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Comparing the incidence of pneumonia in children seen at a Nigerian Teaching Hospital before and during the COVID -19 pandemic

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Abstract: *Background:* Following the outbreak of the new coronavirus (COVID 19) worldwide, many governments across the world including the Nigerian government had to implement measures to curtail the spread of this virus. Such measures included social distancing and personal hygiene which could have also helped to reduce the transmission of pneumonia among other infectious diseases.
Objective: To assess the effect of COVID-19 on the incidence of pneumonia in children seen at the Department of Pediatrics, of a Nigerian private University Teaching Hospital.
Method: We retrospectively analyzed the data of the patients seen with pneumonia in all the Pediatric units of the Teaching Hospital from April 2019 to March 2020 (pre-pandemic period) and compared it with that of those seen during the COVID-19 pandemic from April 2020 to March 2021.
Result: There was a 28% decrease in the total number of children seen in the department from 5,657 in pre-pandemic period to 4,079 in the pandemic period. There was a 17% decrease in the mean number of children seen with pneumonia monthly from 4.92 to 4.08 in the pandemic period. This is despite the relative increase in the incidence rate of pneumonia in children seen from 1.04% in the pre-pandemic period to 1.2% in the pandemic period. We noted more complications of pneumonia including heart failure and anaemia in the pandemic period (24.5% of cases) than in the pre-pandemic period (15.3% of cases).
Conclusion: The incidence of pneumonia in children seems to have increased in the wake of the COVID 19 pandemic.

Key words: Pneumonia, COVID-19, Pediatrics.

Introduction

In December 2019, a new coronavirus (COVID-19) began to spread rapidly throughout the world and became a global pandemic as declared by the World health Organization (WHO) in March, 2020.[1-3] COVID-19 is caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).[1,4] With rising cases of infections worldwide, many governments across the world had to implement measures such as hand washing and wearing of face masks to curtail the spread of this virus.[5-8]

These measures, though meant to curtail the spread of COVID-19, are not expected to have a specific effect on COVID-19 transmission alone but also on transmission of other infectious diseases.[9-11] Studies have shown a decrease in cases of pneumonia as well as other respiratory infections during the COVID 19 pandemic.[11-16]

Pneumonia is a common respiratory disease seen in children especially under-fives. It is a common cause of morbidity and mortality especially in developing societies like ours.[17-18] Based on World Health Organisation (WHO) reports, pneumonia accounts for 14% of all deaths of children under 5 years old, killing 740 180 children in 2019.[19] In Nigeria, 19% of child deaths were due to pneumonia in 2018, and it was the biggest killer of children under-five in 2017.[20]

This study aimed to assess the effect of the COVID-19 pandemic on incidence of pneumonia in children seen in the Department of Pediatrics, of a Nigerian Teaching Hospital.

Methodology

Study setting

The research was carried out at the Pediatrics department of Bingham University Teaching Hospital. The

department has 46-bed capacity, which is divided into the special care baby unit (SCBU), pediatric medical ward (PMW), and emergency pediatric unit (EPU). There is also a pediatric out-patient department (POPD), a clinic which caters for children not hospitalised. It's an academic tertiary hospital that cares for adults and children from all around the metropolis and beyond being that it is a referral center. An average of 120 to 150 children are seen weekly in this hospital.

Materials and method

We retrospectively analyzed the data of the patients seen with pneumonia in all the Pediatric units of Bingham University Teaching Hospital from April 2019 to March 2020 before the COVID 19 pandemic (referred to as pre-pandemic period) and compared it with that of those seen during the COVID-19 pandemic (pandemic period) from April 2020 to March 2021. Ethical Approval
Ethical approval for the study was obtained from the hospital's Health Research Ethics Committee with reference number NHREC/21/05/2005/00836.

Statistical analysis

Categorical data was presented as counts and percentages. When comparing the two periods, t test was used to determine differences of the mean. SPSS version 21 was used for statistical analyses.

Results

There was a decrease in the number of patients seen in all the units of the pediatric department of the hospital from 5,657 pre pandemic period to 4,079 during the pandemic with an average total decrease of about 28% (Table 1).

Table 1: Total number of patients seen in department of paediatrics

Variables	Total No. of patients seen		Percentage decrease (%)
	Pre-pandemic 2019/2020	Pandemic period 2020/2021	
POPD	5011	3539	29.4
SCBU	238	213	10.5
EPU	123	95	22.8
PMW	285	232	18.6
Total	5657	4079	27.9

No. = number, POPD = paediatric outpatient department, SCBU = special care baby unit, EPU = emergency paediatric unit, PMW = paediatric medical ward

There was also a corresponding decrease in the number of children seen with pneumonia from 59 patients pre-pandemic to 49 patients during the pandemic period giving a decrease of 16.9% (Table 2).

