Niger J Paed 2015; 42 (1): 51 – 54

ORIGINAL

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Co-morbidities in children hospitalized for community acquired pneumonia in Maiduguri, Nigeria

DOI:http://dx.doi.org/10.4314/njp.v42i1,11

Accepted: 4th November 2014

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Abstract: *Background:* Pneumonia is one of the commonest causes of morbidity and mortality in children, especially in developing countries. These children are also at risk of other morbidities, thus, increasing the morbidity and mortality.
Objective: This study was conducted to examine the prevalence and pattern of co-morbidities in children admitted for community acquired pneumonia (CAP) in Maiduguri.
Methodology: All children admitted into the Emergency Paediatric Unit (EPU) of the University of Maiduguri Teaching Hospital (UMTH), Maiduguri, in 2011, with CAP were prospectively followed until discharge or death. The children were evaluated for co-morbidities clinically and by examination of appropriate specimen where necessary.
Result: A total of 115 children aged one month to 14 years were admitted for CAP during the study period. While majority of the children studied were under-five; 107 (93%), 65(56.5%) were males, 101 (87.8%) had one or multiple co morbidities, with about half of them 58 (50.4%) afflicted by malaria. Pre admission medication was commoner for orthodox than traditional medication. No significant difference in mortality outcome was however noticed between children with co-morbidity and those without co-morbidity, $p > 0.05$.
Conclusion: The occurrence of co-morbid conditions among children hospitalized for CAP in Maiduguri is common; however, the presence of co-morbidity did not significantly affect the mortality outcome of their management. It is recommended that the presence of co-morbidity be actively looked for in children hospitalized for pneumonia, so as to effect holistic treatment, and improve the outcome of management.

Key words: Pneumonia, Children. Co-morbidity, Maiduguri, Mortality outcome

Introduction

Pneumonia is one of the commonest causes of childhood morbidity and mortality, especially in developing countries[1-4]. It is estimated that six million out of the global 156 million episodes of clinical pneumonia per year occurs in under-5 (U-5) children in Nigeria, (0.33 episodes per child-year in Africa).[3]Pneumonia accounts for approximately four million deaths of children worldwide and two-thirds of the global pneumonia deaths were concentrated in 10 developing countries; Nigeria (204, 000 deaths) only second to India (408, 000 deaths) among others[2, 3]. The risk factors for the high burden of pneumonia in the developing countries are overcrowding, lack of exclusive breast feeding, low birth weight and limited access to health care services. These factors also put these children at risk of other morbidities like malnutrition, malaria, diarrhoeal disease and measles among others. The colossal contribution of these illnesses to U-5 morbidity and mortality operating either singly or in combination has been highlighted in the recent World Health Organization (WHO) publication on integrated management of childhood illnesses[5]. The importance of holistic management of children with multiple morbidities, especially the in-patients cannot be over emphasized. This is because, in-patients provide ample opportunities to the physicians to evaluate and where necessary carry out investigations to arrive at an additional diagnosis or an alternative primary diagnosis. Previous studies in Nigeria showed that co-morbidities were not only common, but worsen the outcome of patients with pneumonia[6,7]. This study was conducted to

examine the prevalence and pattern of co-morbidities (not complications) in children admitted for community acquired pneumonia (CAP), defined as pneumonia in a previously healthy person who acquired the infection outside a hospital[8]. Pre-hospitalization treatment modalities by care givers and the outcome of management of these children were also studied.

Methodology

All children admitted into the EPU of the University of Maiduguri Teaching Hospital (UMTH), Maiduguri, in 2011, with fever, cough, fast breathing, chest wall indrawing or additional features of CAP formed the study group.[9] These children were evaluated for other morbidities as guided by the clinical findings and followed up until discharge or death. The diagnosis of co-morbidities among the patients was made clinically and by examination of appropriate specimens where necessary. Children aged one month to 14 years fulfilled the inclusion criteria. Pre-admission medications given to the children were also obtained from the care givers. Data generated was entered into a computer data base (Microsoft excel office version 2007, Washington) and analyzed using SPSS version 16. Results were expressed in proportions or percentages. A comparison for difference between children with or without co-morbidities was done using Fisher-Exact test. A p-value of < 0.05 was considered significant.

