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RESEARCH ARTICLE

EFFECTIVENESS OF CHEST RADIOGRAPHY IN THE MANAGEMENT OF NON-SEVERE PNEUMONIA IN CHILDREN

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ABSTRACT

The aim was to determine the effectiveness of chest radiography in the management of acute lower respiratory infections (ALRI) in children. The inclusion criteria were children aged between 6 months to 6 years with non-severe pneumonia. Findings were compared for three groups: Group 1: Patients without radiological examination; Group 2: Patients with abnormal radiological findings; Group 3: Patients without abnormal radiological findings. A total of 312 children were analyzed in the study. There were 162 children (52%) in Group 1, 28(9%) in Group 2 and 122 (39%) in Group 3. Both clinical parameters and laboratory data did not differ significantly across the groups. Chest radiograph is a very popular diagnostic tool in children with ALRI for practical approach. On the other hand it is difficult to distinguish etiology and x-ray has vary disadvantages. The clinical evaluation as per WHO criteria and close follow-up more effective and less harmful strategies in the management of non-severe ALRI in children especially in developing countries.

INTRODUCTION

Acute lower respiratory tract infections (ALRI) are the major cause of deaths worldwide and children under 59 months of age are mostly affected (Simoes *et al*, 2006, Williams *et al*, 2002). For diagnosis and management of chest infections in children, chest radiographs are commonly used worldwide especially in developing countries (Cao *et al*, 2013). Chest radiographs are often used to support the decision to use antibiotics in children aged <5 years with ALRI. However, interpretation of the radiograph in children is difficult and lacks clarity of diagnosis. In addition radiography is not helpful in understanding the etiology such as viral, bacterial or fungal infection or there is a risk of exposure to ionizing radiation, spending to time, labor and money is a distinct handicap. The impact of diagnosis of suspected chest infections with the help of chest radiographs has not been systematically evaluated through clinical follow-up. The aim of this study is to determine the effectiveness of chest radiographs in the management of ALRI in children.

MATERIAL AND METHODS

Study design and population

This is a retrospective, descriptive, observational study conducted at the outpatient pediatric clinic between January 1, 2012 and December 1, 2012. The study was approved by regional ethics committee and informed consent was obtained from the parents. The data of management non-severe pneumonia in children (n=132) collected at the pediatric outpatient department were used for this study.

The inclusion criteria were children aged between 6 months to 6 years whith non-severe pneumonia, with data available for appropriate diagnostic check-ups and clinical follow-ups. The exclusion criteria; included hospitalization for any cause at the first clinical evaluation, congenital anomalies, cough >14 days, a history of active tuberculosis, cardiac anomalies, allergy and insufficient clinical, laboratory and demographics data.

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Acute lower respiratory infection was clinically confirmed and classified as "non-severe pneumonia" according to World Health Organization (WHO) criteria. The children with symptoms of cough and fast breathing (50 per minute or more if 6 months up to 12 months; 40 per minute or more if 12 months up to 6 years) without chest indrawing, cyanosis, abnormal level of consciousness or stridor were considered to have “non-severe pneumonia” (WHO, 1995, WHO, 2002).

Data collections and determination of patient groups

During study period the patients visited same pediatrician who prescribed laboratory and radiological investigations entirely at the discretion of the clinician. The complete physical examination within first 10 days of evaluation is considered as appropriate clinical follow-up. Duration of ilness is the time from diagnosis to complete resolution of clinical signs.

The chest radiograph were evaluated by the same radiologist. The presence of patches of diffuse or lobar consolidation, and interstitial involvement in radiographic findings were considered abnormal.

Pneumonia can be due to viral or bacterial infection; however there is no reliable way to distinguish the etiology. Fever is the best predictor of infection which requires treatment with antibiotics (El-Radhi *et al*, 1999). Therefore, the children showing signs of pneumonia with high fever (axillary temperature ≥38,5 °C) and/or the chills were given an antibiotic (amoxicillin at a dose of 50 mg/kg/day orally in divided doses every 8 hours).

The data pertaining demographics, clinical, laboratory and radiological findings; registered in hospital information management system were recorded on specially designed case report forms.

Statistical Analysis

Statistical analysis was performed using the Medcalc Turkey statistical package program. Kruskal–Wallis test and the Standard chi-square test were used to compare the proportions between groups and the means within groups were compared using ANOVA followed by Student’s t test. A p value <0.05 was considered statistical significant.

RESULTS

The data collected from a total of 312 children were analyzed in this study. Based on radiologic investigations 162 children (52%) were included in group 1, 28 (9%) in group 2 and 122 (39%) in group 3. Of the 150 patients who underwent radiologic investigations, 122 (81.3%) did not reveal any pathological findings. A comparison of demographic variables, clinical, laboratory outcomes between the groups is presented in Table 1.

