

Risk factors for lower respiratory tract infections in children

Ibrahim Silfeler¹, Ibrahim Cansaran Tanidir², Vefik Arica³

ABSTRACT

Objectives: Acute respiratory tract infections are divided into two groups as upper and lower respiratory tract infections. These are very common diseases in childhood. In this study, we aimed to determine risk factors for lower respiratory tract in this region.

Methodology: Three hundred and fifty children who presented at pediatric polyclinics of our hospital were included in our study. Their examinations, backgrounds, family histories and information about environmental factors were recorded in questionnaire forms.

Results: Lack of vaccination, duration of breastfeeding, onset age of cow's milk, family history for asthma and food allergy, number of hospitalized people in the same room, number of people who live in same house and smoking around the children were evaluated for the presence of LRTI, and LRTI risks of these factors were respectively observed as 1.69, 1.71, 1.61, 1.69, 1.20, 1.47, 1.56 and 2.63 fold increased.

Conclusion: Standardization of clinical diagnosis, accurate and realistic use of antibiotics, correction of nutrition, improvement of socio-economic situation and the elimination of environmental factors will significantly reduce morbidity and mortality in children due to Lower Respiratory Infections.

KEY WORDS: Environmental factors, Lower respiratory tract infection, Risk factors.

Pak J Med Sci April - June 2012 Vol. 28 No. 3 488-491

How to cite this article:

Silfeler I, Tanidir IC, Arica V. Risk factors for lower respiratory tract infections in children. Pak J Med Sci 2012;28(3):488-491

INTRODUCTION

Acute respiratory tract infections are frequently encountered diseases in childhood. Most of these are upper respiratory tract infections (URTI). Pneumonia, Croup syndrome, acute bronchiolitis, acute bronchitis and lower

respiratory tract infections (LRTI) may be included in lower respiratory tract infections (LRTI), because lower respiratory tract is cited as a region which includes larynx and below.

LRTI is a common disease of childhood all over the world, and causes death of children who are younger than five years in developing or least developed countries. In these developing countries as in Turkey, low birth weight, nutritional deficiencies, crowded living conditions and high nasopharyngeal carriage rate of respiratory tract pathogens are risk factors which increase morbidity and mortality of LRTI.¹

In children who were exposed smoke, epidemiologic studies have shown that there was an increase at lower respiratory tract diseases (LRTI), middle ear effusion, asthma and sudden infant deaths.² Furthermore, there was a significant increase at complaints of wheezing and coughing and pulmonary infections in children

1. Ibrahim Silfeler,
 2. Ibrahim Cansaran Tanidir, Mehmet Akif Ersoy Training and Research Hospital, Department of Pediatrics, Istanbul, Turkey.
 3. Vefik Arica,
- 1, 3: Department of Paediatrics, Faculty of Medicine, Mustafa Kemal University, Antakya, Hatay, Turkey.

Correspondence:

Ibrahim Silfeler,
Aladdin Village, Gungor Uydukent 30 parcel,
D11 / 3 of Antakya, Hatay, Turkey.
E-mail: drsilfeler@gmail.com

- * Received for Publication: September 6, 2011
- * Revision Received: January 24, 2012
- * Revision Accepted: February 10, 2012

whose mothers smoke. It was directly proportional to the amount of cigarette.³

According to 1999 data of World Health Organization (WHO), 10.5 million children who were under age of two years have lost their lives each year in the world due to preventable and curable diseases. Lower respiratory tract infections are responsible for 28% of the deaths.⁴ According to 2003 data of Ministry of Health in Turkey; lower respiratory tract infections are responsible for deaths between 0-4 years at a rate of over 40%.⁵

In this study, we aimed to determine risk factors for lower respiratory tract infections in terms of low socioeconomic level in our region.

METHODOLOGY

This study was performed in Hassa which is the low developed town of Hatay city. Inclusion criteria were to accept joining the study, not to have another chronic disease and not to be exposed to the inhaled chemicals in any environment. Those patients who are associated with severe disease (sepsis, meningitis, etc.), Infants with severe neurological and metabolic disorders, children with immune deficiency that was previously known and children who age less than one month were excluded from the study. Specificity of the LRTI-related informa-

tion reduced as time passes.^{6,7} Therefore, symptoms of LRTI in the last 15 days were questioned among patients.

