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POLIO - AN ENDEMIC DISEASE IN PAKISTAN: LITERATURE REVIEW

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ABSTRACT

Poliomyelitis is a highly contagious and incurable disease, which mainly affects children under five years of age leading to irreversible paralysis and possibly death. For decades, both private and government organizations have been putting efforts through their partnership to eradicate polio completely from the different parts of the globe and as a result of those efforts there are left only three countries which are currently polio endemic. Since Pakistan is one of those three countries which still remain polio endemic along with Afghanistan and Nigeria, it is significant to address this issue and work on the preventive measures to control the incidence of such a lethal disease. In Pakistan, a program was introduced on immunization in 1978, known as Expanded Program on Immunization (EPI). The main purpose of EPI was to reduce the burden of diseases like polio and tetanus. Although the number of polio cases has fallen due to the classic efforts of government and other NGOs, polio is not eradicated from Pakistan. This situation is thought provoking. Even after the great global efforts; polio is not eradicated from Pakistan. Multiple factors might have prevented the eradication of this deadly disease from our society.

Keywords: Polio, Pakistan, Vaccine, Epidemiology.

INTRODUCTION

It is often said that prevention is better than cure (anonymous) but in some situations prevention is the only option as there is no cure. This applies to the deadly disease known as "Poliomyelitis", which is a contagious and incurable disease mainly affecting children under five years of age, leading to irreversible paralysis and possibly death (Khowaja, 2012). The first outbreak of poliomyelitis was reported in Europe and USA in 19th century (Paul & Peach, p. 81-82). The host of this disease is man, therefore an effort was initiated to eradicate this deadly disease from the world. Thus, after smallpox, poliovirus (PV) has been on the road to potentially becoming the second major human virus to be eradicated from the globe (Van den Pol, 2013). Eradicating polio has been a priority of public health since creation of the first effective vaccine in 1952 (Groce, N. E., Banks, L. M., & Stein, M. A. 2014). For decades, both

private and government organizations have been putting efforts through their partnership to eradicate polio completely from different parts of the globe and as a result only three countries which are currently polio endemic (Larson, H. J., & Bhutta, Z. A. 2013). Since Pakistan is one of those three countries in which polio remains endemic, along with Afghanistan and Nigeria, it is significant to address this issue and work on the preventive measures to control its incidence (Larson, H. J., & Bhutta, Z. A. 2013).

Burden of Disease

In 1998, 350,000 polio cases were reported in the World Health Assembly. In 2001, 119 cases were reported and in 2002 it decreased to 90 cases. However, in 2003 more cases were reported than 2002, while in second half of 2003, the number of cases reduced to 55. In 2004, 59 cases were confirmed whereas, during 2003-2004 number of cases reduced to 50% and from 2005 to 2008, number

of cases continued to decrease. During 2009-2010, number of cases reached upto 198 which were almost double and in 2011- 2012, 223 cases were confirmed. In 2013, 16 polio cases had been reported which indicates that the disease is not completely eradicated from Pakistan (Bhutta, 2013). In addition to this, majority of cases are young children aged below 3 years (56%), though a shift to older children is observed (43% > 35 months in 2008 compared to 10% in 2006 & 34% in 2007) (Karamat, A .K 2008).

History of Polio

Polio may be eradicated soon from the globe and interest in this ailment will therefore decline. However, polio was one of the major infections shaping public health in the 20th century and it may still be important to understand the epidemiology of polio and the history of infectious diseases (Nielsen, N, 2002). Polio virus was first defined by Michel Underwood in 1789, which is derived from the Greek word, polios for "gray" and myelos for "spinal cord" (Baicus, A. 2012, Paul & Peach, p. 81-82). Poliovirus is a member of the enterovirus subgroup and belongs to Picornaviridae family with an RNA genome. There are three poliovirus serotypes (P1, P2, and P3). Among these, type 2 appears to be the most effective antigen (Ilyas, 2008 and Park, K 2013). The virus enters into the nervous system where it mostly affects lower motor neurons in the spinal cord, brain stem and motor cortex, resulting in flaccid paralysis. The poliovirus is inactivated by heat, formaldehyde, chlorine, and ultraviolet light (Ilyas, 2008 and Park, K 2013).