Results

There were a total of 115 children with pneumonia aged one month to 14 years with pneumonia. Majority of the children studied were U-5(107, 93%), 65(56.5%) were males. One hundred and one (87.8%) children had one or more co morbidities, with over half of them 58 (50.4%) afflicted by malaria, table 1.

Table 1: Frequency distribution of co-morbidities in hospitalized children for pneumonia

Co morbidities	Frequency (percent)
Malaria	58 (50.4)
Malnutrition	28 (24.3)
Meningitis	8 (7.0)
Urinary tract infection	8 (7.0)
Sickle cell disease	6 (5.2)
HIV infection	2 (1.7)
Congenital heart disease	2 (1.7)
None	14 (12.2)

Note: Multiple morbidities were found in 11 children, total number of children was 115

Review of pre-admission medication showed that 55(47.8%)of children were given orthodox medications, 2(1.7%)had only traditional medications and 6(5.2%) had both traditional and orthodox medications. Medication detail was not available in 4(3.5%) children, while 48(41.7%)had no medication before admission. Names of drugs given to 29(25.2%)children were not given, while 9(7.8%), 5(4.3%) and 4(3.4%) children were given ampiclox, cefuroxime and cotrimoxazole respectively. Combinations of drugs were given to 6(5.2%) children and the remaining 2(1.7%) children had gentamicin injections. The outcome of management with respect to the different morbidities is shown in table 2.

Table 2: Co morbidity Treatment outcome in children hospitalized for Community Acquired Pneumonia.

Co-morbidity	Outcome Discharged	*DAMA	Died
None	12	0	2
Malaria	56	0	2
Malnutrition	22	2	4
Meningitis	4	0	4
Urinary tract infection	6	0	2
Sickle cell disease	4	1	1
Congenital heart disease	1	0	1
HIV infection	2	0	0

NB: *DAMA: Discharged against medical advice, $p = 0.659$.

In spite of the occurrence of co-morbidities, no significant difference in mortality was however found between children with co-morbidity and those without, $p = 0.659$

Discussion

Infections in general and pneumonia in particular, are common causes of U-5 morbidity and mortality. The high rate of co-morbidity among children with pneumonia found in this study is similar to previous reports[5-7]. For example in a study conducted in Ogun State Nigeria, 30% of the children with malaria also had pneumonia, furthermore, 23% of all children enrolled satisfied the criteria for both malaria and pneumonia[10]. The challenges of diagnosis and management of children with malaria and pneumonia co-morbidity was highlighted earlier in a hospital based study in Mozambique[11]. Malaria, especially when severe results in respiratory symptoms and signs; thus mimicking pneumonia. This underscores the importance of holistic approach in patient management such as search for alternate diagnosis or co -morbidity. Although, the likelihood of over diagnosis of malaria as a result of positive blood film parasitaemia was discussed earlier in Africa[12], where malaria was reported to be frequently over-diagnosed and results in failure to treat other life-threatening conditions, however, in clinical setting; especially among the ill children with symptoms and signs suggestive of malaria, such positive blood film parasitaemia are not ignored despite the presence of other confirmed morbidity. These patients thus, deserved to be treated for malaria as a matter of urgency.

The relatively high proportion of pneumonia among the malnourished children and vice versa was previously reported in Nigerian studies[6,7]. It has been shown that the epidemiology, clinical features, aetiologic agents, treatment outcome of pneumonia among the malnour-

