Monaldi Archives for Chest Disease

eISSN 2532-5264 https://www.monaldi-archives.org/

Monaldi Arch Chest Dis 2025 [Online ahead of print]

To cite this Article:
Raj S, Palepu S, Bandyopadhyay A, et al. **Treatment practices of childhood pneumonia: the perspective of caregivers. A community-based study in West Bengal.** *Monaldi Arch Chest Dis* doi: 10.4081/monaldi.2025.3150

Treatment practices of childhood pneumonia: the perspective of caregivers. A community-based study in West Bengal

Satyajeet Raj,[1] Sarika Palepu,[2] Arkapal Bandyopadhyay,[3]
Farhad Ahamed,[2] Gitismita Naik,[2] Vikash Kumar Rai[1]

[1]All India Institute of Medical Sciences, Kalyani, West Bengal; [2]Department of Community Medicine and Family Medicine, All India Institute of Medical Sciences, Kalyani, West Bengal; [3]Department of Pharmacology, All India Institute of Medical Sciences, Kalyani, West Bengal, India

Correspondence: Sarika Palepu, Department of Community Medicine and Family Medicine, All India Institute of Medical Sciences, Kalyani – 741245, West Bengal, India.
Tel.: 7980975904. E-mail: sarika.cmfm@aiimskalyani.edu.in

Contributions: SR, SP, conceptualized the study and prepared the draft of the manuscript; FA, provided critical inputs for the study; SR, VKR, contributed to data acquisition and participant recruitment; SR, SP, AB, did preliminary statistical analysis; AB, FA, GN, reviewed and revised the manuscript.

Conflict of interest: the authors declare that there is no conflict of interest

Ethics approval and consent to participate: the study was started after obtaining ethical clearance from the Institutional Ethics Committee vide number IEC/AIIMS/Kalyani/Meeting/2023/039–R.

Informed consent: data collection was done after obtaining written informed consent from the participants.

Patient consent for publication: not applicable.

Availability of data and materials: data and materials are available from the corresponding author upon reasonable request.

Funding: this study was funded by the Indian Council of Medical Research under "ICMR STS 2023 Grants" programme.

Acknowledgments: the authors thank all the participants for providing their valuable time to participate in the study. They also thank the Accredited Social Health Activist (ASHA) workers for supporting the data collection process.

Abstract

Pneumonia, an acute lower respiratory infection, is the single largest infectious cause of death in children worldwide. In this study, we aimed to assess the treatment practices of parents/caregivers for the management of pneumonia in children under 5 years of age in a rural community of West Bengal and to determine the associated causal factors. About 200 children were randomly selected by the multi-stage sampling method from two health and wellness centers. Data was collected in Epicollect and analyzed with STATA 17. Logistic regression analysis was used to evaluate the risk factors associated with childhood pneumonia. The mean (± standard deviation) age of the mother was 28±4.63 years, and for the father, it was 34.61±5.59 years. Most of the families belonged to the middle and lower middle class, and in around half of the families, overcrowding was present. Around 71% of children were delivered by a lower section cesarean section (LSCS), 12% of them were preterm, and 24% were of low birth weight. The majority of children were exclusively breastfed and also immunized for their age. About 66 children (33%) had acute illness in the last 3 months, and 132 (66%) in the last 6 months. In this study, 41% (n=82) of children had pneumonia in the last 6 months. All of them availed some sort of treatment, mainly (62.2%) from private practitioners, followed by government health facilities (25.61%). Around 90% of the families adopted home remedies like traditional herbs (42.5%), followed by tepid sponging (36.9%), *etc*. Around 62.2% of families were very satisfied with the treatment. The caste of family, mode of delivery (LSCS), low birth weight, family history of respiratory disorder, and family history of smoking were found to be significantly associated with childhood pneumonia ($p<0.05$). Knowledge of parents/caregivers was satisfactory in the present study, and all children received some form of treatment for pneumonia.

Key words: pneumonia, under-5 children, health facility, management, morbidity, treatment practices.