Table 2: Patients with Pneumonia seen in the department of paediatrics

Variables	Pneumonia patients seen		Percentage decrease (%)
	Pre-pandemic 2019/2020	Pandemic period 2020/2021	
POPD	21	19	9.5
SCBU	6	1	83.3
EPU	4	3	25.0
PMW	28	26	7.1
Total	59	49	16.9

No. = number, POPD = paediatric outpatient department, SCBU = special care baby unit, EPU = emergency paediatric unit, PMW = paediatric medical ward

The mean number of children seen with pneumonia per month was 4.92 in the pre-pandemic period and decreased by 17.1% to 4.08 in the pandemic period (Table 3).
The number of patients seen was divided into in-patients and out-patients as shown in Table 4. Even though, there was a decrease in the total number of sick children seen in the paediatric department before the pandemic, the period specific incidence of pneumonia in children in the hospital was 1.04% pre-pandemic and increased by 16% to 1.2% during the pandemic.
In the pre-pandemic period, 9 (15.3%) of the cases of pneumonia had complications, while 12 (24.5%) children had complications during the pandemic. These complications include anaemia and heart failure. There were five suspected cases of COVID 19 pneumonia during the pandemic period; however, they all tested negative to the COVID 19 test.

Table 3: Comparison of mean number of patients seen with pneumonia per month in both periods

Period	Mean	SE Mean	SD	T test
Pre-pandemic	4.92	1.221	4.231	0.671
Pandemic	4.08	1.097	3.801	

SE = standard error, SD = standard deviation

Table 4: Comparison of total admissions and pneumonia cases between both years

Year	Pre-pandemic period 2019/2020		Pandemic period 2020/2021	
	Total No	Pneumonia No *(%)	Total No	Pneumonia No * (%)
In-patient	646	38 (5.9)	540	30 (5.6)
Out-patient	5011	21 (0.4)	3539	19 (0.5)
Total	5657	59 (1.04)	4079	49 (1.2)

*Percentage of total admissions that are pneumonia

Discussion

The COVID 19 pandemic had a significant impact on the health sector.[6, 9, 21] Our study revealed a general decrease in the number of children presenting to the hospital during the pandemic with various illnesses (like malaria, diarrhoeal diseases and other respiratory tract infections among others) including pneumonia. This finding is at par with that of various studies carried out in other parts of the world like Japan, Italy, France and the United States of America.[7, 11-15, 22] This decline could be explained by the restrictions in movement, fear of contacting the coronavirus infection in the hospital, or even the non-availability of funds to meet healthcare needs of these children due to the economic downturn caused by the closure of various businesses during the pandemic.
Another possible explanation for a reduction in the cases of pneumonia in children seen in the hospital is the possible impact of the COVID-19 preventive measures like the closure of schools, restrictions of large gatherings and social events, self-quarantine as well as personal hygiene such as mask wearing and hand sanitization on the incidence of communicable diseases. Pneumonia can be transmitted by air borne droplets; it is therefore possible that these measures could have helped reduce significantly the incidence of pneumonia. This has also been suggested by findings from other studies in other parts of the world[11,23,24]

We observed more complications like heart failure and anaemia associated with pneumonia in the patients that presented during the pandemic. A possible explanation for this could be a delay in presentation to the hospital caused by the restriction of movement. Moreover, there was a general downturn of the economy of the country triggered by the closure of offices and businesses. This could have led to a limitation of funds available to cater for the healthcare needs of these children.
The symptoms of COVID-19 and other viral pneumonia are similar, thus posing a challenge in distinguishing between the two especially in our resource poor settings. Chest radiographs are not sensitive enough to distinguish between the two and studies have shown that CT scan of the chest may be more helpful. Though there is evidence in literature that COVID-19 is less serious in children than adults, availability of proper diagnostic methods to distinguish COVID-19 pneumonia from other viral pneumonias would help improve treatment outcomes.[25,26]

This study being a retrospective hospital based study is not without its limitations. The possibility of incomplete data and unstandardized information as well as variability in diagnostic criteria cannot be completely ruled out. For instance, the ages and gender as well as socio-economic statuses of the study population were not captured in the data source. Knowledge of these parameters could have helped to better interpret the results of this study. Also, it is possible that some cases have been duplicated thus, posing a problem with determining incidence rates.

Conclusion

Despite the decreased incidence of pneumonia in the wake of the COVID-19 pandemic, this change was not significant. The restriction of movement and imposition of wearing of masks in public places and hand washing could have helped to reduce the incidence of community acquired pneumonia in children.

Authors Contribution
MS: participated in conceptualization of the study, study design, data and statistical analysis, manuscript editing and review.
MMI: participated in literature search, data acquisition, data and statistical analysis, manuscript preparation, editing and review.
HS: participated in conceptualization of the study, study design, definition of intellectual content and manuscript review.
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