ORIGINAL ARTICLE

COVERAGE AND CAUSES OF MISSED ORAL POLIO VACCINE IN URBAN AND RURAL AREAS OF PESHAWAR

Mohammad Naeem, Muhammad Adil, Syed Hussain Abbas, Muhammad Zia-ul-Islam Khan, Syeda Maria Naz*, Ayasha Khan*, Muhammad Usman Khan**

Department of Community Medicine, Khyber Medical College, *Leady Reading Hospital, **Khyber Teaching Hospital, Peshawar

Background: Poliomyelitis mainly affects children under five years of age. Pakistan is one of the few countries where wild polio is still endemic. The purpose of this study was to find out the coverage rate and factors associated with the failure of OPV in urban and rural areas of Peshawar. **Methods:** This cross-sectional study was conducted in Peshawar. Data was collected through random sampling in Peshawar University, Peshawar Saddar, Hashtnagri, Naway Kalay and Pawaka from 9th to 19th June 2010. A questionnaire was used to interview parents of 548 children, aged four years and below, about demographics, OPV vaccination status, reasons for missed vaccination and views on immunization and EPI staff. Forty workers from immunization staff were also interviewed through a separate questionnaire to find out factors associated with low OPV coverage. Chi-square test was used for statistical testing and $p<0.05$ was considered significant. **Results:** Only 64.2% children were completely vaccinated, 13.3 % not vaccinated at all, and 22.4% were incompletely vaccinated. The reasons for not vaccinating were lack of awareness (23.8%), family problem/mother busy (20.8%), centre too far (21.3%), wrong ideas (10.2%), fear of reaction (7.6%), child ill (5.6%) and miscellaneous causes (10.6%). The problems faced by the EPI staff were lack of awareness among people (32.5%), load shedding (20.0%), poor transport facilities (10.0%), unavailability of vaccines (10.0%) and insecurity (10.0%). **Conclusion:** Low vaccination coverage in Peshawar is mainly due to low awareness among people, poor economic conditions and poor salaries, insecurity and transport problems faced by the immunization staff.

Keywords: OPV, Immunization, EPI, Polio

INTRODUCTION

Poliomyelitis is an acute viral infectious disease spread primarily via the faecal-oral route. It mainly affects children under five years of age.[1] A global effort to eradicate polio began in 1988, 20 years after the start of EPI program. It was led by the WHO, UNICEF, and The Rotary Foundation and relied mostly upon Oral Polio Vaccine (OPV).[2] Three doses of OPV produce immunity to all three poliovirus types in more than 95% of recipients.[3] Polio cases have decreased by over 99% since 1988, from an estimated 350,000 cases to just over 1,604 in 2009. In Pakistan, Polio is endemic since the wild type virus has never been eliminated from the country. Mass polio vaccination campaigns started in Pakistan in April 1994 and are still under way.[4] In 2009, 89 out of the global 1,604 cases (reported from 23 countries) were reported from Pakistan. In 2010, 134 cases have been reported from Pakistan mainly from districts in the Federally Administered Tribal Areas (FATA), Khyber Pakhtunkhwa, Karachi and Balochistan.[5] This is a matter of serious concern for the people as well as the authorities because a major portion of new cases every year are from Pakistan. There are countries, which are now declared absolutely polio free and planning is being done to stop the OPV immunization, yet in Pakistan rather having a sharp decrease in new cases every year, the number of cases reported annually is raising. Keeping in view the disease burden in the region, this study was conducted in Peshawar for three purposes:

1. To find out the reasons of missed vaccination among people of Peshawar
2. To compare the coverage rate of OPV with other areas of Pakistan
3. To point out where OPV immunization programme needs to focus to become more effective.