Framework to Understand the Nature of Disease

Classical age-structured mathematical model can be used as a framework to understand the development of disease in particular population (Bunimovich-Mendrazitsky, 2005). This model can be used to understand the dynamics of disease transmission of poliomyelitis. The model assumes a constant population having a defined number of host individuals N , each of the individual belongs to any one of four different groups: susceptible (S), exposed (E), infected (I) and recovered (R). After exposure to infection, susceptible individuals are moved to the exposed group and remain there for a latent period of 3–6 days, which is followed by the infectious group

(Bunimovich-Mendrazitsky, 2005). Infected individuals include those with minor and major illnesses, as well as paralytic poliomyelitis, and the infectious period can last for at least 20 days (WHO, 2003). Upon recovery from infection, individuals become part of recovered group (Mendrazitsky & Stone, 2005).

Vaccines Against Polio

Albert Sabin and Jonas Salk developed an effective vaccine against polio virus in the early 1960 (Shah, 2011). The Sabin oral vaccine, which contains live attenuated polio virus is superior to the Salk inactivated vaccine in two ways. First, it is easily administered; second it provides a long-lasting immunization. Currently trivalent oral polio vaccine is being used in Pakistan (Shah, 2011). These vaccines are being provided free of cost to all children since 2000 (Khowaja, 2012). According to Expanded Program of Immunization (EPI), a child who has received one dose of BCG vaccine, three doses of oral polio vaccine, DPT3 and one measles vaccine is called as a fully immunized child (Shah, 2011).

Initiatives to Eradicate Polio from the World

Multiple initiatives have been taken so far to eradicate this disease from the planet. For example, Polio eradication initiative is a six billion dollar project that has been employed since twenty years, targeting two million people, the history's largest co-ordinated mobilization project in the cause of public health. However, in the last few years the project has been unable to make significant headway in reducing the case count to zero, in fact, the number of new polio cases have increased (Closser, 2011). In 1998, the 41st World Health Assembly targeted to make this world polio free by the year 2000, but unfortunately this aim could not be fulfilled completely. This was followed by Global Polio Eradication Initiative (GPEI) in 1988, which was a partnership between national governments, World Health Organization (WHO), Rotary International, US Centers for Disease Control and prevention, UNICEF and Bill & Melinda Gates Foundation (Fact File: Polio eradication and end game strategic plan 2013–2018).

In Pakistan, a program was introduced on immunization in 1978, known as Expanded Program on Immunization (EPI). The main purpose of EPI was to reduce the burden of

diseases like polio and tetanus. Due to lack of resources in Pakistan, it was difficult to provide health facilities but later, National Accelerated Program on Health and WHO provided funds to fulfil basic needs. About 97% of the immunization was provided by EPI while 3% was fulfilled by the private sector (Bhutta, 2013). This resulted in reducing the mortality rates due to these fatal diseases. Moreover, data from Pakistan was reviewed and it was found that about 10,000 vaccinators and 6,000 lady health visitors fulfilled the immunization needs of the society by visiting houses. Despite this huge work force there are variable fluctuations in the trends of this disease (Closser, 2011).

