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(CASE STUDY ARTICLE)

A case study of a circulating vaccine derived polio virus in a Nomad in Zaria – Kaduna state, Nigeria

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Abstract

Immunization regarding polio has yielded quite a tremendous positive impact as a result of campaigns and involvement of various stake holders from the grass root to the federal level in Nigeria. Interventions from international agencies and organizations in light of synergic partnership with Nigeria in order to tackle polio cannot be overemphasized. All these have helped to place Nigeria as one of the polio – free nations in the world.

This was retrospective case study involving a 2 year old female orphan who was moved from a hygiene and sanitation-deficient and non-immune susceptible settlement fulani settlement in Kubau LGA to Anguwan Alkali community in Zaria in order to live with her grandmother. She was taken to Babban Dodo PHC in Zaria for community management of acute malnutrition programme as a malnourished child. The child was claimed to have been vaccinated.

On the 18th of August 2018, the Assistant District Nursing officer of Zaria LGA, Kaduna State, Nigeria was notified about case of a sudden onset of left limb flaccid paralysis that started on the 17th of August 2018. The case was reported to the Kaduna state ministry of health. After fitting the AFP case definition. Stool sample was taken for laboratory investigation. The sample was sent to the National Level Polio Immunization Laboratory at the University of Ibadan on the 21st August 2018. The laboratory test results came out positive for cVDPV2. Results from the community survey also showed that most of the catchment settlement for PHC Anguwan Alkali has RI coverage of less than 70%. The detection of the cVDPV2 strains underscores the importance of maintaining high level of often Routine Immunization coverage at all levels to minimize the risk and consequences of any poliovirus circulation in Zaria LGA-Nigeria

Keywords: Circulating vaccine; Derived polio virus 2; Immunization; Migration; prompt response; stake holders

1. Introduction

One of the goals of the polio end game strategy of 2019 to 2023 is to stop circulating vaccine derived polio virus 2 (cVDPV2) [1]. The Africa Health Strategy 2007–2015 points out that, although Africa has 10% of the world population, it bears 25% of the global disease burden and only 3% of the global health workforce [2]. Also the polio end game at the

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time of a pandemic of the COVID- 19 is challenging [3]. The legacy of polio in Africa goes far beyond the tragedies of millions of children with permanent paralysis. It has a positive side, which includes the many well-trained polio staff that have vaccinated children, conducted surveillance, tested stool specimens in the laboratories, engaged with communities, and taken care of polio patients. This legacy also includes support for routine immunization services and vaccine introductions and campaigns for other diseases [4]. As recently as 2012, Nigeria accounted for more than half of all polio cases worldwide. This success is the result of a concerted effort by all levels of government, civil society, religious leaders and tens of thousands of dedicated health workers. More than 200,000 volunteers across the country repeatedly immunized more than 45 million children under the age of five years, to ensure that no child would suffer from this paralysing disease. Innovative approaches, such as increased community involvement and the establishment of Emergency Operations Centers at the national and state level, have also been pivotal to Nigeria's success [5]. Beginning in 2012, The Global Polio Eradication Initiative (GPEI) began establishing emergency management and control facilities in the 3 remaining polio-endemic countries. National and sub national Emergency Operations Centers (EOCs) were opened in Nigeria (8 during 2012–14), Pakistan (6 during 2014–15), and Afghanistan (4 in 2016). All remain in operation and provide an important framework for a heightened command-and-control response to complex public health emergencies [4]. In mid.-2020, the Global Polio Eradication Initiative (GPEI) plans to introduce a genetically stabilized, novel OPV type 2 (nOPV2) that has a lower risk for generating VDPV2 than does Sabin mOPV2; if nOPV2 is successful in limiting new VDPV2 emergences, GPEI foresees the replacement of Sabin mOPV2 with nOPV2 for cVDPV2 outbreak responses during 2021 [6, 7, 8]. Three years since it had a case caused by the natural polio virus, a heartening milestone for a country that nearly derailed the global drive to eradicate the disease after some regions banned vaccination in 2003. But Faisal Shuaib, head of the country's public health agency, called only for "cautious euphoria" [9]. The last case of wild polio virus (WPV) was reported in Borno state in August 2016 [10]. Having researched into the epidemiological trend of poliovirus in Nigeria (2009–2013), Adetokunboh asserted that Nigeria on the road towards total elimination of poliovirus with the reduction in new cases in the last two years. However, more effort is needed to sustain this drive in Nigeria and the other endemic countries [11]. As at September 25, 2015, the World Health Organization (WHO that polio is no longer endemic in Nigeria, leaving the devastating disease endemic in only two countries and bringing the world one major step closer to achieving this goal of ending polio for good [12]. Fournier-Caruana et.,al [13] reported that thirty-one ongoing and new cVDPV type 2 (cVDPV2) outbreaks were documented during July 2019–February 2020; nine outbreaks spread internationally. Interestingly, the new cVDPV2 outbreaks were often linked to poor coverage with monovalent Sabin oral poliovirus vaccine (OPV) type 2 during outbreak response campaigns [13]. [9]. Another report by Mary et.,al [8] for the period of January 2017–June 2018, stated that cVDPV circulation was detected in six countries.

