

Pneumococcal Vaccination Status of Children with Sickle Cell Disease in Port Harcourt, Nigeria

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Abstract

Background: The sickle gene confers an increased vulnerability to infection, particularly to certain bacterial pathogens, and this has significantly contributed to morbidity and mortality in individuals with sickle cell disease. Immunization plays an important role in the prevention of infection in children with sickle cell disease; we sought to assess the pneumococcal vaccination rate of children with this disease in Port Harcourt, Nigeria.

Materials and Methods: This was a cross-sectional questionnaire based study of children with sickle cell disease presenting in the Sickle Cell Clinic of the University of Port Harcourt Teaching Hospital, Nigeria from January 2013 to December 2013.

Results: There were 181 children with sickle cell disease. One hundred and seventy nine (98.9%) of them were SS genotype while 2(1.1%) children had SC genotype. Immunization coverage according to the National Programme on Immunization was 172 (95.1 %). The rates for other specific vaccines, range from 102(66.2%) for the anti-Haemophilus influenza vaccine in the form of pentavalent vaccine to 10(5.5%) for the pneumococci. The major reasons for non-vaccination of pneumococcal were unavailable in Government Health Facility, ignorance, lack of proper education on the need of the vaccine and the outrageous cost of these vaccines for the families who knew about them.

Conclusion: The immunization coverage for pneumococcal infections among children with sickle cell disease is poor. These results propose the need for a national program against sickle cell disease, which should license health facilities to include pneumococcal vaccine in their routine vaccination program.

Keywords: Immunization, Children, Sickle Cell Disease, Nigeria.

Introduction

Sickle cell disease (SCD) is a genetic disorder in which hemoglobin is structurally abnormal, resulting in the episodic formation of sickle-shaped red blood cells (RBCs) and a wide range of clinical manifestations [1]. The underlying abnormality is a single nucleotide substitution (GTG for GAG) in the gene for β -globin on chromosome 11, resulting in the replacement of a glutamic acid residue with valine on the surface of the protein (termed HbS) [2]. The sickle gene confers an increased susceptibility to infection, especially to certain bacterial pathogens, and at the same time infection provokes a cascade of SCD-specific pathophysiological changes [3]. The disease weakens the immune system and puts its victims at risk for serious bacterial infection and childhood death. Infection is a significant contributor to morbidity and mortality in sickle cell disease (SCD). Figures examined from studies in the Democratic Republic of the Congo, Nigeria, Kenya and Senegal

-- countries with the highest sickle-cell disease burden -- clearly demonstrate an increased risk of serious bacterial infection, especially invasive pneumococcal disease, in African children with sickle-cell disease [4].

Immunization is one of the most successful and cost-effective public health interventions [5]. In 2010, global efforts to immunize children with vaccines against life-threatening diseases set a record high, reaching 109 million children and averting more than two million deaths along with countless episodes of illness and disability annually (UNICEF, 2012) [6]. However, despite substantial gains in recent years, millions of children are not immunized, exposing them to disabilities or premature death.

In developed countries, actions to prevent and effectively treat infection have made a significant impact to improvements in survival and quality of life, and are continually being developed and extended. However, progress continues to lag in less developed countries such as ours where the patterns of morbidity and

mortality are less well defined and implementation of preventive care is poor. This study provides an insight into the Pneumococcal vaccination status of children with SCD in Port Harcourt, Nigeria.

Materials and Methods

This was a cross-sectional questionnaire based study of children with sickle cell disease presenting in the Sickle Cell Clinic of the University of Port Harcourt Teaching Hospital (UPTH), Nigeria from January 2013 to December 2013. Data on Immunization coverage was collected. This was done by taking careful history and scrutinization of immunization cards. This questionnaire contains structured and open-ended questions meant to elicit spontaneous responses on the immunization seeking behavior by mothers. It also contains sections for bio-data, card retention, immunization status, and eligibility for immunization or otherwise, historical recall of morbidity and/or mortality from NPI vaccine- preventable diseases and genotype.

The ethical approval for the study was obtained from the Ethical Committee of the UPTH. The collected data were entered into computerized data base after coding using an EPI Info version 6.0 packages and later converted to SPSS (version 16.0). The results were expressed in percentages.