MATERIAL AND METHODS

This cross-sectional study was conducted from 9 June 2010 to 19 June 2010. Peshawar (both urban and rural areas) was selected as it has the best medical services available compared to other parts of the province. A questionnaire was used to interview parents after their informed consent. Through cluster random sampling, parents of 548 children, four years and below, were interviewed in different areas of Peshawar, i.e., Peshawar University Campus, Hashtnagri, Naway Kalay and Pawaka village. Children above four years and those who spent the first two months of their life outside Peshawar were excluded. Information was collected about the OPV immunization status, demographics, education of the family earner (None, Primary, Middle, Matric, Higher education (above Matric), Traditional/Madrassa), occupation and income of the family earner, accessibility of EPI centre in terms

of distance, behaviour of immunization staff, frequency of their visits by household workers, parents' views on immunization whether it was useful or not and reason for non immunization. Health education of parents was also assessed by asking the immunization schedule from the parents. Immunization record was collected by cards or mother's recall. Parents were asked to choose the best time (morning, afternoon, evening and anytime) and place of immunization (home, health centres. hospitals, and private).

A separate questionnaire was designed to interview 40 health personnel working in different EPI centres of Peshawar. They were asked about their education, courses done, their authorities, income and incentives, security arrangements, education about immunization, knowledge of cold chain and response of people and the community leaders. Staff workers who visited house to house during National Immunizations Days for Polio eradication were especially asked about difficulties faced in OPV and suggestions to improve coverage.

Data were analysed using SPSS-16. Frequencies and cross tabulation were done. Pearson's Chi-square test was used for statistical testing, and $p<0.05$ was considered significant.

RESULTS

Out of 548 children 291 (53.1%) were females and 257 (46.9%) were males. Urban population was 55.8% while rural population was 44.2%. The full immunization coverage of OPV was 64.2% completely vaccinated, 22.4% incompletely vaccinated and 13.3% not vaccinated at all.

For 1st dose (at birth) 79.0% were vaccinated, 21.0% were not vaccinated. For 2nd dose at 6th week 76.6% were vaccinated and 23.4% were not vaccinated. For 3rd dose at 10th week 73.7% were vaccinated and 26.3% were not vaccinated. The 4th dose at 14th week 72.6% were vaccinated while 27.4% were not vaccinated.

The reasons for not vaccinating (n=197) were many but lack of awareness was the highest (23.8% n=47). Others were family problem/mother busy (20.8% n=41), centre too far (21.3% n=42), wrong ideas e.g. sterility (10.2% n=20), fear of reaction (7.6% n=15), child ill (5.6% n=11) and miscellaneous causes (10.6% n=21). Immunization cards were present with 52.6%.

The literacy rate was as follows: illiterate (41.1%), higher education (26.7%), primary education (12.4%), Matric (11.7%), Middle (5.8%), and Madrassa education (2.4%).

Parents' knowledge about vaccination was: 34.1% having little knowledge, 30.5% enough, 17.2% moderate, 11.7% with no knowledge and 6.6% knew everything; 90.5% parents considered immunization beneficial. Negative answers were 52 (9.5%), the reasons were: fear of reaction 16 (30.7%), considering vaccine ineffective 17 (32.6%), misconceptions like sterility etc. 13 (25.0%) and previous bad experience 4 (7.7%). Source of knowledge about vaccination was health workers in 49.3%, TV/radio 36.3%, and 5.3% had the guidance of community leaders or relatives; 82.2% mothers had access to TV, 6.9% had access to print media but 10.2% had no access to TV radio or printed material.

About the frequency of visits by the health workers, 42.3% answered Often, 28.5% Very often, 15.3% Seldom, and (13.9%) answered Never. When asked how well the health workers provided health education, most (34.9%) answered good, average (26.3%), very good (28.5%), but significant number answered poor (10.8%) and very few answered excellent (1.8%); 57.3% parents wanted immunization at home, and 79.3% suggested morning time for it.

A clear pattern of low immunization among uneducated and high immunization among educated families was revealed ($p<0.001$) (Table-1). High immunization rates were found for urban areas (76.5% completely vaccinated) in comparison to rural areas (48.8% completely vaccinated) ($p<0.001$). Among different ethnic groups Afghanis were 48.3% completely immunized, Pakistani Pushtoons were 61.1% immunized and non-Pushtoons were 100% immunized ($p<0.001$).

