5- 3.5 Kg in the under one year were the highest followed by 15.00% in weight group of 5-8 Kg in the age group of 1-2 years children.

Table -3: Distribution in Children suffering from Acute Respiratory Infection according to Height and Age

Age in years	Height in centimetres						
	≤40	41-60	61-80	81-100	101-120	121-140	>141
≤ 1　　(n=41)	2(1.00%)	39(19.50%)	-	-	-	-	-
>1- ≤ 2　(n=68)	-	42(21.00%)	26(13.00%)	-	-	-	-
>2-≤ 3　(n=25)	-	5(2.50%)	20(10.00%)	-	-	-	-
>3-≤ 4　(n=18)	-	-	16(8.00%)	2(1.00%)	-	-	-
>4-≤ 5　(n=14)	-	-	8(4.00%)	6(3.00%)	-	-	-
>5-≤ 6　　(n=9)	-	-	-	8(4.00%)	1(0.50%)	-	-
>6-≤ 7　　(n=7)	-	-	-	3(1.50%)	4(2.00%)	-	-
>7-≤ 8　　(n=5)	-	-	-	-	3(1.50%)	2(1.00%)	-
>8-≤ 9　　(n=3)	-	-	-	-	-	1(0.50%)	2(1.00%)
>9-≤ 10　(n=5)	-	-	-	-	-	1(0.50%)	4(2.00%)
>10-≤ 11　(n=3)	-	-	-	-	-	-	3(1.50%)
>11-≤ 12 (n=2)	-	-	-	-	-	-	2(1.00%)

Table-3 showed the distribution in Children suffering from ARI according to Height and Age. Height measurements next to weight for age are also one of the important anthropometric measurements taken in the paediatric age group for monitoring growth and development. Accuracy in less than 5 age group is more with Weight for Age in monitoring of growth and developments and this table shows the normal height for age when compared with the standard height for age scale, 21.00% normal height were in the age group of 1-2 years and normal heights are also suffering from ARI in almost uniform percentage.

Table-4: Clinical Presentation of Acute Respiratory Infection in Children

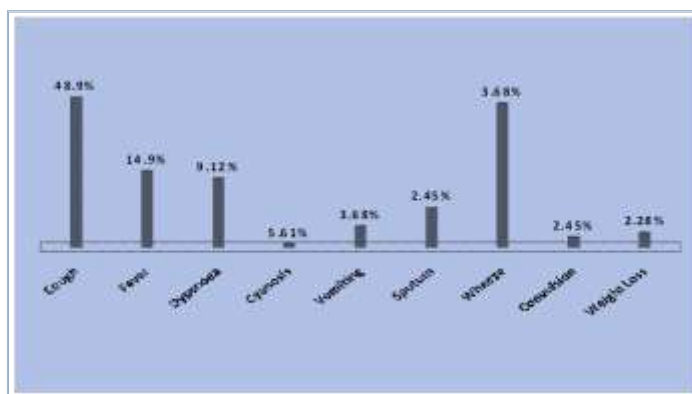| Clinical Presentations	Presentation of symptoms		Duration
	Yes (Number & %)	No (Number & %)	In Days (Mean ± SD)
Cough	183(91.50%)	17(8.50%)	12±5.32
Fever	93(46.50%)	107(53.50%)	5±3.27
Dyspnoea	84(42.00%)	116(58.00%)	8±2.56
Cyanosis	4(2.00%)	196(98.00%)	2±1.5
Vomiting	26(13.00%)	174(87.00%)	3±2.33
Sputum	48(24.00%)	152(76.00%)	4±1.76
Wheeze	176(88.00%)	24(12.00%)	6±2.43
Convulsion	12(6.00%)	188(94.00%)	2±1.66
Weight loss	18(9.00%)	182(91.00%)	632±264.73

Fig-1: Bar diagram showing the clinical presentation of ARI in children

Table-4 and Figure-1 showed the various clinical symptoms of ARI children. Some children were having the symptoms of more than one or two symptoms. Majority are admitted with history of cough, fever and dyspnoea. 91.50%, 46.50% and 42.00% were having symptoms of cough, fever and dyspnoea respectively, followed by cyanosis, vomiting, sputum, wheeze, convulsion and weight loss etc.