The demographic characteristics (gender and age) were similar across the groups. Similarly, other parameters such as clinical (fever, cough, respiratory distress, diarrhea, vomiting, presence of wheezing, mean duration of illness, the use of antibiotics) and laboratory data (leukocyte count, CRP levels) did not differ significantly in different groups. None of the 312 patients developed an unusual findings, complications or was hospitalized. The duration of illnes was found to be similar between antibiotic treated and non-treated population (7.6±2.3 and 7.5±2.1 respectively, p=0.81). In antibiotics-treated patients who were not having diarrhea at baseline, 19 (28.3%) developed diarrhea and/or loose stools, six (8.9%) nausea, five (7.5%) prolonged diarrhea of ≥ 10 days and three (4.5%) rash.

Table 1 A comparison of variables between groups

Variable	Group 1 (n=162)	Group 2 (n=28)	Group 3 (n=122)	p
Age, month*	29.4±14.1	29.5±16.8	29.5±14.0	0.99
Gender (male), n (%)	87(53.7)	15 (53.6)	65 (53.3)	0.99
Fever, °C *	37.4±1.0	37.4±1.1	37.4±1.1	0.98
Fever, n (%)	35 (21.6)	6 (21.4)	26 (21.3)	0.99
Cough, n (%)	121 (74.7)	21 (75)	95 (77.9)	0.81
Diarrhea, n (%)	45 (27.8)	8 (28.6)	34 (27.9)	0.99
Vomiting, n (%)	25 (15.4)	4 (14.3)	18 (14.8)	0.98
Wheezing, n (%)	83 (51.2)	14 (50)	60 (49.2)	0.94
Use of antibiotics, n (%)	35 (21.6)	6 (21.4)	26 (21.3)	0.99
Leukocytosis, n (%)	39 (24.1)	6 (21.4)	26 (21.3)	0.84
CRP (>10 mg/dL), n (%)	46 (28.4)	8 (28.6)	36 (29.5)	0.97
Duration of illness*, day	7.6±2.1	7.6±2.0	7.6±1.6	0.99
Leukocyte**, /mm^3	7900 (2100-26200)	7050 (3200-22000)	7400 (2300-26000)	0.81
CRP**, mg/dL	6 (1-24)	4.7 (1-24)	4 (1-48)	0.17

* mean± SD (standard deviation), ** median (min-max)

Based on the radiologic investigations, the data collected were evaluated and classified into three categories: The patients without radiological examination (group 1), patients with radiologic findings indicating pneumonia (group 2) and patients with radiologic findings that did not detect pneumonia (group 3). The clinical characteristics and laboratory findings were compared between the groups.

DISCUSSION

Chest radiography is widely accepted used for the diagnosis of ALRI in children. The chest radiography is used with the assumption that it will enable more accurate diagnosis of ALRI than clinical investigations alone and can change the management of patient with ALRI. However, the disadvantages of X-ray are exposure to radiations, higher cost, time

consuming, and requirement of more space. Also it cannot distinguish between viral and bacterial pneumonia (Swingler *et al*, 2008). Therefore, WHO guidelines do not recommend the use of chest radiography for the management of children with acute lower respiratory infections in developing countries (WHO, 1995).

Swingler *et al*. noted that chest radiography does not affect clinical outcome of ALRI in outpatient children and is not beneficial in ambulatory infection. There are also inconsistencies between the radiologists and even between their own assesments of the same radiograph (Swingler *et al*, 1998). Similarly, Bharti *et al*. suggested that chest radiography has limited value in predicting clinical improvement in children with pneumonia (Bharti *et al*, 2008). In addition, Sarria *et al*. reported that the diagnosis of lower respiratory tract infections in children remains a challenge due to variability in inter-observer interpretations (Sarria *et al*, 2003). These earlier findings support the results of this study which revealed that chest radiograph did not provide any clinical benefit for children with non-severe pneumonia.

The levels of C-reactive protein (CRP) positively correlated with the WHO defined criteria for ALRI in children. However, total leucocyte count (TLC) is found to be not sensitive enough in few studies (Lakhani *et al*, 2013). In this study, radiological findings did not corralate with elevated CRP and TLC.

Also abnormal findings were detected in 18.3% of children who underwent chest radiography and were not associated with clinical symptoms of non-severe ALRI. This is supported by earlier data that only 14% of children with clinically diagnosed non-severe ALRI show abnormal chest X-rays (Hazir *et al*, 2006).

In developed countries, uncomplicated ALRI is the most common acute illness which is managed in primary care the majority of patients receive antibiotics, even in low-antibiotic-prescribing countries (Butler *et al*, 2009). Several studies have shown that the antibiotic treatment in children with nonsevere ALRI does not have significant effect on the duration of illness (Hazir *et al*, 2011, Awasthi *et al*, 2008). In cases with suspected pneumonia, antibiotics provide little or no benefit for children with ALRI and also causes slight side effects.

The World Health Organization's definition of childhood pneumonia, comprises cough, difficulty in breathing, and increased breathing rate, is effective for ALRI in children especially non-severe pneumonia (Puumalainen *et al*, 2008). It is suitable to guide management of acute respiratory infections when resources are limited. In accordance with WHO guideline, we did not observe any complication in children with non-severe ALRI during clinical follow-ups. This study demonstrates that WHO definition to detect non-severe ALRI in children is a useful marker especially in the early clinical assessment.