No significant effect was observed with the sex of children and immunization. The males and females completely vaccinated were 63.8% and 64.6% respectively ($p=0.550$).

Immunization was high among parents having government jobs (78.1%) and private jobs (74.9%) as compared to than labourers (43.3%) ($p<0.001$). Similarly mothers having government jobs, the immunization rate was high (83.3%) as compared to house wives (64.9%). This could be due to the association of higher education and income in these families ($p<0.001$). Income had great effect on the immunization status of the child ($p<0.001$) (Table-2). The immunization status of the children progressively fell with distance and significant fall in immunization was observed below 12 Km (less than 2 Km 74.4% immunized, 3–7 Km 66.4% immunized, 8–12 Km 65.2% immunized) but it had a clear effect on immunization of the children above 12 Km (42.1% immunized) ($p<0.001$). Respondents who thought immunization wasn't of any benefit had a very low immunization status (7.7%) than the those who though immunization was beneficial (70.2%) ($p<0.001$). In areas where EPI workers visited often, rate of immunization was higher (81.0%) than areas where health workers never visited (50.0%). Mothers who had access to TV/radio had higher immunization 68.1% than mothers who didn't have access to TV/radio 23.2%.

Mothers having access to printed material in addition to TV/radio had even better immunization rate 78.9% (p<0.001). Mothers who had more knowledge on immunization were more likely to have their children immunized (p<0.001) (Table-3).

Most of the staff (70%) was not satisfied with their salaries and incentives given to them. Sufficient transport was not available to EPI staff (75%). Main hurdles faced by immunization staff are in (Table-4).

Most of the immunization staff put the community leaders' cooperation as good (50%) however; significant number (30%) answered poor. 67.5% considered that NGOs were not cooperative. About parents' knowledge they said: average (52.5%) and poor (37.5%). Suggestion for improvements given by immunization staff is given (Table-5).

Table-1: Education of Parents and OPV immunization [n(%)]

Education	Complete	incomplete	Never
Higher Education	136 (93.15)	9 (6.16)	1 (0.7)
None	106 (47.1)	65 (28.9)	54 (24.0)
Middle	26 (81.25)	5 (15.63)	1 (3.12)
Matric	49 (76.56)	12 (18.75)	3 (4.69)
Primary	33 (48.53)	26 (38.24)	9 (13.23)
Traditional	2 (15.4)	6 (46.1)	5 (38.5)

Table-2: Income of Families and OPV Immunization [n(%)]

Income (Rupees)	Complete	Incomplete	Never
≤3000	21 (36.84)	17 (29.83)	19 (33.33)
3001–10000	133 (51.75)	78 (30.35)	46 (17.9)
10001–17000	68 (79.07)	12 (13.95)	6 (6.97)
17001–24000	63 (91.3)	6 (8.7)	–
24001+	67 (84.8)	10 (12.7)	2 (2.5)

Table-3: Mothers' knowledge about immunization and OPV immunization [n(%)]

Knowledge	Complete	Incomplete	Never
Everything	28 (77.8)	4 (11.1)	4 (11.1)
None	18 (28.12)	15 (23.44)	31 (48.44)
Enough	149 (89.22)	15 (8.98)	3 (1.8)
Little	102 (54.55)	60 (32.08)	25 (13.37)
Moderate	55 (58.51)	29 (30.85)	10 (10.64)

Table-4: Main Hurdles faced in immunization by immunization staff

	Frequency	%
Lack of awareness and wrong ideas in parents	13	32.5
Load shedding	8	20.0
Negative role of media	3	7.5
No transport	4	10.0
Lack of vaccines	4	10.0
Security problems	4	10.0
None	2	5.0
Other	2	5.0
Total	40	100

Table-5: Suggestions by the immunization staff for improvement in EPI

	Frequency	%
Increase Awareness	18	45.0
Other	6	15.0
Provide Security	5	12.5
Recruit Adequate Staff	3	7.5
Improve Transport Facilities	8	20.0
Total	40	100

DISCUSSION

Coverage of OPV in Peshawar is 64.3%. Such low coverage clearly answers the question as why Polio is still endemic in Pakistan and new cases are still emerging. Over the years, districts, regions and countries report 80–100% coverage.[6,7] Eradication of Polio requires 100% coverage by complete doses but a large portion of population is incompletely vaccinated making them susceptible.

