International Journal of Contemporary Pediatrics
Saheb SA et al. Int J Contemp Pediatr. 2017 Nov;4(6):2032-2035
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291

DOI: http://dx.doi.org/10.18203/2349-3291.ijcp20174725

Original Research Article

Influence of seasonal variation on severity and outcomes in acute bronchiolitis

Shaik Ateal Saheb, R. Samba Siva Reddy*

Department of Pediatrics, Narayana Medical College, Nellore, Andhra Pradesh, India

Received: 10 October 2017
Accepted: 13 October 2017

***Correspondence:**
Dr. R. Samba Siva Reddy,
E-mail: rssreddy@gmail.com

ABSTRACT

Background: Bronchiolitis is a predominant cause of respiratory insufficiency and hospitalization in infants during the first year of their life. Respiratory syncytial virus (RSV) has been the major causative virus; other viruses also cause bronchiolitis. Some are activated in winter while another virus in non-winter seasons. This seasonal trend affects the morbidity in infants. In the Indian context, data regarding seasonal influence on the severity and complications of acute bronchiolitis is less. Hence, this study was undertaken to assess the influence of season on morbidity on mortality in acute bronchiolitis.
Methods: Infants or children <2 years of age, with the first episode of acute bronchiolitis diagnosed clinically, were evaluated. Clinical, demographic, radiological and risk factors were recorded and correlated with seasons.
Results: The age of the infants was 4.0±2.9 months. Peak occurrence (87.7%) was within six months of age. 78/105 (74.3%) of bronchiolitis occurred during July to December. 22/105 (20.9%) were mild, 43/105 (43.9%) were moderate, and 40/105 (38.9%) were severe. The order of chest X-ray findings are consolidation <atelectasis <normal <pulmonary infiltrates <bilateral Hyperareation. Apnea was seen in 2.9%, Otitis media in 7.6% and seizures in 3.8% of infants. The season did not show statistically significant trend on the severity of bronchiolitis. There were no infant deaths due to bronchiolitis in the present study.
Conclusions: In the present study, the season did not show statistically significant trend on the severity of bronchiolitis. Studies with more extensive population are needed to reassess the seasonal effects on morbidity of acute bronchiolitis.

Keywords: Bronchiolitis, Outcomes, Respiratory Syncytial virus, Severity

INTRODUCTION

Viral bronchiolitis is a lower respiratory tract infection (LRTI) that affects 20-30% of infants.[1] It is a significant cause of hospitalisation in infancy and often caused by the respiratory syncytial virus (RSV).[2] It presents with clinical symptoms of wheezing, tachypnea and cough among healthy young children.[3] Bronchiolitis occurs most frequently among children younger than 12 months of age and infants younger than six months are at highest risk of clinically significant disease. Mortality is around 0.5% to 1.5% in hospitalized patients, increasing to 3-5% for those with underlying cardiac or pulmonary disease.[4] The diagnosis is usually clinical symptoms and investigations are not needed to confirm the diagnosis. Acute complications including respiratory failure, apnea, pneumothorax, occurring among infants hospitalized with bronchiolitis, more commonly among premature infants and infants with congenital abnormalities and immunodeficiency.[5] Treatment is mainly supportive, paying attention to hydration and maintaining satisfactory oxygenation. Bronchodilators, steroids and other treatment modalities do not alter the course of the illness nor reduce the length of the hospital stay. The association

between early bronchiolitis (especially RSV infection) and recurrence of wheeze has been debated hotly.[6,7] In the Indian context, data regarding seasonal influence on the severity and complications of acute bronchiolitis is less. Hence, this study was undertaken to assess the influence of season on morbidity on mortality in acute bronchiolitis.

METHODS

This prospective study was conducted during the period November 2007 to October 2009. Infants or children <2 years of age with the first episode of acute bronchiolitis, determined by fever, rhinitis, tachypnoea, cough, wheezing, crackles, use of accessory muscles and chest X-ray findings such as hyperinflation of the lungs, peri-bronchial thickening, increased interstitial markings and collapse of the lung. Children with underlying chronic lung disease or neurological disease or congenital heart disease, immunocompromised or with hospital-acquired bronchiolitis were excluded.