Introduction

Pneumonia, an acute respiratory infection affecting lungs is the single largest infectious cause of death in children worldwide. Accounting for about 14% of all deaths, it is still a leading cause of death in children under 5 years of age. Major risk factors for pneumonia in under five children include age particularly under 2 years old, malnourished child, environmental factors like exposure to indoor air pollution, lack of vaccination particularly pneumococcal and Haemophilus influenzae type b and immunocompromised state like human immunodeficiency virus infection [1]. These deaths could be prevented by cost effective interventions like immunization, health education, good nutrition, exclusive breastfeeding, and sanitary management. Children residing in lower- and middle-income countries like India are more susceptible to adverse outcomes of pneumonia. To decrease the under-five mortality to 25 per 1000 live births by the end of 2030 as proposed by sustainable development goals addressing this leading infectious cause is of prime importance [2]. As large proportion of pneumonia cases in children of developing world is caused by bacterial pathogens, prompt treatment with a full course of effective antibiotics is key to reducing pneumonia deaths. Government of India recently introduced SAANS campaign (social awareness and action plan to neutralise pneumonia successfully) with the aim of accelerating action against childhood pneumonia by generating awareness around protect, prevent and treatment aspects of childhood pneumonia and to enhance early identification and care seeking behaviour among parents and caregivers [3]. This programme focuses on enhancing community awareness about pneumonia symptoms, risk factors, and preventive measures. It also encourages the early identification of pneumonia and seeks to improve the timely use of appropriate medical treatment, particularly in rural and underserved areas. Through SAANS programme efforts are made to promote vaccination, better nutrition, improved sanitation, and hygiene practices to combat pneumonia effectively. The objective of this study to assess the treatment practices of parents/care-givers for management of pneumonia in children under-five years of age and also to determine the causal factors associated with childhood pneumonia in a rural community.

Materials and Methods

The present study was conducted in two randomly chosen rural health and wellness centres (HWC) (in a primary health centre affiliated to a tertiary care institution) in West Bengal. Assuming the prevalence of pneumonia as 4.9% according to a study by Minz A et al [4], absolute precision of 3 and non-response rate of 5%, the calculated sample size was 209. According to Sample registration system (SRS) 2020, the birth rate of West Bengal was 14.6 per 1000 population and under five mortality rates of 22 per 1000 [5], there were about 1000 children under 5 years of age in the two selected HWCs. Line-listing of all children under five

years of age was made with the help of ASHA workers and about 210 children were randomly selected with the help of random number generator software. If more than one child belonged to the same family as per the random number table, only one child was included in the study by lottery method.

Inclusion criteria: Parents/Care-givers of all children under five years of age residing in the study area for more than six months and willing to provide written informed consent.

Exclusion criteria: Parents/care-givers who were not available at the residence despite two visits and infants below 2 months of age.

The study was started after obtaining ethical clearance from Institutional Ethics Committee (vide number - IEC/AIIMS/Kalyani/Meeting/2023/039 – R). A pre-tested semi structured interview schedule was used to collect socio-demographic information, natal history, anthropometry (weight for age, height for age, weight for height and mid-upper arm circumference), history of pneumonia in the previous six months prior to survey, management practices followed by parents/care-givers, morbidity profile of the children and hindrances in availing treatment. The socio-economic status of family was assessed using the modified Kuppuswamy scale. Anthropometry of the children was done with infantometer/stadiometer (for height), standardised digital weighing scales (for weight) and Shakir's tape (for Mid upper arm circumference).

Statistical analysis: Data was collected in Epi-collect 5 and exported to Microsoft Excel 2013. Coding was done after checking for completeness and consistency. The data was analysed using STATA 17. Continuous data was presented as mean (±SD) and categorical data was presented as percentages (%) after applying tests of normality. Anthropometric assessment was derived using WHO Anthro package in R software version 4.3. Logistic regression analysis was used to evaluate the risk factors associated with childhood pneumonia. Variables with p-value less than 0.25 on bivariate logistic regression were included in multi-variate logistic regression. A "p" value less than 0.05 on multi-variate logistic regression was considered as statistically significant.

Operational definitions: Pneumonia (pneumonia and/or severe pneumonia) was defined as any child of age 2 to 59 months, with fever, cough and/or difficult breathing, fast breathing and/or chest indrawing and/or general danger signs (not able to drink, persistent vomiting, convulsions, lethargic or unconscious, stridor in a calm child or severe malnutrition [6].

Wasting: low weight-for-height, moderate wasting is when a child's weight-for-height is between -2 and -3 standard deviations while severe wasting is when a child's weight-for-height is below -3 standard deviations as per WHO growth charts.

Stunting: low length/ height for age, moderate stunting is when a child's height-for-age is between -2 and -3 standard deviations while severe wasting is when a child's height-for-age is below -3 standard deviations as per WHO growth charts

Cost of care: this includes direct costs like hospital fees, medications, and medical procedures, as well as indirect costs such as transportation.