Three hundred and fifty patients who presented at the pediatric polyclinics of our hospital in Hassa region, which has only hospital in the state, were enrolled according to the inclusion criteria. Anamnesis, backgrounds, family histories and information about environmental factors of these patients were recorded on questionnaire forms. Passing more than four lower respiratory tract infections was defined as recurrent lower respiratory tract infection. The obtained data to determine risk factors for LRTI was statistically evaluated by using SPSS software.

RESULTS

In 2010, a total of 13356 patients were admitted to pediatric polyclinics of our hospital, 578 of those were treated by hospitalization. Lower respiratory tract infection was diagnosed in 340 (58.8%) of inpatients and 2271 (17%) of patients who applied polyclinic. Eighty patients were diagnosed as LRTI. Sixteen of those (20%) were recurrent LRTI.

It included 207 (70%) boys and 143 (30%) girls. LRTI risk of male patients was found to be 1.83 times increased against female patients. The mean age of patients was 28.3 ± 22.8 months, and mean birth

Table-I: Some factors which cause LRTI.

		LRTI (+)	LRTI (-)	Relative Risk	95% Confidence Interval
Gender	Male	24	119	1	0.47-0.97
	Female	56	151	1.83	1.04-1.49
Maternal Education Level	≥8 years	24	127	1	0.44-0.91
	<8 years	56	143	2.07	1.10-1.58
Vaccination Status	Complete	74	264	1	0.88-1.00
	Incomplete	6	6	1.69	1.11-10.17
Feeding with Breast milk	≥6 months	58	221	1	0.76-1.05
	<6 months	22	49	1.71	0.97-2.34
Beginning Cow milk	≥12 months	48	191	1	0.69-1.03
	<12 months	32	79	1.61	0.98-1.89
History of Asthma	No	66	240	1	0.83-1.03
	Yes	14	30	1.69	0.87-2.82
Presence of Food Allergy	No	74	253	1	0.92-1.05
	Yes	6	17	1.20	0.48-2.92
People Living In Same Room	≤3	48	186	1	0.71-1.06
	>3	32	84	1.47	0.93-1.77
Presence of URTI in family members	No	40	171	1	0.64-1.03
	Yes	40	109	1.56	0.98-1.67
Smoking Around Baby	No	32	172	1	0.47-0.83
	Yes	48	98	2.63	1.30-2.09

weight was 3073.7 ± 409.5 grams. The mean age of their mothers was 27.5 ± 5.8 years. When these 199 patients were evaluated in terms of mother education level, the mean education level was less than 8 years. That is the obligatory education period for Turkey. LRTI risk of children whose mothers took education less than 8 years was 2.07 times increased than children whose mothers have educated for more than 8 years (Table-I).

When vaccination status, duration of breastfeeding, age at onset of cow's milk, family history for asthma, family history for food allergy, number of hospitalized people in the same room and people who live in the same house were evaluated for the presence of LRTI, the risk of developing LRTI was observed 1.69, 1.71, 1.61, 1.69, 1.20, 1.47, and 1.56-fold increase, respectively (Table-I). Furthermore, we demonstrated that smoking around the children increased LRTI risk 2.63 times (Table-I).

DISCUSSION

Lower respiratory tract infection (LRTI) is common causes of mortality and morbidity in babies and infants all over the world.⁸ In 2002, LRTI has caused 3.9 million deaths around the world according to World Health Organization (WHO) data. LRTI is composed 6.9% of deaths due to infectious diseases and ranked first among the reasons for under-5 years mortality.⁴

In many studies, male gender was reported to be more risky than female in terms of LRTI. This is because male gender is sensitive against genetic and environmental factors.⁹ In this study, male gender was also found to have 1.83 times higher risk than girls for development of LRTI.