Bronchiolitis was categorized as mild if there are minimal respiratory distress, age >3months, respiratory rate (RR) <50/minutes, taking adequate feeds, no risk factors and oxygen saturation >95%. Moderate bronchiolitis is defined as infants with mild to moderate respiratory distress, RR 50-70/minutes, no risk factors, and oxygen saturation 92-95% and severe bronchiolitis with moderate to severe respiratory distress ~70/minutes, looks toxic, poor feeding, apnea, oxygen saturation <92%. Oxygen saturation was measured using a portable Nellcor oximeter (model NIOA; Hayward, California, USA) for at least 5 minutes. Exclusive breastfeeding is defined as breastfeeding alone for six months in infants >6 months of age and currently breastfeeding in infants <6 months of age.

Statistical analysis

Demographical variables and clinical variables were reported in frequencies with their percentages, mean and its standard deviation. Association between the severity of bronchiolitis and seasonal variation was analysed using Spearman correlation analysis. A P value <0.05 was taken as significant.

RESULTS

A total of 105 cases of bronchiolitis were evaluated. The age of the infants was 4.0±2.9 months. Peak occurrence (87.7%) was within six months of age. It can be seen from the Table 1 and 2, that majority of sufferers were boys.

Table 1: Predisposing factors bronchiolitis in infants across different seasons.

		January-March		April -June		July- Sept		Oct - Dec		Total	
		n	%	n	%	n	%	n	%	n	%
Gender	Female	5	26.30	3	37.50	12	30.00	10	26.30	30	28.60
	Male	14	73.70	5	62.50	28	70.00	28	73.70	75	71.40
Socio economic status[8]	Lower middle	8	42.10	4	50.00	10	25.00	11	28.90	33	31.40
	Upper	4	21.10	2	25.00	1	2.50	8	21.10	15	14.30
	Upper middle	7	36.80	2	25.00	29	72.50	19	50.00	57	54.30
Gestation	Pre-term	0	0.00	2	25.00	3	7.50	4	10.50	9	8.60
	Term	19	100.00	6	75.00	37	92.50	34	89.50	96	91.40
Nutrition[9]	<3%	0	0.00	2	25.00	1	2.50	1	2.60	4	3.80
	3-10%	0	0.00	2	25.00	8	20.00	6	15.80	16	15.20
	10-50%	11	57.90	1	12.50	18	45.00	21	55.30	51	48.60
	50-75%	5	26.30	2	25.00	13	32.50	9	23.70	29	27.60
	>75%	3	15.80	1	12.50	0	0.00	1	2.60	5	4.80
Breast feeding	No	8	42.10	5	62.50	21	52.50	16	42.10	50	47.60
	Yes	11	57.90	3	37.50	19	47.50	22	57.90	55	52.40
Family history asthma	None	12	63.20	6	75.00	32	80.00	26	68.40	76	72.40
	Father	0	0.00	0	0.00	2	5.00	0	0.00	2	1.90
	Mother	0	0.00	2	25.00	1	2.50	1	2.60	4	3.80
	Others	4	21.10	0	0.00	3	7.50	4	10.50	11	10.50
	Siblings	3	15.80	0	0.00	2	5.00	7	18.40	12	11.40
Atony	None	12	63.20	6	75.00	24	60.00	29	76.30	71	67.60
	Insect bite	6	31.60	2	25.00	13	32.50	8	21.10	29	27.60
	Seborrheic dermatitis	1	5.30	0	0.00	3	7.50	1	2.60	5	4.80

Only 9/105 (8.6%) were preterm babies. 50/105 (47.6%) did not have breastfeeds. Majority 57/105 (54.30%) are the offspring of upper middle class. 71/105 (67.6%) were having nutritional status less than 50%, and only 5/105 (4.8%) were above 75% mark. 12/105 (11.40%) of siblings of infants has asthma. 29/105 (27.60%) had suffered insect bite. 78/105 (74.3%) of bronchiolitis occurred during July to December. 22/105 (20.9%) were mild, 43/105 (43.9%) were moderate, and 40/105 (38.9%) were severe.

Table 2: Seasonal variations, chest x-ray findings and complications across the severity of bronchiolitis.

