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Research Article

Determination of the Diagnostic Value of Chest X-Ray Findings in the Differentiation of Bacterial, Viral And Atypical Pneumonia in Children Aging from One Month to Fourteen Years Old Referring to Mofid Children Hospital in 2012-2013

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Abstract

Introduction: Approximately 200 million children under the age of five years are diagnosed with pneumonia every year and pneumonia is responsible for the deaths of nearly 2 million of these children; it is responsible for 1.5% of children's deaths worldwide. Thus, it can be claimed that, pneumonia is of global significance, especially in case of children.

Method: The present descriptive, analytical study was conducted on children aged from 1 month to 14 years old. They are diagnosed with febrile CAP pneumonia in the infectious, pulmonary, and PICU infections in Mofid Hospital from December 2014 till the end of 2014.

Findings: In terms of radiological symptoms, the chest X-ray turned out to be abnormal in 100% of cases; 39.3% cases of infiltration, 19.1% cases of lung edema, 16.1% cases of opacity, 9.8% cases of pleural effusion, 10.1% cases of pre-bronchial thickness (PBT), 3.4% cases of collapse, and 2.2% cases of anemia were reported by the radiologist. With a frequency of 1%, pleural thickness, diffusion of emphysema and atelectasis were also a part of the findings of the chest X-ray.

Conclusion: The most common radiographic findings of the present study included infiltration, opacity and lung edema. Out of 123 subjects examined in Normak et al study, 93 subjects turned out to have alveolar consolidation or pleural effusion.

Keywords

Chest X ray; Children; Pneumonia; Disability; Killer

Introduction

With a mortality rate of 90%, South Asia and parts of Africa are the areas with the highest rates of death from the Pneumonia [1]. In other words, Pneumonia can be called as the reason of death of the children in developing and in the elderly developed countries [2]. One of the UN's goals is to reduce the mortality rate of children under the age of five by a factor of 2.3 between 1990 and 2015. UNICEF and the World Health Organization referred to pneumonia as the forgotten murder of children in 2006 and, in May 21, 2010, pneumonia was declared as a deadly killer of children for the first time in the history of global health [3]. Approximately 200 million children under five years of age are diagnosed with pneumonia each year and pneumonia is responsible for the deaths of nearly 2 million of these children; pneumonia is responsible for 1.5% of children's deaths worldwide [4]. Thus, it can be claimed that, given the following reasons, pneumonia is of global significance, especially in case of children.

1. Pneumonia is still one of the most important causes of death and disability in children.
2. Death due to pneumonia is considerably preventable in this age group.
3. A recurrence of pneumonia in the child causes chronic pulmonary diseases in the future.
4. Interventions to reduce pneumonia and lower lung canal infections have short and long term benefits [5].

Despite the fact that pneumonia is one of the most common causes of childhood illnesses around the world, it is quite a challenge to infer pathological process in the lungs from some of the points in history and clinical examination. Many diseases in children, such as malaria, severe anemia, and bacterial sepsis produce a spectrum of clinical signs and symptoms that are overlapping with pneumonia, and the differentiation between these diseases is a challenging situation [5]. The definition of pneumonia is very broad, with one group covering the presence of infiltration in the chest rhythm while and another group based on a series of respiratory symptoms. However, the definition of the World Health Organization is based on clinical findings by observation and respiratory rate per unit time. This definition has its own problems in case of infants since bronchiolitis is common in this age group and the symptoms of these two diseases are overlapping [6]. Despite huge disagreement among scientists [7] and the major role of chest radiography in diagnosing pneumonia, the role of chest radiography in the diagnosis of pneumonia has become paramount due to the diversity in interpretation and the inability to diagnose the causes of bacterial pneumonia based on chest radiography. The results of a study showed that 21% of patients diagnosed with CAP had a negative radiographic picture of their chest [8]. The results of another study indicated that abnormal respiratory sounds, Rawls, cough and persistent fever (more than 2 days) were independent predictors of pneumonia in children above 2 years old. Similar results are obtained by Neumann et al. [9]; during pathological process of pneumonia, tissue damage caused by infection and inflammation activates neutrophils and macrophages, which are components of local inflammation cells. The liver also secretes acute myocardial proteins in response to cytokines (TNF, IL-1, IL-6). Usually, the acute phase response is widely used for differential diagnosis between bacterial and viral infections. What is used on a daily basis in the clinic include: white blood cell count, red

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blood cell sedimentation rate (ESR), CRP, and absolute neutrophil count [10]. Chest radiography has long played a major role in the diagnosis of childhood pneumonia. However, recent research has questioned the necessity of chest radiography due to its diversity in interpretation as well as its inability to differentiate between multiple microbial causes. Breastfeeding in patients suspected of pneumonia is sometimes interpreted as natural, which causes doctors to treat pneumonia, regardless of chest X-ray findings. According to the findings of a study, 21% of patients diagnosed with CAP had normal chest X-ray [11].