CONCLUSION

Thus, chest radiography does not benefit in prognosis of non-severe ALRI in children. The clinical evaluation as per WHO criteria and close follow-ups are more effective and less harmfull strategies in the management of non-severe ALRI in children especially in developing countries.

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References

Awasthi S., Agarwal G., Kabra S.K., Singhi S., Kulkarni M., More V., Niswade A., Pillai R.M., Luke R., Srivastava N.M., Suresh S., Verghese V.P., Raghupathy P., Lodha R., and Walter S.D. 2008. Does 3-day course of oral amoxycillin benefit children of non-severe pneumonia with wheeze: a multicentric randomised controlled trial. PLoS One, 3(4), e1991.

Bharti B., Kaur L., and Bharti S. 2008. Role of chest X-ray in predicting outcome of acute severe pneumonia. Indian Pediatr., 45, 893-898.

Butler C., Hood K., Verheij T., Little P., Melbye H., Nuttall J., Kelly M.J., Mölstad S., Godycki-Cwirko M., Almirall J., Torres A., Gillespie D., Rautakorpi U., Coenen S., and Goossens H. 2009. Variation in antibiotic prescribing and its impact on recovery in patients with acute cough in primary care: prospective study in 13 countries. BMJ, 338, b2242.

Cao A.M., Choy J.P., Mohanakrishnan L.N., Bain R.F., and van Driel M.L. 2013. Chest radiographs for acute lower respiratory tract infections. Cochrane Database Syst Rev, 12, CD009119.

E.A.F. Simoes, T. Cherian, J. Chow, S.A. Shahid-Salles, R. Laxminarayan and T.J. John. 2006, Acute Respiratory Infections in Children. In: D.T. Jamison, J.G. Breman, A.R. Measham, G. Alleyne, M. Claeson, D.B. Evans, P. Jha, A. Mills and P. Musgrove (eds.), *Disease Control Priorities in Developing Countries*, 2nd edition. Oxford University Press, New York, pp.483-497.

El-Radhi A.S., Barry W., and Patel S. 1999. Association of fever and severe clinical course in bronchiolitis. Arch Dis Child, 81, 231-234.

Hazir T., Nisar Y.B., Abbasi S., Ashraf Y.P., Khurshid J., Tariq P., Asghar R., Murtaza A., Masood T., and Maqbool S. 2011. Comparison of oral amoxicillin with placebo for the treatment of world health organization-defined nonsevere pneumonia in children aged 2-59 months: a multicenter, double-blind, randomized, placebo-controlled trial in pakistan. Clin Infect Dis, 52(3), 293-300.

Hazir T., Nisar Y.B., Qazi S.A., Khan S.F., Raza M., Zameer S., and Masood S.A. 2006. Chest radiography in children aged 2-59 months diagnosed with non-severe pneumonia as defined by World Health Organization: descriptive multicentre study in Pakistan. BMJ, 333(7569), 629.

Lakhani D., and Muley P. 2013. The association of positive chest radiograph and laboratory parameters with community acquired pneumonia in children. J Clin Diagn Res, 7(8), 1629-1631.

Puumalainen T., Quiambao B., Abucejo-Ladesma E., Lupisan S., Heiskanen-Kosma T., Ruutu P., Lucero M.G., Nohynek H., Simoes E.A., and Riley I. 2008. ARIVAC Research Consortium. Clinical case review: A method to improve identification of true clinical and radiographic pneumonia in children meeting the World Health Organization definition for pneumonia. BMC Infectious Diseases, 8, 95.

Sarria E., Fischer G.B., Lima J.A., Menna Barreto S.S., Flôres J.A., and Sukiennik R. 2003. Interobserver agreement in the radiological diagnosis of lower respiratory tract infections in children. J Pediatr (Rio J), 79(6), 497-503.

Swingler G.H., Hussey G.D., and Zwarenstein M. 1998. Randomised controlled trial of clinical outcome after chest radiograph in ambulatory acute lower-respiratory infection in children. Lancet. 1998, 351(9100), 404-408.

Swingler G.H., and Zwarenstein M. 2008. Chest radiograph in acute respiratory infections in children. Cochrane Database Syst Rev. 20(3), CD001268. Review. Update in: Cochrane Database Syst Rev. (1), CD001268.

Williams B.G., Gouws E., Boschi-Pinto C., Bryce J., and Dye C. 2002. Estimates of worldwide distribution of child deaths from acute respiratory infections. Lancet Infect Dis, 2, 25-32.

World Health Organization. Consultative meeting to review evidence and research priorities in the management of acute respiratory infections. In WHO/ARI/04.2 Geneva: WHO; 2003.

World Health Organization. The management of acute respiratory infections in children. Practical guidelines for outpatient care. Geneva: WHO; 1995.

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