		Mild		Moderate		Severe		Total	
		n = 22		n = 43		n = 40		n = 105	
Age	Months	3.2±2.2		4.1±3.2		4.0±3.2		4.0±2.9	
Gender	Female	9	40.90	14	32.60	7	17.50	30	28.60
	Male	13	59.10	29	67.40	33	82.50	75	71.40
	Total	22	100.00	43	100.00	40	100.00	105	100.00
Season	January-March	5	22.70	7	16.30	7	17.50	19	18.10
	April-June	2	9.10	3	7.00	3	7.50	8	7.60
	July-September	8	36.40	19	44.20	13	32.50	40	38.10
	October-December	7	31.80	14	32.60	17	42.50	38	36.20
	Total	22	100.00	43	100.00	40	100.00	105	100.00
Chest X-ray	Atelectasis	3	13.60	5	11.60	3	7.50	11	10.50
	Bilateral Hyperareation	8	36.40	18	41.90	14	35.00	40	38.10
	Consolidation	1	4.50	0	0.00	3	7.50	4	3.80
	Normal	6	27.30	6	14.00	8	20.00	20	19.00
	Pulmonary infiltrates	4	18.20	14	32.60	12	30.00	30	28.60
	Total	22	100.00	43	100.00	40	100.00	105	100.00
Complications	None	19	86.40	37	86.00	34	85.00	90	85.70
	Apnea	1	4.50	2	4.70	0	0.00	3	2.90
	Otidismedia	2	9.10	4	9.30	2	5.00	8	7.60
	Seizures	0	0.00	0	0.00	4	10.00	4	3.80
	Total	22	100.00	43	100.00	40	100.00	105	100.00

Table 3: Spearman's correlation between severity of bronchiolitis and risk factors.

Severity of bronchiolitis		Season	Socio-economic status	Nutrition	Breast-feeding	FH/o Asthma	Atony
	R	0.084	0.041	-0.138	-0.123	0.114	-0.064
	p-value	0.395	0.677	0.161	0.21	0.247	0.519

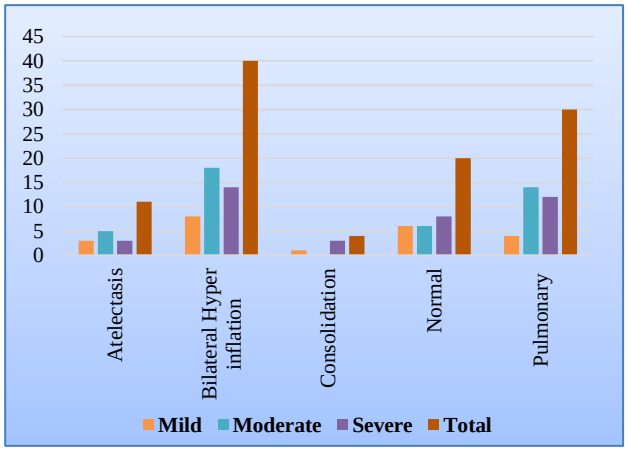

Figure 1: Severity of bronchiolitis versus spectrum of chest X-ray features.

The order of chest X-ray findings are consolidation<atelectasis<normal<pulmonary infiltrates <bilateral Hyper-areation. Apnea was seen in 2.9%, Otitis media in 7.6% and seizures in 3.8% of infants. The season did not show statistically significant trend on the severity of bronchiolitis (Figure 1). Additionally, risk factors for bronchiolitis did not have a significant correlation with severity of disease (P>0.05) (Table 3). There were no infant deaths due to bronchiolitis in the present study.

DISCUSSION

Bronchiolitis secondary to respiratory syncytial viral infections (RSV) is a predominant cause of respiratory insufficiency and hospitalisation in infants during the first year of their life.[10,11]