Barriers in Eradicating Polio

Although the number of polio cases has fallen due to the classic efforts of government and other NGOs (Closser, S. 2010) Pakistan lags behind in achieving the required target. This situation is thought provoking. Even after the great global efforts; polio is not eradicated from Pakistan and multiple factors might have prevented the eradication of this deadly disease from our society. The emergence of overt violence, deadly attacks and insecurity of health workers are uncertain blocks to achieve this goal due to which vaccination campaigns have been stopped in highly sensitive areas. Data suggest between December 2012 and February 2013, 16 members of polio vaccination teams operating in Pakistan and one law enforcement officer were killed by militants linked to the Taliban (Watson, M. 2013). As a result of these barriers, many innocent children are deprived of being vaccinated and ultimately end up with this horrible disease (Bhutta, 2013). Moreover, multiple factors like poor quality of polio immunization campaigns, war, conflict zones might have contributed too. Apart from these factors, health infrastructure was damaged during the flood of 2010, which resulted in low polio vaccine coverage. "Talibanization" and misinterpretation of religion are reasons, forcing parents to refuse vaccination for their children on the mistaken grounds that it is haram. Some people have strange misconceptions about polio vaccine like infertility and impotence, sterility in children which prevent them from getting the vaccine on right time (Obregón, R., Chitnis, K., Morry, C., Feek, W., Bates, J.,

Galway, M., et al. 2009). The poverty promotes transmission of a number of diseases and the concept that in developing countries transmission is via faecal-oral route, but in developed countries it is via droplets/aerosol is long overdue for revision. It is very likely that both routes are applicable throughout the world, their relative importance varying according to circumstances of crowding and sanitation (John, T. J., & Vashishtha, V. M. 2013). Moreover, poor housing, sanitation and lack of clean water cause diarrheal diseases, which can interfere with the absorption of polio vaccine. Some families have a low income and cannot afford the polio vaccine, while others don't have the time to avail the facilities of vaccine (Shah, 2011). Another reason is the fear of developing side-effects after vaccination like fever, bloating of skin and weakness (Khowaja, 2012). Presence of minimal access to health services, use of fake vaccinations and maintaining the cold chain for vaccine storage are major hurdles in polio eradication (Bhutta, 2011). Refusal to work everyday, strikes by health care workers, less motivation towards work, falsifying requisite records, making it appear that the work had been done, corruption and false compliance (Closser, 2010) are the obstacles in the accomplishment of goals.

Strategies to Eradicate Polio

Considering these obstacles, innovative strategies can be proposed to achieve this goal. The latest draft of the Polio Endemic Strategic plan 2013-2018 have suggested implementation of new strategies, in which initiative of health worker safety is of high importance (Bhutta, 2011). An internationally funded and administered project works through government health systems, called Vertical Program (Closser, 2010). Planners of eradication project often speak of capacity to succeed in terms of two factors, technical feasibility (biological features of pathogen and available vaccine and control measures) and operational feasibility (capacity to deliver the necessary interventions to the populations where they are needed). Another step is the training of health care workers running the initiative of polio eradication at global level. UN Officials planned and implemented polio hero award system as a token of appreciation and positive reinforcement to recognize the best teams and areas in charge (Bhutta, 2011).

Recommendations

Health education and counseling of the resistant families and communities can be done by involving the local stakeholders like community people and religious leaders. Apart from this, effective programs and policies can be designed at national level to improve the coverage of immunization throughout the country. Moreover, the important and top most priority should be the safety and security of the health workers, who are mainly responsible for the field activities at the ground level. In addition to this, there should be inter sectoral collaboration between various government and private providers, who can make efforts jointly to eradicate this disease from the country. Multiple donors and organizations, currently working on polio eradication can work very closely by putting their integrated efforts. Both qualitative and quantitative researches can be done to assess the barriers at health system level, at community and individual level by taking appropriate actions accordingly. Apart from this, active as well as passive surveillance mechanisms need to be stronger and efficient to diagnose the cases and to vaccinate the contacts in the vicinity as early as possible.

Conclusion

Finally, it is concluded that polio is a cause of social and economic burden, which calls for developing innovative strategies for good quality polio immunizations, considering the conflicts and insecurities in particular settings. Furthermore, implementation of comprehensive, effective and integrated preventive strategies will reduce the incidences of polio among Pakistani population. Early detection is possible through profound awareness, facilitating diagnosis and treatment. There is also a need for effective partnerships at national, regional and global levels to make Pakistan a polio free country.

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