Table-5: Medical Examination in Children suffering from Acute Respiratory Infection

Clinical Parameters		(Mean ± SD)
Pulse (bt/min.) (Range from 167-86)		146.33±68.59
Temperature (C^0) (Range from 37-40)		38.06±1.86
Respiration rate (per min.) (Range from 35-60)		47.82±19.65
BP (mm of Hg.)		Not regularly on record
Pallor	Present	37(18.50%)
	Absent	163(81.5%)
Jaundice	Present	2(1.00%)
	Absent	198(99.00%)
Cyanosis	Present	12(6.00%)
	Absent	188(94.00%)
Edema	Present	3(1.50%)
	Absent	197(98.50%)
Chest Examination	Normal	38(19.50%)
	Abnormal	162(81.00%)
C.V.S. Examination	Normal	196(98.00%)
	Abnormal	4(2.00%)
Abdominal Examination	Normal	196(98.00%)
	Abnormal	4(2.00%)
C.N.S. Examination	Normal	199(99.50%)
	Abnormal	1(0.50%)

Table- 5 showed the General Physical and systemic Examination in Children suffering from ARI children. Important examinations done are Pulse, Respiration rate, Respiratory examination looking for respiratory spasm. Onsets of fever are the additional signs of ARI seen in this patients and fitting the standard criteria of diagnosis. Pulse rate and Respiratory rate were 146.33±68.59 bt/minute and 47.82±19.65 per minute respectively. Chest finding are positive to 19.50%. 2.00% children were having abnormal valvar murmur heart sound and another 2.00% were also having abnormal abdominal finding in the form of hepatomegaly and ascites. 0.50% children were having abnormal CNS finding due to febrile convulsion.

Table-6: Investigation in Children suffering from Acute Respiratory Infection

Investigations		
Haemoglobin (13-17 g/dl) (range 7.8-13.6)		12.67±3.92(Mean± SD)
T.L.C. (9x10^3) (range from 8.60-14.30)		9.83±5.62(Mean± SD)
D.L.C.	neutrophils (40-80 %)	67.61±21.86(Mean± SD)
	lymphocytes (20-40 %)	37.33±24.85(Mean± SD)
	monocytes (2-10 %)	8.19±2.59(Mean± SD)
	eosinophils (1-6 %)	3.24±2.81(Mean± SD)
	Basophils (0-2 %)	2.36±1.96(Mean± SD)
E.S.R. (36-52%)		56.81±32.74(Mean± SD)
Chest X-ray (n=47)	Normal	15(31.91%)
	Abnormal	32(68.09%)
Sputum (n=16)	Normal	8(50.00%)
	Abnormal	8(50.00%)
Gastric aspirate (n=4)	Normal	3(75.00%)
	Abnormal	1(25.00%)

Table-6 showed the investigations in Children suffering from ARI. Haemoglobin levels were in the range from 7.8 to 13.6 mg/dl and T.L.C.s was in the range from 8.60 to14.30x10$^3.$ ESR level were high (56.81±32.74).15 children (31.91%) out of 47 children had X-ray chest and were having signs of pneumonia in the X-ray chest. Sputum cultures were positive in 8 out of 16 children tested for culture sensitivity. Gastric aspirate of one child out of 4 children was positive to culture report and antibiotics were given according to the sensitivity report. Most of the diagnosis was made as per W.H.O. protocol with history and clinical features of ARI and least investigation was needed and done.

Table-7: Management with Oral / Ryles tube feeding / Breast milk / I. V. Fluids in Children suffering from Acute Respiratory Infection

Oral (n=200)	accepted	26(13.00%)
Ryles tube feeding	accepted	86(43.00%)
Breast milk	given/accepted	38/64(59.38%)
I.V. fluids	given	106(53.00%)
	not given but IV line	42(21.00%)
	not given	52(26.00%)

Table-7 showed the general management with Oral / Ryles tube feeding / Breast milk / I.V. Fluids in Children suffering from ARI. 13.00% children accepted oral, almost all the Medications were done with IV medications. 59.38% of children out of 64 breast feeding children were fed by breast milk. Majority of them 53.00% had I.V. fluids and I.V. line in the initial hospital days. Duration of Hospital stay was 6± 4.83 days.