ished children may be different from that of the well nourished children[3,4,13]. Pneumonia and infection in general result in malnutrition through the induction of anorexia, vomiting, and pyrexia with increased metabolism and negative nitrogen balance[14]. Although malnutrition is usually a chronic event, acute events such as infections also result in malnutrition in children; thus the term severe acute malnutrition (SAM). Pneumonia usually resolves within few days of commencement of treatment, but sometimes, it may take a longer course, depending on the aetiologic pathogen, promptness and adequacy of treatment, and more importantly if associated with complications. On the other hand, malnutrition can predispose to infection through lowered immunity[14]. Although, the possibility of the predisposition to pneumonia by malnutrition and vice versa was highlighted above, the two can independently occur in a child, as co-morbidity. Malnutrition poses challenges in the diagnosis and treatment of children with infections, as there is substantial variation in epidemiology, aetiologic agents and clinical findings of infection in the setting of malnutrition[15]. This challenge is in addition to the background social problems, high cost of treatment and longer hospital stay commonly found in the management of malnourished children that may be responsible for the high rate of DAMA among the malnourished children[16,17].

The occurrence of urinary tract infection (UTI) among the patients may be a coincidental clinical finding as pneumonia and UTI do not share common aetiologic agents. Likewise the origin of UTI is usually an ascending infection, as haematogeneous origin of UTI is rare except in early infancy or neonatal period[18]. However, the same may not be said for meningitis as the two important agents causing pneumonia are also known to cause meningitis; S. *pneumoniae* and H.*influenza*. However, it is difficult to speculate that the same agents caused pneumonia and meningitis in the children studied, as the detection of the aetiologic agents for the pneumonia was not part of what this study sought to determine. Meningitis can occur as a result of haematogenous metastatic/embolic complication of pneumonia[19]. Either UTI or meningitis, or both can also occur in a patient as part of septicaemic illness from pneumonia.

Although, SCD has been shown to be an important risk factor for pneumonia, with increased incidence and severity[20], the proportion of children with SCD in this and earlier study in Ilorin[7], Nigeria was modest. However, it is critical to note that, a significant overlap exists between the features of pneumonia and acute chest syndrome[21].

The very low proportion of children with HIV infection in this study should not be construed as if it is not an important co-morbid condition with pneumonia, but indeed, a significant risk and a usual co-morbid condition[1,3]. Apart from invasive bacterial pneumonia, HIV infected children are also at risk of lymphoid interstitial pneumonia, *Pneumocystis jiroveci* pneumonia and tuberculous pneumonia. The paucity of HIV infected children in the study group is due to nature of the patients studied, as only children that met CAP criteria were included. Most HIV infected children in developing countries become symptomatic soon after birth or at presentation[22,23], and may not qualify for the CAP criteria.

The administration of treatment, usually in form of drugs to children at home before resorting to hospital or in-patient care is a common practice. Although majority of the mothers gave one form of treatment or another to their children, substantial proportion did not attempt treatment before presentation. The fact that most mothers did not know the names of drugs given to their wards, lack of pre-admission medication details in many of them and patronage of traditional treatment may perhaps be due to maternal ignorance or illiteracy. Otherwise, detailed history of drugs administered during an acute illness like pneumonia may not be difficult to recall. Although, the details of the mothers' education was not part of this study, previous studies in the same community suggest high rate of maternal ignorance and illiteracy[24]. Even though some of the children had antibiotics before presentation, adequate improvement was not recorded; thus the admission. The lack of response was probably because the children had severe pneumonia requiring hospitalization, improper administration of medication or the presence of co-morbidity, or the children had viral pneumonia. Ill children with pneumonia sometimes require in addition to antibiotics fluid, intravenous medications, oxygen and other supportive treatment which cannot be delivered safely on out-patient basis.

Although the study population was not large, the lack of significant statistical difference in mortality outcome of the children may be due to the fact that majority of the children with co-morbidities were identified and necessary treatment administered. The importance of identifying co-morbidities goes beyond treatment during the period of hospitalization, but also for proper follow up treatment, counseling etc.

While the proportion of malaria and malnutrition among children hospitalized for pneumonia in Maiduguri was high, the proportion of other co-morbidities in these children was relatively low. We therefore recommend that all children hospitalized for pneumonia be screened for malaria, and be evaluated for other co morbid conditions in order to provide a holistic management.

Acknowledgement

We wish to acknowledge Professor H Yusuph for painstakingly going through the manuscript despite his tight schedule.

Conflict of Interest: None
Source of Funding: None

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