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Pattern and Trends of Respiratory Disease Admissions at the Emergency Paediatrics Unit of Jos University Teaching Hospital – A Four Year Review

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Authors' contributions

This work was carried out in collaboration between all authors. Author ESY conceived and designed the study, collected the data, performed the statistical analyses and wrote the first draft. Author HOA managed the analyses and literature search. Authors CSY, EUE, CJ and AOE collected the data and managed the analyses. Author SO contributed to the design of the study and literature search. All authors read and approved the final manuscript.

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ABSTRACT

Aims: Respiratory diseases contributes substantially to the number of Paediatric admissions and deaths especially in low income countries. Understanding the trends will help in health planning and resource distribution. This study is to describe the pattern and trend of respiratory diseases in children in a tertiary healthcare facility in north-central Nigeria.

Study Design: This study was a retrospective study including all patients admitted and managed with respiratory diseases. The relevant clinical information was extracted from the hospital records.

Place and Duration of Study: The Emergency Paediatric Unit (EPU) of the Jos University Teaching Hospital (JUTH), Jos Nigeria, between January 2012 and December 2015.

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Methodology: A total of 2277 children aged 6 weeks-18 years were admitted into the unit within the study period. Out of these, 498 (21.9%) were diagnosed with respiratory disease. Clinical records were retrieved and reviewed. Those with inconclusive diagnosis as well as those with associated co-morbidities such as cardiac anomalies were excluded. The data collected were entered and analyzed using Epi Info version 7.2. Student t-test and chi-square test were used to analyze categorical and continuous variables respectively.

Results: Pneumonia accounted for 54.4% of total respiratory diseases. Cases of Pneumonia were mostly seen at the peak of the rainy and the harmattan seasons. (March, June/July and October/November). The highest number of cases of respiratory diseases were in the under-fives. The commonest complication was congestive cardiac failure and it was commoner in the younger age group.

Conclusion: The prevalence of respiratory diseases remains high and contributes significantly to hospital admissions especially in the under five children. There is need to introduce new vaccines and re-enforce existing immunization against common organisms that cause pneumonia in children. There is also need to introduce policies that would ensure appropriate treatment for children to reduce the burden of these diseases.

Keywords: Respiratory diseases; pneumonia; prevalence; children.

ABBREVIATIONS

ARI : Acute Respiratory Infection
CCF : Congestive Cardiac Failure
EPU : Emergency Pediatric Unit
HREC : Health Research Ethical Committee
JUTH : Jos University Teaching Hospital

1. INTRODUCTION

An understanding of epidemiological trends in hospital admissions is critical for health care planning and appropriate resource allocation especially in resource poor settings where the resources are not readily available [1]. Evidence shows that acute respiratory infection contributes to a substantial number of Paediatric admissions and death in children less than 5 years especially in low income countries [2]. A regular health facility-based assessment of child health is considered essential to provide information needed for evidence-based decisions and planning that will positively impact on all children [3,4]. Hence a facility based study can help provide the required data on pattern and trends of respiratory illnesses.

A systematic review of global burden of diseases between 1990 and 2000 reported Pneumonia, a respiratory illness, as the leading cause of morbidity and mortality in children aged below 5 years [5]. Apart from pneumonia, children may suffer a variety of respiratory illnesses ranging from common cold, nasopharyngitis, laryngitis, sinusitis, bronchiolitis, tonsillopharyngitis, asthma, tuberculosis to foreign body aspiration [6].

In most developing countries like Nigeria, hospital data is a major source of information on the health status of the population because of poor community surveillance and records systems. Many children only come into contact with the health system when they fall sick. Characterizing the pattern and trends of the common morbidity like acute respiratory infections can help with planning and appropriate resource allocation.

This study was therefore carried out to determine the pattern and trend of respiratory admissions at the emergency department of Jos University Teaching Hospital, with the aim of using the information generated from the data to establish the profile of respiratory patients, their demographics and diagnostic peculiarities which will help in critical health care planning and redistribution of resources.

2. METHODOLOGY

This study was a retrospective study. It was a review of all the case notes of patients admitted into the emergency paediatric unit of a tertiary health facility in North central Nigeria from January 2012 to December 2015 with a diagnosis of a respiratory disease. Clinical records of all the admitted children were retrieved and reviewed. Those with inconclusive diagnosis as well as those with associated co-morbidities such as cardiac anomalies were excluded from the study. The sample size was made up of all patients with complete records from January 2012- December 2015. The data collected were entered and analyzed using Epi

Info version 7.2. Student t-test was used to analyze categorical and while the chi-square test were used to analyze the continuous variables. A P value < 0.05 was considered statistically significant. Tables and graphs were used to represent the data obtained. The Institutional Health Research Ethical Committee (IHREC) of the Teaching Hospital gave ethical approval for this research.

3. RESULTS AND DISCUSSION

During the review period, a total of 2277 children aged 6 weeks-18 years were admitted into the Paediatric Emergency unit. Of the total admissions, 498 (21.9%) were diagnosed as having a respiratory disease. The distribution of admissions per year is shown in Table 1.

