



A Correlation Between Clinical and Chest Radiographic Diagnosis of Pneumonia in Nigerian Children

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ABSTRACT

This study aims to establish if there is a correlation between the clinical and chest radiographic diagnosis of pneumonia in Nigerian Children and the most vulnerable age of its occurrence. It also emphasizes the importance of a simple chest radiograph in management of paediatric pneumonia patients.

A Total of 100 chest radiographs of children 16 years and below with clinical symptoms of pneumonia and their request forms were reviewed. Thirty seven (37) of the radiographs were in agreement with clinical diagnosis of pneumonia while 63 radiographs had no evidence of infection or inflammation in the lung fields. Statistical analysis was done with Statistical Package for Social Sciences version 13 to determine the P value ($P < 0.05$), this was thought to be statistically significant therefore; the authors are of the opinion that Chest radiographs are efficacious in the management of children suspected to have pneumonia. Plain chest radiograph has some value in the clinical diagnosis of pneumonia.

Key words: Radiography, pneumonia

INTRODUCTION

Respiratory diseases are a major cause of mortality and morbidity worldwide especially in most developing countries including Nigeria [1]. Amongst these respiratory diseases, pneumonia is the leading cause of death in children worldwide [2]. It is reported as a cause the death of an estimated 2 million children every year, even more than AIDS, malaria, and measles combined [2]. Approximately 150 million new cases of pneumonia occur annually among children younger than 5 years worldwide accounting for approximately 10-20 million hospitalizations [3].

In Nigeria, as at 2007 the under 5 mortality rate was 197/1000 lives which is far more than the 70/1000 millennium goal target by 2015. Between the year 2000 and 2003 it was estimated that pneumonia accounted for 20% of deaths in children under the age of 5 years in Nigeria [1]. In a prospective cohort study in Ilorin, a town in western Nigeria, the rate of acute respiratory infections was 3 episodes/child/year with pneumonia being responsible for 13 episodes/child/year [1]. This is why relevant diagnosis and prompt treatment is important.

The clinical, radiological, and laboratory diagnosis of pneumonia cannot be overemphasized. These three tiers of diagnosing pneumonia usually work together where available. There are no studies done to our knowledge which have correlated the diagnostic reports of paediatricians and radiologists in Nigeria to establish whether there is a positive or negative correlation and therefore ascertain the importance of chest radiography in interdisciplinary diagnosis of pneumonia.

MATERIALS AND METHODS

A retrospective study done between December 2009 and December 2010 of 100 children aged 0-16 years who were referred to radiology department from children outpatient or children emergency for a chest radiograph with clinical features and diagnosis of different types of pneumonia at the University of Nigeria Teaching Hospital (UNTH) Enugu, Nigeria. The chest radiographs were done mainly in the posterior-anterior positions and their reports were written by different randomly selected qualified radiologists.

RESULTS

Thirty seven (37) of the radiographs were in agreement with clinical diagnosis of pneumonia while 63 radiographs had no evidence of infection or inflammation in the lung fields. Statistical analysis was done with Statistical Package for Social Sciences version 13 to determine the P value ($P < 0.05$), this was thought to be statistically significant therefore; the authors are of the opinion that Chest radiographs are efficacious in the management of children suspected to have pneumonia.

Table 1: showing the age distribution of the chest radiographs .

SEX	MALE	57	
	FEMALE	43	
AGE	RANGE	NUMBER	
	0-5YRS	69	
	6-11YRS	25	
	12YRS AND ABOVE	6	
RADIOLOGIC CORRELATION WITH CLINICAL FINDINGS	YES	NO	
	37	63	
TOTAL			
BRONCHOPNEUMONIA		28	
LOBAR PNEUMONIA		8	
ATYPICAL PNEUMONIA		1	
TOTAL		37	
ASSOCIATIONS	HIV/AIDS	6	
	CCF/HF	2	
	PTB	2	

DISCUSSION

Pneumonia is defined as an infection of the lungs in which the lung tissue of an infected person is filled with fluid or pus [4]. This can be caused by a variety of microorganisms-viruses, bacteria, fungi and parasites [4]. Symptoms vary depending on age of the child but the common symptoms include fever, cough, and unusually rapid breathing .Some schools of thought decided to classify pneumonias based on radiographic findings as lobar pneumonia, bronchopneumonia, interstitial pneumonia and miliary pneumonia [3,4] .