The relationship between maternal education and child health should be well known and considered.^{7,10} Etiler et al⁷ have evaluated relationship between maternal education level and development of LRTI. They have found that low maternal education level increased LRTI risk. Our study was consistent with other studies. Similarly, we have found that LRTI risk of children whose mothers took education less than 8 years was 2.07 times than children whose mothers have educated for more than 8 years (Table-I).

One of the most important working fields of pediatrician is preventive medicine. The most important part of preventive medicine is vaccination. Lack of vaccination makes risky individuals and society against infections. In our study, we found 1.69 fold increased risk of LRTI in patients with incomplete vaccination.

Number of lower respiratory tract infection, otitis media and gastrointestinal diseases reduced in infants by breast milk intake.¹¹ Some studies have reported that only feeding with breast milk in the first four months of life had positive effects on the severity and duration of respiratory symptoms, whereas any reduction was not encountered for incidence of respiratory diseases.^{12,13}

In our study, we have found that LRTI risk increased 1.71 times due to receiving breast milk less than six months. Cow milk proteins are not easily digested by young infants and absorbed as large molecular weights. Subsequently, this may cause development of allergic disorders such as bronchial asthma by stimulating the immune system.¹² Sipahi et al have reported that cow milk allergy caused recurrent LRTI in 11.1% of patients.¹⁴ In our study, risk of LRTI was found 1.61-fold increased in patients who started cow milk before 12 months.

Etiler et al have reported the 1.75-fold increased risk of LRTI in patients with familial asthma history.⁷ Similarly, we have found 1.69-fold increased risk.

Both upper and lower respiratory tracts can be affected by food allergy. Lower respiratory tract involvement is generally associated with a greater delay in onset of symptoms and with a larger quantity of allergen ingestion than chronic rhinitis.¹⁵ We have found 1.2 times increased risk of LRTI in patients with familial food allergy history.

In our study, LRTI risk was found to be 1.47-fold increased, when the number of people who live in the same room was more than three. In a study of Etiler et al, any increase was not seen contrast to our study.⁷ The risk of LRTI was found to be 1.56 fold high in people who live in the same house according to presence of URTI.

Exposure to passive smoking is known to be another important risk factor for lower respiratory tract infections.¹⁶⁻¹⁸ The number of symptomatic days of children who are exposed to secondhand smoke is greater than that of children who live smoke-free environment, and the prolonged symptoms are observed after treatment.¹⁹ In the studies conducted in Turkey, frequency of determined passive drinking with cotinine measurement varies between from 53 to 85 percent in children.^{20,21}

This study has suggested that exposing secondhand smoke had 2.63 fold risks in patients with LRTI. These results are consistent with the literature. All children have a right to be healthy according to "agreement of children's rights".²² Nevertheless, half of children in the world are

exposed to smoking unwillingly. The way of the prevention is important for child health.

Our study has showed that socioeconomic status and environmental factors underlie on the basis of risk factors of LRTI. The relationship with maternal education and exposure to tobacco smoke supports that. High maternal education level is also affected from socio-cultural status of the family in addition to good-looking infants.

Socio-economic and environmental factors should not be underestimated in control of LRTI which is one of the most important cause of morbidity and mortality in Turkey. As can be seen in our study, increasing the level of socio-economic society, elimination of one of the most important risk factor that is smoke exposure and of other environmental factors, will significantly reduce the morbidity.