The pattern of respiratory disease seen over the period is shown in the Table 2. Pneumonia accounted for 54.4% of total respiratory diseases and the highest all through the period followed by pharyngotonsillitis (27.3%) and tuberculosis (6.8%).

The monthly prevalence of respiratory pathologies seen each year is shown in Fig. 1. Most the cases of pneumonia and Pharyngotonsillitis appear more in the month of March and least in December. Peak period for Pneumonia was at peak of rainy (wet) and the harmattan (dry) seasons. March, June/July and October/November.

Among the children most cases of respiratory disease were in the younger age group as shown in Table 3.

Table 1. Distribution of admissions

| Year | Total admissions N | Respiratory disease N (%) |
|-------|--------------------|---------------------------|
| 2012 | 653 | 146 (22.3) |
| 2013 | 759 | 204 (26.9) |
| 2014 | 132 | 23 (17.4) |
| 2015 | 733 | 125 (17.1) |
| Total | 2277 | 498 (21,9) |

Table 2. Pattern of respiratory disorders seen over the study period

| Disorder | 2012 (%) | 2013 (%) | 2014 (%) | 2015 (%) | Total (%) |
|---------------------|-----------|------------|-----------|-----------|-------------|
| Pneumonia | 75 (51.4) | 114 (55.9) | 14 (60.9) | 68 (54.4) | 271 (54.4) |
| Pharyngotonsillitis | 43 (29.5) | 51 (25.0) | 5 (21.7) | 37 (29.6) | 136 (27.3) |
| Tuberculosis | 8 (5.5) | 20 (9.8) | 1 (4.3) | 5 (4.0) | 34 (6.8) |
| Asthma | 3 (2.1) | 3 (1.5) | 1 (4.3) | 3 (2.4) | 10 (2.0) |
| Bronchiolitis | 6 (4.1) | 7 (3.4) | 2 (8.7) | 5 (4.0) | 20 (4.0) |
| Otitis media | 3 (2.1) | 4 (2.0) | 0 (0.0) | 4 (3.2) | 11 (2.2) |
| Laryngomalacia | 5 (3.4) | 2 (1.0) | 0 (0.0) | 1 (0.8) | 8 (1.6) |
| Others | 3 (2.1) | 3 (1.5) | 0 (0.0) | 2 (1.6) | 8 (1.6) |
| Total | 146 | 204 | 23 | 125 | 498 (100.0) |

**Others included: Sinusitis, Foreign body and croup*

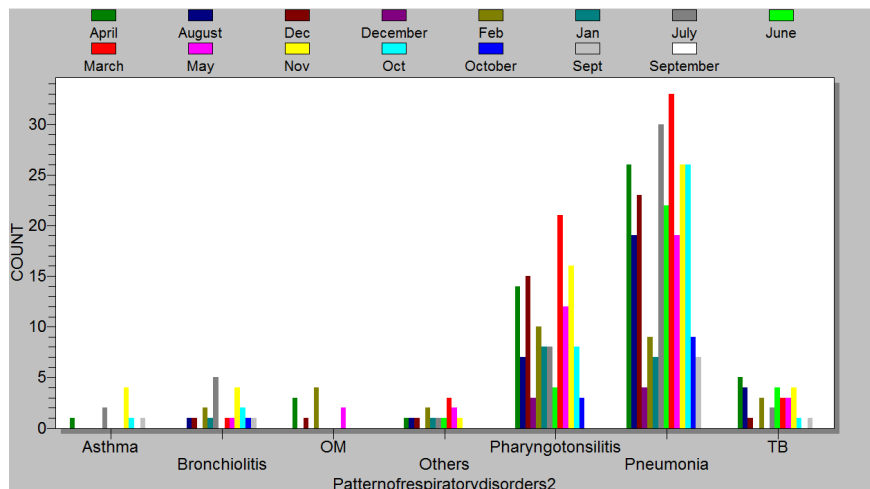


Fig. 1. Monthly prevalence of respiratory disease

Table 3. Age distribution of respiratory disease

| Pattern of respiratory disorders | 6 weeks- 5 y (%) | 6-10 y (%) | 11-15 y (%) | 16-<18 y (%) | Total (%) |
|----------------------------------|------------------|------------|-------------|--------------|------------|
| Pneumonia | 234 (86.3) | 20(7.4) | 12(4.4) | 5(1.8) | 271(100.0) |
| Pharyngotonsillitis | 116(86.6) | 11(8.2) | 6 (4.5) | 1(0.7) | 134(100.0) |
| Bronchiolitis | 20(100.0) | 0(0.0) | 0(0.0) | 0 (0.0) | 20(100.0) |
| Tuberculosis | 19(55.9) | 6(17.6) | 7(20.6) | 2(5.9) | 34(100.0) |
| Otitis Media | 10(90.9) | 1 (9.1) | 0(0.0) | 0(0.0) | 11(100.0) |
| Asthma | 4(40.0) | 4(40.0) | 2 (20.0) | 0(0.0) | 10(100.0) |
| Others | 13(81.3) | 2(12.5) | 1(6.3) | 0(0.0) | 16(100.0) |
| Total | 416(83.9) | 44(8.9) | 28 (5.6) | 8(1.6) | 496(100.0) |