In developing countries childhood pneumonias are diagnosed using clinical parameters only. Although this is cheap, sensitive and maximizes the number of children identified and treated empirically, it is also non-specific and highly dependent on the context in which it is being applied [5] .

The simple chest radiograph has been an important investigative tool in the diagnoses of diseases, since the discovery of X-rays in late nineteenth century. Though new techniques in radiology such as CT scan, MRI, have improved the diagnostic abilities of physicians, plain radiography of the chest still remains the most commonly utilized tool for pediatricians in diagnosing pneumonia and other respiratory conditions [6]. The standard test for diagnosis of patients is a 2 view plain chest radiograph. However when chest radiographs are subjected to blinded readings they may not differentiate between viral disease and bacterial disease [7]. Although unilateral and or lobar infiltrates are often seen in bacterial pneumonia ,several studies have found the pattern of radiologic features could not accurately distinguish a bacterial etiology from a viral etiology [7]. In contrast a large Finnish series concluded that an alveolar (equivalent to a lobar) infiltrate is an insensitive but reasonably specific indication of bacterial infection [7].

Chest radiographic patterns include –

- (1) Peribronchial and perivascular interstitial infiltrates.
- (2) Ill defined densities.
- (3) Homogenous consolidation like ground glass mainly in the lower fields of lungs.
- (4) Enlargement of hilar is common.
- (5) Segmental/lobar atelectasis{7}.

Silverman et al classified the radiological appearances seen on chest radiograph independent of bacteriological information into 2 categories-

(1) Lobar pneumonia-consolidation confined to segmental boundaries.

(2) Bronchopneumonia-more widespread or ill defined consolidation.

Presence of other features –pleural effusion and pneumatocele were observed.

Needle aspiration of lungs at region of maximum consolidation was done and cultured. Pharyngeal secretion culture was also done. Degree of concordance between pharyngeal and lung aspirate culture was poor [8].

Although radiological pneumonia is used as an outcome measure in epidemiological studies, there is a considerable variability in the interpretation of chest radiographs therefore a standardized method for identifying radiological pneumonia will facilitate comparison of the results of vaccine trials and epidemiological studies of pneumonia [9]. A term known as primary end point pneumonia which shows alveolar consolidation or pleural effusion was popularly introduced by WHO as gold standard for reference reading done by multi-observer review of pediatric radiographs from developing countries with 20 readers which involved radiologists and pediatricians with 14 of them having a sensitivity and specificity greater than 0.70 in identifying primary end pneumonia [9].

Enwere et al strongly associated primary end pneumonia with bacterial aetiology and severe pneumonia. Since this category of pneumonia is significantly reduced after vaccination with Haemophilus Influenza b and pneumococcal vaccines, the risk-benefit of antimicrobial prescription of clinical pneumonia for children with increased respiratory rate may warrant re-examinations once vaccines are in full use [10]. Among children who did not receive pneumococcal vaccine, the incidence of pneumonia with no radiographic abnormality was about twice that of other infiltrates pneumonia and three times that of primary end point pneumonia [10,11].

Many of these distinguished authors tried to establish the role of chest radiograph in diagnosis of lower respiratory tract infections in children and in differentiating the bacterial and viral lower respiratory infections

The study showed that Thirty seven (37) of the radiographs were in agreement with clinical diagnosis of pneumonia while 63 radiographs had no evidence of infection or inflammation in the lung fields. Statistical analysis was done with Statistical Package for Social Sciences version 13 to determine the P value ($P < 0.05$), this was thought to be statistically significant therefore; the authors are of the opinion that anterior posterior Chest radiographs are efficacious in the management of children suspected to have pneumonia.

The result also showed that 69 patients fell within the 0 – 5 year age group. Therefore one could say this age group (0-5 years) is most vulnerable in terms of the likelihood to present at the hospital with suspected pneumonia. No particular significant sex predilection is visualized.

In Nigeria, the cost of this procedure is about 10 Dollars and it is therefore not entirely prohibitive in terms of financial cost. Its importance is even further emphasized in cases where that appear especially

In cases that appear resistant to treatment.

Finally in conclusion we submit that plain chest radiograph has a place in the diagnosis of pneumonia in the paediatric age group especially in cases of resistance to treatment based widely accepted standards of diagnosis as outlined in the text.

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CONFLICT OF INTEREST; NONE DECLARED.