REFERENCES

1. Tanir G, Aytekin C. Cocuklarda alt solunum yolu enfeksiyonlari. (Respiratory tract infections in children). *STED* 2001;10(10):382-385.
2. Environmental tobacco smoke: a hazard to children. American Academy of Pediatrics Committee on Environmental Health. *Pediatrics*. 1997;99:639-642.
3. Price JA. Nonpharmacologic means of preventing asthma. *Lung* 1990;168(Suppl):286-291.
4. WHO: Integrated Management of Childhood Illness (2003). <http://www.who.int/child-adolescent-health>.
5. Arseven O, Ozlu T, Aydin G. Toraks Dernegi cocukluk caginda TKP tani ve tedavi rehberi. (Guide to diagnosis and treatment of childhood CAP Thoracic Society). *Turk Toraks Degisi* 2002;3:1-15.
6. Harrison LH, Moursi S, Guinena AH, Gadowski AM, El-Ansary KS, Khallaf N. Maternal reporting of ARI in Egypt. *Int J Epidem*. 1995;24(5):1058-1063.
7. Etiler N, Aktekin MR. Frequency of lower respiratory tract infection and influencing factors. *Turgut Ozal Tip Mekezi Dergisi*. 2000;7(3):208-214.
8. Yilmaz G, Uzel N, Isik N, Ugur S, Aslan S, Badur S. Akut alt solunum yolu enfeksiyonu olan cocuklarda viral etkenler ve respiratory syncytial virus alt gruplari. (Acute lower respiratory tract infection in children with viral and respiratory syncytial virus sub-groups of factors). *Turkish J Infection*. 2000;14(2):157-164.
9. Rasul CH, Kabir A, Rashid AKMM, Mahboob AKMM, Hassan MA. Role of antibiotic in the outcome of bronchiolitis. *Pak J Med Sci*. 2008;24(5):707-711.
10. Victora CG, Fuchs SC, Flores JA, Fonseca W, Kirkwood B. Risk Factors for pneumonia among children in a Brazilian Metropolitan area. *Pediatrics*. 1994;93(6):977-985.
11. Wright AL, Holberg CJ, Taussig LM, Martinez FD. Relationship of infant feeding to recurrent wheezing at age 6 years. *Arch Pediatr Adolesc Med*. 1995;149:758-763.
12. Wafula EM, Limbe MS, Onyango FE, Nduati R. Effects of passive smoking and breastfeeding on childhood bronchial asthma. *East Afr Med J*. 1999;76:606-609.
13. Cushing AH, Samet JM, Lambert WE. Breastfeeding reduces risk of respiratory illness in infants. *Am J Epidemiol*. 1998;147:863-870.
14. Sipahi T, Tezic T, Ipekcioglu H, Uzel G. Recurrent or Persistent Lower Respiratory Tract Infections In Infancy: A Study Of 99 Cases. *Turkiye Klinikleri Pediatri Dergisi*. 1994;3(3):99-103.
15. Heiner DC. Respiratory diseases and food allergy. *Ann Allergy*. 1984;53:657-664.
16. Holberg CJ, Wright AL, Martinez FD, Ray CG, Taussig LM, Lebowitz MD. Risk factors for respiratory syncytial virus associated lower respiratory illness in the first year of life. *Am J Epidemiol*. 1991;133:1135-1151.
17. McIntosh K. Respiratory syncytial virus. Behrman RE, Kliegman RM, Jenson HB, eds. *Nelson Textbook of Pediatrics*. 18th ed. Philadelphia: WB Saunders. 2007: 1388-1390.
18. Couriel JM. Passive smoking and the health of children. *Thorax*. 1994;49:731-734.
19. Abulhosn RS, Morray BH, Llewellyn CE, Redding GJ. Passive smoke exposure impairs recovery after hospitalization for acute asthma. *Arch Pediatr Adolesc Med*. 1997;151:135-139.
20. Boyaci H, Duman C, Basygit I, Ilgazli A, Yildiz F. Determination of environmental tobacco smoke in primary school children with urine cotinine measurements. *Turk Toraks*. 2004;52:231-236.
21. Keskinoglu P, Cimrin D, Aksakoglu G. The impact of passive smoking on the development of lower respiratory tract infections in children. *J Trop Pediatr*. 2007;53:319-324.
22. Convention on the Rights of the Child. http://www.finno.dk/relationships-and-family-en/children/convention-on-the-rights-of-the-child?set_language=en Date of access: 12.12.2005.

Authors Contribution:

Ibrahim Silfeler: Designed the research protocol and did literature search.

Ibrahim Silfeler and Ibrahim Cansaran Tanidir: Conducted the study and did data analysis.

Ibrahim Silfeler and Vefik Arica: Prepared the final manuscript for publication.