2. Study area and ethical protocol

2.1. Study area

This study was carried out in Zaria, Kaduna State – Nigeria. Zaria is a major city in Kaduna State in northern Nigeria, as well as being a Local Government Area. Formerly known as Zazzau, it was one of the original seven Hausa city-states [14]. Zazzau, was the capital of the Hausa kingdom of Zazzau [14]. Zazzau is thought to have been founded in 1536 [15]. Human settlement predates the rise of Zazzau, as the region, like some of its neighbors, had a history of sedentary Hausa settlement, with institutional market exchange and farming. The largest marketplace is in Sabon Gari [16].Other more recent neighborhoods include Danmagaji/Wusasa, PZ, Kongo, GRA-Zaria, Hanwa, Bassawa, Lowcost Kofan-Gayan and Shikka [17]. Zaria, Nigeria is located in the Federal Republic of Nigeria with GPS coordinates of 11° 5' 7.9476'' N and 7° 43' 11.8020'' E. The population of Zaria is about 700,000 people, and it is one of the most crowded cities in the country [18]. Zaria has a tropical savanna climate (Köppen climate classification Aw) with warm weather year-round, a wet season lasting from April to September, and a drier season from October to March [19].The aim of this study is to view the case of vaccine derived polio virus on a nomad child in Zaria, Kaduna State Nigeria.

2.2. Ethical approval

Ethical approval with Reference Number NHIRC/03/17/2018 (MOH/ADM/744/VOL.1/919) was obtained from the Kaduna State Ministry of Health Kaduna State, Nigeria.

3. Case reports and protocols

3.1. History and surveillance protocol

On the 18th of August 2018, the Assistant Disease Notification Officer (DSNO) of Zaria Local Government Area (LGA), Kaduna State, Nigeria was notified about a case of a sudden onset of left limb flaccid paralysis that started on the 17th

of August 2018, involving a 2 year old girl living in Anguwan Alkali community in Zaria, a semi urban area. The case was investigated on the 19th and 20th of August by the surveillance team of the State Ministry of Health. The age of the child brings into mind the assertion of Familusi and Adesina [20], who reported that, the highest incidence (40.4%) was in the age group one to two years followed by age group 6 months.

The child comes from a family of 3 comprising of a father, grandmother and the child. They are Hausa/Fulani by tribe. She is an orphan, her mother died when she was just 7 months of age and lived with her aunty in a fulani settlement in Kubau LGA where lack of proper care as she was constantly mingling with cattle and sometimes fed from the container that cows were fed from. These however, drew the attention of the grandmother in Zaria who relocated the case study subject to Zaria. She was taken to Babban Dodo PHC in Zaria for Community Management of Acute Malnutrition (CMAM) programme as a malnourished child, where she was picked by the ADSNO. The child was claimed to have been vaccinated.

The health seeking behaviour of the family was good because whenever they are sick they visit the clinic rather than following the traditional way of medicine, the family has no socio-cultural belief or practice that may affect the acceptance/utilization of health services including immunization. Their domiciliation was classified as urban area because they have access to clean water and sanitation.