Methodology

The present descriptive, analytical study was conducted on children aged 1 month to 14 years old diagnosed with febrile CAP pneumonia in the infectious, pulmonary, and PICU infections in Mofid Hospital from December 2014 to the end of 2014. Aging between 1 month to 14 years, abnormal findings, such as pericardia, perihelia, pre-bronchial, lobar, segmental, sub-segmental, reticular, reticular, alveolar, adenopathy, and Pleural fluography, in the chest radiography that are in the interest of pneumonia, having at least two of the following symptoms or symptoms: fever or copper OVI 38.3, tachypnea (Definition of tachypnea: respiratory rate per minute RR ≥ 60 in a group older than one month, RR ≥ 50 in the age group of 1 to 12 months RR ≥ 40 (in the age group of 1-5 years), cough for longer From 24 hours, abnormal hearing in the respiratory sounds (Ral, Wiz, Ronkey, decreased respiratory sounds), respiratory distress (chest tightness in the subcostal region, intercostal hyperactivity disorder, nasal sprains), and pain in the chest wall were the main inclusion criteria; on the other hand, the main exclusion criteria were confirmed immune system deficiency, chronic underlying disease, hospital infection, and chronic cough (more than 4 weeks). Quantitative data was reported as mean standard deviation and qualitative data was reported as crude frequency and percentage. A mathematical model was used to structure and formulate the prediction rule for all types of pneumonia (using stepwise regression analysis). Based on this mathematical model, a clinical prediction rule was designed. The formulation was conducted in two phases: in the first phase, the stepwise regression analysis and the relationship between dependent and non-dependent variables was determined. In the second phase of accreditation, the likelihood of a type of pneumonia in two age groups (less than 5 years of age and above or equal to 5 years) in children with pneumonia symptoms based on PCR were compared and contrasted with the sampled culture.

Findings

In terms of radiological symptoms, the chest X-ray turned out to be abnormal in 100% of cases; 39.3% cases of infiltration, 19.1% cases of lung edema, 16.1% cases of opacity, 9.8% cases of pleural effusion, 10.1% cases of pre-bronchial thickness (PBT), 3.4% cases of collapse, and 2.2% cases of anemia were reported by the radiologist. With a frequency of 1%, pleural thickness, diffusion of emphysema and atelectasis were also a part of the findings of the chest X-ray. CRP turned out to be positive in 59% of cases, ESR was more than 30 mm/h in 38% of cases, the number of white blood cells was more than 12000 in 59% of cases, and 70% of samples had high PMN.

Discussion and Conclusion

The results of the study showed that there was no significant difference between the mean age of involvement of girls and boys, although the mean age of conflict in boys was lower than that of girls. There was no significant difference between the mean age of boys and girls in Suleimani et al. study [12]. The results of a study conducted in 2005 indicated that pneumonia occurred mostly in children less than five years of age [13]. The results of a multistage PCR study conducted on 85 patients from 2012-2015 in France showed that the mean age for severe CAP cases was 2 years and in mild to moderate cases, it was 3.8 years [14]. The most common clinical symptoms turned out to be cough, fever and tachypnea in the present study. In this regard, the results of Normark et al. study showed that the frequency of tachycardia, Tachypnea and febrile esophagus was 85% of the cases [15]. The most common clinical symptom of pneumonia was cough, which was found in 93% of patients; other symptoms were tachypnea, dyspnea, fever and positive findings in lung etiology in Suleimani et al. study [16]. The most common radiographic findings of the present study included infiltration, opacity and lung edema. Out of 123 subjects examined in Normak et al study, 93 subjects turned out to have alveolar consolidation or pleural effusion [17]. It was difficult to obtain valid samples to determine the cause of acquired pneumonia in children; so, it could be part of the cause of the low level of detection of the virus in this study. Also, starting an antibiotic to avoid the serious consequences of the disease can also be a cause of low levels of diagnosis. (Patients had already received an antibiotic in the emergency department).

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