Table-8: List of Drugs used for treatment in Children suffering from Acute Respiratory Infection

Name of the drug	Dose	Route	Action	number & %
Inhaler Salbutamol (100 µg puf)	t.d.s.	Inhalation	Bronchodilator	26(13.00%)
Tablet Salbutamol (2 mg)	t.d.s.	Oral	Bronchodilator	4(2.00%)
Tablet Terbutaline (5 mg)	t.d.s.	Oral	Bronchodilator	16(8.00%)
Inhaler Beclomethasone dipropionate (100mg puf)	q.i.d.	Inhalation	Bronchodilator	4(2.00%)
Inhaler Budesonide (100µg puf)	t.d.s.	Puff	Bronchodilator	1(0.50%)
Inhaler Fluticasone (200 µg puf)	t.d.s.		Bronchodilator	1(0.50%)
Syrup Codeine (12 mg)	1 t.s.f. t.d.s.	Oral	Expectorant	52(26.00%)
Syrup Bromhexine (8-16 mg)	1 t.s.f. t.d.s.	Oral	Expectorant	112(56.00%)
Syrup Diphenhydramine(50 mg)	1 t.s.f. t.d.s.	Oral	Anti-allergic	37(18.50%)
Syrup Pheniramine maleate (50 mg)	1 t.s.f. t.d.s.	Oral	Anti-allergic	11(5.50%)
Syrup Promethazine(12.5 mg)	1 t.s.f. t.d.s.	Oral	Anti-allergic	15(7.50%)
Tablet Cetrizine(10 mg)	b.d.	Oral	Anti-allergic	11(5.50%)
Paracetamol Syrup & tablet	2-5 mg q.i.d.	Oral	Antipyretic and Analgesic	125(62.50%)

Table-8 showed the list of Drugs used for treatment in Children suffering from Acute Respiratory Infection. The symptomatic management were quite complex on record. Respiratory spasm patient were symptomatically managed with bronchodilators in the form of inhaler or injections. Cough mixtures, Mucolytics, Corticosteroids and antipyeretics etc were given according to the need.

Table-9: List of Antibiotics used for treatment in Children suffering from Acute Respiratory Infection

Name of the drug	Dose	Route	number & %
Syrup Co-trimoxazole (Trimethoprim 40mg + Sulphamethoxazole 200 mg)	2 t.s.f. b.d.	Oral	42(21.00%)
Syrup/Tablet Ciprofloxacin 250 mg	10ml. b.d.	Oral	4(2.00%)
Tablet Ofloxacin(200 mg)	b.d.	Oral	4(2.00%)
Cap Amoxycillin (500 mg)	10 ml q.i.d.	Oral	46(23.00%)
Cap /Inj. Ampicillin (500mg)	10 ml q.i.d.	Oral	42(21.00%)
Cap Cephelexin(1)(250 mg)	10 ml q.i.d.	Oral	8(4.00%)
Syrup/Tablet Cephadroxil(1)(250mg)	b.d.	Oral	68(34.00%)
Inj.Cephazolin(1) 500 mg	b.d.	I.V.	48(24.00%)
Inj.Cephaclor(2) 500mg	t.d.s.	I.V.	54(27.00%)
Inj.Cefoxitin (2)500 mg	t.d.s.	I.V.	26(13.00%)
Tablet Cefuroxime(2) 250 mg	b.d.	Oral	12(6.00%)
Inj.Cefetaxime(3) 500mg	t.d.s.	I.V.	2(1.00%)
Inj.Ceftriaxone(3) 500 mg	b.d.	I.V.	6(3.00%)
Syrup/Tablet Erythromycin 250mg	t.d.s.	Oral	87(43.50%)
Syrup/Tablet Azithromycin 250mg	t.d.s.	Oral	65(32.00%)
Syrup/Tablet Roxithromycin 150 mg	b.d.	Oral	46(23.00%)
Inj.Gentamycin 40mg	b.d.	I.V.	38(19.00%)
Inj.Amikacin 15mg/kg/day	b.d.	I.V.	42(21.00%)