3.2. Laboratory protocol and community survey for routine immunization (RI) coverage in DHIS2

The first stool sample was taken for laboratory investigation after fitting the AFP case definition. The second sample was taken the next day and sent to the National Level Polio Immunization Laboratory at the University of Ibadan on the 21st August 2018 with EPID number NIE-KAS-ZAR-18-019.

Community survey was carried out in order to ascertain the RI coverage in the district where the case was reported. Upon report of the case by the DSNO of the Zaria LGA to State DSNO, the case was investigated and verified.

3.3. Stake holder's response/follow-up

A Rapid response team for resolving vaccine hesitancy for both house to house and schools was assigned and monitored. The LGA chairman and his wife were part of the supervisors for the outbreak response OBR and SIA. The chairman provided enough and extra pluses such biscuits, other snacks and soaps for the vaccinated children. The traditional and religious leaders were out and about supporting the process as well. In order to improve the routine immunization coverage, community engagers as part of community engagement strategy (CES), line listed under one properly after an orientation by the state team. The use of tickler bag to track defaulters was emphasized. Monthly RI validation with community engagers and RI providers, carried out regularly. PHC Anguwan Alkali where the index case lived was prioritized for all activities that would increase RI coverage. All planned 4 outreaches and 4 fixed sessions were conducted. Since implementation of the measures above, the LGA has remained silence for cVDPV2.

4. Results and discussion

The laboratory test results came out positive for cVDPV2. Results of the community survey showed that most of the catchment settlement for PHC Anguwan Alkali has RI coverage of less than 70%. Understanding the dynamics of cVDPV emergence and outbreaks as a function of population immunity and other risk factors may help to improve risk management and the development of strategies to respond to possible outbreaks [21]. The most significant risk factor for cVDPV outbreaks, like wild poliovirus outbreaks, is insufficient population immunity.

Since 2013 a majority of poliomyelitis cases on the African continent were part of the West Africa-B1 lineage [22], which suggests that migration from Nigeria had a large impact on poliomyelitis cases in the African continent [23].

The migration of this case individual from such a density of hygiene and sanitation-deficient and non-immune susceptible settlement to Zaria favors poliovirus circulation. This was evident in the history of her domiciliation i.e. a fulani settlement in Kubau LGA, before she was moved to the city of Zaria. The risk is amplified by population movement, whether for family, social, economic or cultural reasons as well as seasonal duration of tropical conditions [3, 24].

The prompt response by all the stake holders ranging from the primary health care facility, the traditional and religious institutions, local government leadership and Kaduna state ministry of health with focus on community mobilization was a great key factor the success of handling the case and general polio eradication program. This is in tandem with report by the UNICEF [25]. that "The outstanding commitment and efforts that got Nigeria off the endemic list must

continue, to keep Africa polio-free. We must now support the efforts in Pakistan and Afghanistan so they soon join the polio-free world." – Dr Margaret Chan, Director-General, World Health Organization.

Furthermore, the following factors led to the successful implementation of the outbreaks response and the subsequent SIA that followed afterward: There was a lot of community mobilization was done and there was a lot of cooperation and children were immunized during an outbreaks response in Kwarbe A, B, Anguwan Patika and Anguwan Juma. All micro plans were updated, Kwarbe B where the girl with the Cvdpv2 resided was visited by all senior supervisors in the State. The performance in the community, ward and LGA level was good. The last Supplementary Immunization Activities (SIAs) result shows zero missed children which the community passed the last LQAS.

5. Recommendations

The suburban areas of Zaria to be connected to the municipal water system and ensuring sewage and sanitary systems as well to sustain the eradication effort achieved. Maintain the strong routine immunization activities established and the tracking of defaulters from the improved Routine Immunization Cards with contact tracing capabilities.

6. Conclusion

The detection of the cVDPV2 strains underscores the importance of maintaining high level of often Routine Immunization coverage at all levels to minimize the risk and consequences of any poliovirus circulation in Zaria LGA-Nigeria.

Compliance with ethical standards

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Disclosure of conflict of interest

Authors declare no conflict of interest.

Statement of ethical approval

Ethical approval with Reference Number NHIRC/03/17/2018 (MOH/ADM/744/VOL.1/919) was obtained from the Kaduna State Ministry of Health Kaduna State, Nigeria.

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