Results

There were 181 children with sickle cell disease. One hundred and seventy nine (98.9%) of them were SS genotype while 2 (1.1%) children had SC genotype. Most 100 (55.2%) of the mothers had tertiary education while 61 (33.7%) and 20 (11.0%) had secondary and primary levels of education respectively. The card possession rate in this study is 169 (93.4%) while the card availability rate is 46 (27.4%). Immunization coverage according to the NPI was 172 (95.1%). The rates for other specific vaccines, range from 102 (66.2%) for the anti-Haemophilus influenza vaccine in the form of pentavalent vaccine to 10 (5.5%) for the pneumococci. The major reasons for non-vaccination of pneumococcal were unavailable in Government Health Facility, ignorance, lack of proper education on the need of the vaccine and the outrageous cost of these vaccines for the families who knew about them.

Vaccine	Number	Percentage
BCG	179	98.9
OPV0	173	95.6
OPV1	158	87.3
OPV2	158	87.3
OPV3	147	81.2
DPT1	153	84.5
DPT2	149	82.3
DPT3	139	76.8
HBV1	140	77.3
HBV2	138	76.2
HBV3	135	74.6
PENTA (Hib)	102	56.3

Measles	152	84.0
Yellow fever	123	66.8
PCV	10	5.5

Table 1: Immunization Coverage of Children with SCD. Key: BCG- Bacillus Calmatte Guerin; OPV-Oral Polio vaccine; DPT- Diphtheria Pertussis Tetanus Vaccine; HBV- Hepatitis B Virus; PCV-Pneumococcal Vaccine.

Reasons	No	Percentage
Ignorance	93	54.4
Not part of NPI	30	17.5
Have knowledge but vaccine was expensive in private Hospitals	63	36.8
No proper education on its importance	102	59.6
Unavailable in Government Health facility	161	89.0
Previous side effect	0	100.0

Table 2: Reasons for Lack of Pneumococcal Immunization in Children with SCD.

Discussion

Immunization records as enclosed in the Road-to-health (RTH) Card epitomize the most dependable assessment of the immunization status of children. The card possession rate in this study is 96.2% while the card availability rate is 27.5%. Appraisal of card possession and availability remain a vital tool that not only gives an indication of health care provider practices, but also the importance attached to immunization and general state of health of the child by the caretakers. Our finding is comparable to the RTH card possession rate of 97.2% and card availability rate of 17.0 % obtained by Ngini several years ago in Enugu (Nigeria) [7]. These rates indicate that a laudable proportion of mothers embraced the immunization process; few of them appreciate the importance, and the need to always take the card along with the children to the hospital. It also illuminates the negative practice of health-care providers who do not routinely screen for this and emphasize the need for care-takers to bring this card to the hospital.

Ninety five percent of the Children in this study were fully immunized. This is similar to that of Nacoulma et al. in Bukinafaso but above the national average coverage of 23% [8,9].

Pulmonary infections are still the most prevalent cause of death of children with SCA and reports have documented that the risk of early invasive bacterial disease in affected children is 53 to 600 times higher than in the general population [10, 11]. The immunization with pneumococcal vaccines is an important tool in protecting these children. Pneumococcal immunization rate of 5.5% in this study is low. This is at variant with that of Nero et al. where pneumococcal immunization rate was higher than the control population [12]. Natasha et al. demonstrated in their study reduced incidence of invasive pneumococcal disease (IPD) in individuals with SCD following the introduction of pneumococcal vaccine (PCV) into the routine childhood immunization schedule [13]. Among children with SCD who were aged <5 years, the

incidence of IPD decreased by 93% [13].

Pneumococcal vaccination has been used to protect children and adults with SCD. A 7-valent protein conjugate vaccine (PCV7), directed against seven serotypes commonly associated with invasive disease, has been shown to be immunogenic and have efficacy in preventing pneumococcal disease in children with SCD [14,15]. The Unavailability of the vaccine in Government Health facility featured prominently as the major cause of lack of pneumococcal vaccination in this study (89.0%), which is much higher than the 5.6% recorded by Ngini [13]. It is worrisome that this vaccines continue to be unavailable in Government Health Facilities despite the contribution of pneumococcal infections to childhood mortality and morbidity.

Conclusion

The immunization coverage for pneumococcal infections among children with sickle cell disease is poor. These results propose the need for a national program against sickle cell disease, which should license health facilities to include pneumococcal vaccine in their routine vaccination program.

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