High risk pregnancies: for this we include several maternal factors like elderly (>35 years), short stature (<140 cm), mal-presentation, antepartum haemorrhage, threatened abortion, pre-eclampsia, eclampsia, gestational diabetes, multiple pregnancy, previous history of still birth, prolonged pregnancy, pre-existing health condition like heart and kidney disease.

Results

The response rate in the study was 95% as 9 participants could not be contacted despite 2 visits. The mean age of the mother was 28.7 years and most of them (90.5%) were not working (Table 1).

Out of 200 families, in 189 (94.5%) respondents were mother and in 11 (5.5%) respondents were father or any other family member. Nearly two-third (65.5 %) were extended type of family. Majority (77%) of them were registered under health scheme i.e., Swasthya Sathi (Table 2).

In our study, there were 104 males and 96 female children under five years of age (Table 3). Around 11% children had moderate/severe wasting and 3% children had moderate/severe stunting. About 95% children were immunised for age. Majority of the children (89.5%) were availing the Anganwadi services. Only very few (1.5%) children were diagnosed with congenital anomalies and 3% were diagnosed with childhood asthma. About 66 (33%) children had acute illness in last 3 months and 132 (66%) had history of acute illness in last 6 months. There were a total of 89 and 187 acute illness episodes in last 3 months and 6 months respectively. Majority of them had history of fever followed by acute respiratory infection (ARI) and diarrhoea.

In our study out of 200 children, 82 (41%) had pneumonia in last 6 months. Majority of them, i.e., 67 (81.71%) had one episode and 15 (18.29%) had two episodes of pneumonia. All the symptoms and treatment practices were assessed for the most recent episode of pneumonia preceding the interview.

In children with pneumonia, majority of them had symptoms of fever (97.56%) followed by cough (97.56%), persistent vomiting (89.02%), not able to drink (80.49%), fast breathing (76.8%), inability to feed (75.64%), stridor in calm child (25.61%), lethargy (20.73%), weight loss (14.63%), chest indrawing (12.2%), convulsions (2.44%) and unconsciousness (2.44%).

All of the children availed some sort of treatment for pneumonia. Majority (62.2%) of the children went to the private practitioner followed by government health facility (25.61%), Informal health care provider (7.32%) and over the counter medications (4.88%). Around 90% of the families took some type of home remedies during illness (Table 4).

Majority of the respondents (80.49%) reported the treatment to be easily accessible. The median waiting time and consultation time was 60 minutes and 10 minutes respectively. Around 80.49% respondents reported the non-availability of lab services whereas 29.27% reported the availability of medicines. Around 62.2% families were very satisfied with treatment.

Caste of family, mode of delivery (LSCS), Low birth weight, family history of respiratory disorder and family history of smoking are found to be significantly associated with Pneumonia ($p< 0.05$) on multi-variate logistic regression (Table 5).

Discussion

In the present study, prevalence of childhood pneumonia, treatment practices of childhood pneumonia and causal factors associated with childhood pneumonia are assessed.

The prevalence of childhood pneumonia in our study was found to be 41%, which is higher than study done by Nabanita Nirmolia et al. in Dibrugarh India (16.34%) [7]. This difference might be due to larger number of sample size (N=624) as compared to our study and different socio-cultural status of family. According to National Family Health Survey -5 (NFHS-5) about 3% of children under five years had symptoms of ARI in the two weeks before the survey that corresponds to around 39% if we calculate cumulative prevalence for ARI (symptoms of cough, fever) in last six months, which is similar to our study [8].

Regarding knowledge of caregivers about symptoms of pneumonia, in our study majority of respondents noted high fever (97.56%), cough (97.56%), persistent vomiting (89.02%), inability to feed (80.49%) and fast breathing (76.8%) which is higher than study done by Wafa Aftab et al. in rural Pakistan [9], which reported fever (71%), cough (56%), breathing problems (21%). This might be due to difference in educational level of mothers. In our study only 10.5% of mothers were illiterate whereas most of the respondents in study done by Wafa Aftab had not attained formal education.

With respect to management of childhood pneumonia, in our study majority of children went to private practitioner (62.2%) followed by government health facility (25.61%). This result was almost similar to study done by Sunita Dharel et al. in Nepal [10].