Table-9 showed the list of Antibiotics used for treatment in Children suffering from ARI. Antibiotics were given as per W.H.O. protocol mostly and also as per culture report etc. The judicious administration of antibiotics were seen .Most of the antibiotics were given individually or in combination for minimum 5-7 days and extended up to 10-14 days according to the severity of ARI children. The Drugs, dose, Schedule were properly monitored by doctors and nurses once the drugs are dispensed from the pharmacy. Oral medications were given to the higher age group children. Syrup form of antibiotics were given to younger age group children, however there was wastages due to vomiting after administration of antibiotics.

DISCUSSION

The majority of ARI cases were in the age group of below 1 year, 1-2, 2-3, 3-4 and 4-5 years and a decline in the cases of ARI were seen above age group above 5 years children in this study. Similar finding was seen showing most common illnesses in childhood, comprising of as many as 50% of all illnesses in children less than 5 years old and 30% in children aged 5 – 12 years [2].

Underweight and malnutrition are risk and more prone for ARI, more than 10% of children expired due to ARI were reported due to malnutrion and underweight [5]. The majority are admitted with history of cough, fever and dypsnoea followed by cyanosis, vomiting, sputum, wheeze, convulsion, weight loss etc. Fast Pulse and Respiration rate with respiratory spasm can fulfilled the diagnostic criteria and no further investigation are needed for prompt diagnosis and treatment, WHO guidelines[1-4,8,9] should be strictly followed for all children cough or difficult breathing should be referred to a hospital as they are at a very high risk. A control program was initiated by W.H.O. [1-4, 8,] for ARIs that focused on cases managed by health workers, Paramedical staff, Pharmacist and Health Volunteers. The majority of ARI episodes are mild and self-limiting, as in the case of coughs and colds. However, about one in every 30 to 50 episodes of cough will develop into pneumonia. Without treatment, 10% to 20% of pneumonia cases will result in death. [3]. Most of the diagnosis was made as per W.H.O. protocol with history and clinical features of ARI and least investigation was needed and done. The common ARI range from: -cold or cough, sore throat, laryngitis, to bronchitis, bronchiolitis, and pneumonia. Respiratory spasm patient were symptomatically managed with bronchodilators in the form of inhaler or injections. Cough mixtures, Mucolytics, Corticosteroids and antipyretics etc were given according to the need. Antibiotics were given as per W.H.O. protocol, Children with severe pneumonia should be treated with ampicillin/penicillin. Children with non-severe presenting with pneumonia should be given antibiotics for 5 days. Emergency Health kits contain co-trimoxazole, which is a low-cost broad spectrum antimicrobial. An alternative is oral amoxicillin. Supportive measures include oral fluids and anti-pyretics to reduce high fever [1,3,4]. In situations where referral is not possible, oral amoxicillin or co-trimoxazole twice daily with Inj. gentamicin once daily should be given for 10 days. Antibiotics and other managements like spasm are manage by bronchodilator, Cough by mucolytics and cough suppressant or anti allergic mixtures and fever by anti- pyretic are the WHO protocol [2,3]. Guidelines for ARI managements for medical workers, Pharmacist and nurses should be read carefully and management can be handled by the above in emergency situation other than doctors [1-4].

CONCLUSION

Acute Respiratory Infection remains an important public health problem in children globally. Much of this could be reduced by recognizing the disease early and by instituting early antibiotic therapy. In case of felt need and in emergency situation health worker, Para medical and Pharmacist can play an important role in the management of ARI in children as per WHO protocol of management of ARI, no much investigation are necessary if early detected . One can understand from the present study and WHO guidelines for need of admission and referral in ARI cases for serious cases and for antibiotics administration and management of complicated cases.

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