Table 4. Complications of pneumonia by age group

| Complications of pneumonia | 6 weeks - 5 y (%) | 6-10 y (%) | 11-15 y (%) | 16-<18 y (%) | Total (%) |
|----------------------------|-------------------|------------|-------------|--------------|-----------|
| CCF | 64(82.1) | 6(7.7) | 5(6.4) | 3 (3.8) | 78(100.0) |
| Pleural effusion | 1(33.3) | 2(66.7) | 0(0.0) | 0(0.0) | 3 (100.0) |
| Total | 65(80.7) | 8(9.6) | 5(6.0) | 3(3.6) | 81(100.0) |

A few complications of respiratory diseases were seen during the period are shown in above Table 4. Congestive cardiac failure was the most frequent and commoner in the younger age group while pleural effusion was seen in children 6-10 years old.

3.1 Discussion

Over the period under review, admissions from respiratory problems appear to be on a downward trend though with a little surge in 2013 but dipping further down from 2014-2015. This observed decline may be due to the introduction of the *Haemophilus influenza* type B and pneumococcal conjugate vaccines though the exact contribution of immunization could not be determined in this study because it was a retrospective study [7,8]. It may also be due to improved case management of acute respiratory infection (ARI) in the community as several cases of pneumonia for example are being managed outside the teaching hospital. However, more needs to be done to further reduce the high burden of these diseases because though with introduction of these two vaccines the burden of these diseases appear to be declining, the fact that they still constitute a major cause of Paediatric admissions means other strategies need to be put in place to further reduce the burden of these diseases. This may be achieved through continuous health education and public enlightenment which can be achieved through involvement of community and religious leaders as well as role model mothers to help buttress the importance of immunization, clean

environment and early detection of diseases and presentation to the health facilities.

Among respiratory pathologies, pneumonia remains the most frequent throughout the period of review. This is consistent with report from earlier study [9] in this centre that showed pneumonia was the most common cause of childhood admissions this is followed by pharyngotonsillitis and tuberculosis. The prevalence of pneumonia appears similar in all the years under review but with a slight increase in the year 2014. This may not be a true reflection as the year 2014 witnessed fewer admissions due to intractable industrial actions in the hospital.

The rates of tuberculosis over the years appear to be declining which may be as a result of declining rates of HIV infection, or perhaps from improved diagnostic facilities (GeneXpert and Lime Probe Assay which is now available in our centre) and treatment facilities in other centres.

Seasonality of respiratory diseases shows that pneumonia and pharyngotonsillitis were most common in the months of March, June-July and October-November. The month of August and September witnessed few cases which could be attributed to it being towards the ends of the heaviest rains. Asthma cases appear more during November as the harmattan, dusty period approaches. These periods are not surprising because there are increase dust and sporulation of plants with subsequent increase pathogens and pollens in the air leading to increase respiratory infections and asthma exacerbation.

Respiratory pathologies seen during the period occurred more commonly in children <5 years of age. The complications reported during the period under review were commoner in children under five years and it was mainly congestive cardiac failure (CCF). This is not surprising as pneumonia is known to cause congestive cardiac failure in children under five via the following mechanisms: increased myocardial oxygen demand, septic toxemia, myocarditis and ventilation perfusion mismatch which leads to hypoxia. Hypoxia causes pulmonary vascular vasoconstriction which raises the pulmonary arterial vascular pressure. The right side of the heart eventually fails when it cannot adequately pump against the pulmonary pressure [10-13]. This age affectation is in keeping with a previous study in our centre [9]. However, it was noticed that pleural effusion was more in children 6-10 years of age.

The prevalence and pattern of respiratory diseases have continued to show similarities in different parts of the world especially in the under-fives It therefore means that parents should be encouraged continuously on the need to immunize their children or other factors predisposing these children to pneumonia (such as malnutrition, pollution, exclusive breast feeding etc.) needs to be tackled.

Asthma prevalence was 1.5%-4.3% which is within the prevalence rate (0.7-15.2%) reported in some studies from various parts of the country [14-25] however the true prevalence may be higher as the cases seen in this study were only those who came in acute exacerbation.

The congenital disorders reported in this study was exclusively Laryngomalacia based on clinical evaluation without a flexible bronchoscopy (which was not available in our centre) which could have given a more definitive diagnosis.

4. CONCLUSION

The prevalence of respiratory disorders remains high and they still contribute significantly to hospital admissions especially in the under-five children. There is need to introduce new vaccines and re-enforce existing immunization against common organisms that cause pneumonia in children especially those <5 years of age. There is also need to introduce policies that would ensure appropriate treatment for children of these age groups to reduce the burden of these diseases and improve

immunization uptake by parents like presenting immunization cards at the point of elementary school entry.

CONSENT

It is not applicable.

ETHICAL APPROVAL

Ethical approval for this study was obtained from the Health Research Ethical Committee (HREC) of Jos University Teaching hospital (JUTH).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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