In our study, we found that caste of family, mode of delivery, low birth weight, family history of smoking and family history of respiratory disorder were major factors associated with childhood pneumonia. Children belonging to Other Backward Caste(OBC)/ scheduled Caste

(SC)/ scheduled Tribes (ST) had about 12 times higher chance of developing pneumonia than those who belongs to General caste (p=0.003). Children delivered through LSCS had about six times (odd's ratio=6.44) more chance of childhood pneumonia as compared to those born through normal vaginal delivery. Children with low birth weight had about 4.83 times (odd's ratio=0.207) more chance of childhood pneumonia as compared to that of normal birth weight. Similar results were found by Imran khan et al. [11], and Amar M Taksande et al. [12], in which low birth weight of children was also a risk factor for developing childhood pneumonia. Similarly, children having family history of respiratory disorder and family history of smoking had 4.67 times and 2.6 times respectively more chance of developing childhood pneumonia compared to those who had no such family history. Similar result was found in a study done by Sunita Dharel et al. where family history of smoking was also a risk factor for childhood pneumonia [10].

Conclusions

Pneumonia is still a leading cause of morbidity and mortality in children under five years of age in developing countries like India. In our study prevalence of pneumonia in the past six months was found to be around 41%. Caste of family, low birth weight, LSCS delivery, family history of respiratory disorder and smoking were found to be significantly associated with the occurrence of pneumonia. Knowledge of parents/care-givers was satisfactory in the present study and all children received some treatment for pneumonia, majorly from private hospitals. Further in-depth studies need to be conducted to understand the reasons for seeking health care from private health facilities in this community.

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Table 1. Socio-demographic information of parents

SL no.	Variable		Mother, n (%)	Father, n (%)
1.	Age (in years) (mean ±SD)		28.74 ±4.63	34.61±5.59
2.	Education N (%)	Illiterate	21 (10.5)	9(4.5)
		Primary school	16(8)	12(6)
		Middle school	70(35)	45(22.5)
		High school	44(22)	34(17)
		Higher secondary	31(15.5)	47(23.5)
		Graduate/post graduate	21(10.5)	53(26.5)
3.	Occupation, n (%)	Not working	181(90.5)	2(1)
		Working	19(9.5)	198(99)
4.	Age at marriage (in years) (mean ±SD)		19.5±2.74	25.67±3.88

SD, standard deviation.

Table 2. Socio-demographic information of family.

SL no.	Variable		Response
1.	Total no of family members, median (IQR)		5 (4-6)
2.	Religion, n (%)	Hindu	199 (99.5)
		Muslim	1 (0.5)
3.	Caste,n (%)	SC/ST	125(62.5)
		General	51(25.5)
		OBC	24(12)
4.	Monthly income of family (in rupees), median (IQR)		14,000 (10,000-20,000)
5.	Socioeconomic status, n (%)	Upper middle	6 (3)
		Middle	77 (38.5)
		Lower middle	74 (37)
		Lower	43 (21.5)
6.	Health scheme in the family, n (%)	Yes	154 (77)
		No	46 (23)
7.	Overcrowding, n (%)	Yes	103 (51.5)
		No	97 (48.5)
8.	Fuel source, n (%)	LPG	146 (73%)
		Wood/charcoal/cow dung	54 (27%)
9.	Family history of smoking, n (%)	Yes	93 (46.5%)
		No	107 (53.5%)

LPG, liquified petroleum gas; IQR, interquartile range.

Table 3. Details of children under 5 years of age.

SL no.	Variable		Results
1.	Birth order of child, median (IQR)		1 (1-2)
2.	Age of child in months (mean ±SD)		34.52±15.39
3.	Birth weight in grams (mean ±SD)		2748.06±408.99
4.	Distribution of mode of delivery, n (%)	LSCS	142 (71%)
		Normal	53 (26.5%)
		Assisted / forceps	5 (2.5%)
5.	Low birth weight, n (%)	Yes	48 (24)
		No	152 (76)
6.	Preterm deliveries, n (%)	Yes	24 (12%)
		No	176 (88%)
7.	Cried immediately after birth, n (%)	Yes	190 (95)
		No	10 (5)
8.	Exclusively breastfed, n (%)	Yes	164 (82)
		No	36 (18)

Table 4. Treatment practices for pneumonia.