During acute bronchiolitis infections, younger children and those with a history of prematurity were more likely to suffer from severe disease.[12] In the present study, we did not observe such correlation, since there were only 8.6% were preterm babies and 99% of children admitted with bronchiolitis in our hospital were ≤12 months of age. We observed that breastfeeding did do not have too significant impact on the severity of disease since 50/105 (47.6%) did not receive breastfeed. 67.6% had nutritional status less than 50% suggesting malnutrition, and only 4.8% were above 75% mark. However, we did not notice a significant correlation between severity and nutritional status. 11.40% siblings of infants have asthma, and 27.60% had suffered insect bite. It is theoretically possible such patients may experience severe disease. However, we did not notice such a significant finding. We noticed that 74.3% of bronchiolitis occurred between July and December. Influence of seasonal activity of the most commonly detected respiratory viruses has been reported in the literature.[13,14] According to Heyman et al, respiratory syncytial virus is the dominant pathogen during the winter months whereas rhinovirus is more common during other months.[15] However, we did not identify the virus. The season has no significant effect on the severity of bronchiolitis

CONCLUSION

In the present study, the season did not show statistically significant trend on the severity of bronchiolitis. Studies with more extensive population are needed to reassess the seasonal effects on morbidity of acute bronchiolitis.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Glezen WP, Taber LH, Frank AL, Kasel JA. Risk of primary infection and reinfection with respiratory syncytial virus. Am J Dis Children. 1986;140(6):543-6. 2.
2. American Academy of Pediatrics Subcommittee on Diagnosis and Management of Bronchiolitis. Diagnosis and management of bronchiolitis. Pediatrics. 2006;118(4):1774-93.
3. Holman RC, Shay DK, Curns AT, Lingappa JR, Anderson LJ. Risk factors for bronchiolitis-associated deaths among infants in the United States. Pediatr Infect Dis J. 2003;22(6):483-9.
4. Handforth J, Friedland J, Sharland M. Basic epidemiology and immunopathology of RSV in children. Pediatr Respir Rev. 2000;1(3):210-4.
5. Grimaldi M, Gouyon B, Michaut F, Huet F, Gouyon JB. Severe respiratory syncytial virus bronchiolitis: epidemiologic variations associated with the initiation of palivizumab in severely premature infants with bronchopulmonary dysplasia. Pediatr Infect Dis J. 2004;23(12):1081-5.
6. Korppi M, Piippo-Savolainen E, Korhonen K, Remes S. Respiratory morbidity 20 years after RSV infection in infancy. Pediatr Pulmonol. 2004;38(2):155-60.
7. Hegele RG, Ahmad HY, Becker AB, Dimich-Ward H, Ferguson AC, Manfreda J, et al. The association between respiratory viruses and symptoms in 2-week-old infants at high risk for asthma and allergy. J Pediatr. 2001;138(6):831-7.
8. Mishra D, Singh H. Kuppuswamy's socioeconomic status scale: a revision. Indian J Pediatr. 2003;70(3):273-4.
9. De Onis M, Onyango AW, Borghi E, Garza C, Yang H, Group WMGRS. Comparison of the World Health Organization (WHO) Child Growth Standards and the National Centre for Health Statistics/WHO international growth reference: implications for child health programmes. Public Health Nutr. 2006;9(7):942-7.
10. Zorc JJ, Hall CB. Bronchiolitis: recent evidence on diagnosis and management. Pediatr. 2010;125(2):342-9.
11. Petruzella FD, Gorelick MH. Current therapies in bronchiolitis. Pediatric Emergency Care. 2010;26(4):302-7.
12. Sala KA, Moore A, Desai S, Welch K, Bhandari S, Carroll CL. Factors associated with disease severity in children with bronchiolitis. J Asthma. 2015;52(3):268-72.
13. Hall CB, Weinberg GA, Iwane MK, Blumkin AK, Edwards KM, Staat MA, et al. The burden of respiratory syncytial virus infection in young children. New Eng J Med. 2009;360(6):588-98.
14. Janahi I, Abdulkayoum A, Almeshwesh F, Alkuwari M, Al Hammadi A, Alameri M. Viral aetiology of bronchiolitis in hospitalised children in Qatar. BMC Infect Dis. 2017;17(1):139.
Heymann PW, Carper HT, Murphy DD, Platts-Mills TA, Patrie J, McLaughlin AP, et al. Viral infections in relation to age, atopy, and season of admission among children hospitalized for wheezing. J Allergy Clin Immunol. 2004;114(2):239-47. P

Cite this article as: Saheb SA, Reddy RSS. Influence of seasonal variation on severity and outcomes in acute bronchiolitis. Int J Contemp Pediatr 2017;4: 2032-5.