SL no.	Variable (N=82)			Response
1.	Time after which treatment was sought (in hours), median (IQR)			36 (12-72)
2.	Home remedy, n (%)	Yes	Traditional herbs	31(42.47)
			Tepid sponging	27(36.99)
			Give hot drinks	9(12.33)
			Honey	5(6.85)
			Any others	1(1.37)
		No		9 (10.97)
3.	Were multiple health facilities visited for the last episode of pneumonia, n (%)	Yes		25 (30.48)
		No		57(69.52)
4.	Accompanying person to avail treatment, n (%)	Mother		72 (87.8)
		Father		10 (12.2)
5.	Cost of care (in rupees), median (IQR)			1000 (300-1200)
6.	Treatment received, n (%)	Oral medications		72 (87.8)
		Both oral and injectable		10 (12.2)
7.	Duration of treatment (in days), median (IQR)			7 (5-8)
8.	Whether the child was hospitalised for recent episode of pneumonia, n (%)	Yes		10 (12.2)
		No		72 (87.8)

Table 5. Association of pneumonia with selected variables.

SL no.	Variable	Category	Unadjusted OR	p, 95% CI	Adjusted OR	p, 95% CI
1.	Mothers' education	Illiterate	1	-	1	-
		Literate	0.17	0.003, 0.05-0.53	0.33	0.248, 0.05-2.12
2.	Fathers' education	Illiterate	1	-	-	-
		Literate	0.54	0.370, 0.14-2.07		
3.	Mothers' occupation	Not working	1	-	-	-
		Working	0.63	0.383, 0.23-1.75		
4.	Fathers' occupation	Not working	1	-	-	-
		Working	0.69	0.796, 0.04-11.22		
5.	Type of family	Nuclear	1	-	1	-
		Extended	1.48	0.196, 0.81-2.72	0.65	0.394, 0.24-1.73
6.	Caste	General	1	-	1	-
		OBC/SC/ST	3.18	0.000, 2.04-4.97	12.12	0.003, 2.35-62.38
7.	Socioeconomic status	Lower	1	-	1	-
		Lower middle / middle / upper middle / upper	0.137	0.000, 0.06-0.301	0.39	0.101, 0.12-1.20
8.	Overcrowding	Yes	1	-	1	-
		No	0.110	0.000, 0.05-0.21	0.62	0.401, 0.21-1.86
9.	Fuel	LPG	1	-	1	-
		Wood/charcoal	12.50	0.000, 5.73-27.27	2.14	0.242, 0.59-7.67
10.	Gender	Female	1	-	1	-
		Male	1.43	0.210, 0.81-2.53	0.932	0.881, 0.37-2.32
11.	High risk pregnancy	Yes	1	-	-	-
		No	1.16	0.837 0.27-5.01		
12.	Mode of delivery	Normal	1	-	1	-
		LSCS	2.12	0.030, 1.07- 4.18	6.44	0.005, 1.74-23.86
13.	Place of delivery	Government	1	-	1	-
		Private	1.01	0.06, 0.57-1.80	0.31	0.051, 0.09-1.003
14.	Pre term delivery	Yes	1	-	1	-
		No	0.157	0.000, 0.05-0.44	0.58	0.482, 0.13-2.59
15.	Cry after birth	Yes	1	-	1	-
		No	6.27	0.02, 1.29-30.34	1.52	0.777, 0.08-28.37
16.	Low birth weight	Yes	1	-	1	-
		No	0.091	0.000, 0.04-0.20	0.207	0.018, 0.056-0.76
17.	Exclusively breastfed	Yes	1	-	1	-
		No	8.67	0.000, 3.57-21.08	2.06	0.281, 0.55-7.66
18.	Family history of respiratory disorder	Yes	1	-	1	-
		No	0.29	0.000, 0.15-0.57	0.217	0.008, 0.06-0.67
19.	MR	Yes	1	-	1	-
		No	1.49	0.778, 0.09-24.24	-	-
20.	Vitamin A	Yes	1	-	1	-
		No	2.44	0.130, 0.76-7.75	0.217	0.380, 0.33-17.66
21.	IFA syrup	Yes	1	-	1	-
		No	1.46	0.269, 0.74-2.90	-	-
22.	Family history of smoking	Yes	1	-	1	-
		No	0.192	0.000, 0.10-0.35	0.384	0.049, 0.14-0.99
23.	Acute malnutrition	Yes	1	-	-	-
		No	0.71	0.698 0.06 – 5.11	-	-

OR, odds ratio; CI, confidence interval; MR, Measles Rubella; IFA, iron folic acid.