The causes of non-vaccination in our study are consistent with studies conducted in other regions of Pakistan in 1999.[8] A qualitative study conducted in Karachi, reported similar causes along with others like forgetting scheduled dates, low quality services and inaccessibility of government dispensaries, and prevailing myths about immunization. Most parents had little knowledge about immunization.[9,10] Most mothers complained of not being educated well by the EPI staff; therefore, more media coverage should be given to immunization to increase awareness. A study in India has shown radio as the most common source of information during NIDs.[11] There should be health education section in all EPI centres to increase awareness.

Economic condition of families was highly affecting the immunization rates. Where income was less than 3000, immunization was very low. Polio has remained a challenge in Pakistan, particular for the poor, as it spreads among large and dense populations with poor sanitation and hygiene standards due to low income.[12] Low income also affects people living in areas which are at large distance from the EPI centres since they are not able to pay for transportation easily. The immunization was high for people in government and private jobs rather than labourers, this relationship could have been due to income disparities between their jobs and difference in education.

People who had EPI centre or any vaccination facility available within 12 Km had higher immunization rate. But there was a sharp decline in coverage rate above 12 Km. Many people could not afford bringing their children to centres for immunization due to lack of availability of time, money and social factors, therefore, there is a need for more centres in suitable locations to cover large population. It is for the same reason most parents wanted their children to be immunized at their houses. Such relation is reported by UNICEF and seen in other parts of Asia too.[12,13.]

Maternal education is positively related to the chance of child being fully immunized. Most of the mothers thought vaccination was useful but significant number didn't consider it useful. It was found that mothers who were educated well had immunized their children as compared to the uneducated ones. Studies

have shown that increasing maternal knowledge regarding vaccines improves immunization status.[14]

No relation was found between sex of the child and immunization. A study in Sindh showed the same result indicating that gender may not have a role in children when availing free services like immunization.[15,16] This relation was not seen in many regions of the world like in Bangladesh where females are immunized less than males.[17]

The frequency of visits by health workers was reported as often (one visit at least in 3 months) by 40.3% people but to eradicate this endemic, it is not sufficient as their visits can improve health education and thus improving compliance. With increase in population and deteriorating economy, the disease would continue to be endemic.

High immunization rates were found in urban areas due to availability and accessibility of centres, hospitals and better socioeconomic conditions. Families where house workers visited frequently had more knowledge about immunization and the coverage was more. Moreover the immunization was low in villages because most of the mothers in villages are either not educated at all or very less educated. Women's mobility is also decreased in rural areas as they have to be accompanied by males, therefore, field visits by the EPI staff and most importantly education of male members of family is important.[17]

One of the main reasons behind vaccination failure is the salaries and incentives given to the immunization staff. The issue is of greater concern as staff cannot work dedicatedly in bad economic state. It has been highlighted in a qualitative study in Pakistan also.[18] The eradication of Polio is not possible unless dedicated staff is available for which increase in salaries is necessary.

The EPI staff also reported lack of awareness among people as the main hurdle. Due to the insignificant role of media, people still believe in myths regarding immunization.[18] As TV and radio is the most common source of information therefore, in order to modify the beliefs of the communities about immunization, more media coverage should be given to health education. Besides awareness, the staff is facing transport problems also. Sufficient vehicles are not available to visit many far places particularly in rural areas. Due to political instability and law and order situation, security is now a major problem for them. Lack of transportation is making them more susceptible to insecurity. The UNICEF has also reported security issue in countries of Africa and Iraq.[19] The EPI staff also face problems of load shedding and delay in availability of vaccines.

There are certain limitations in cross sectional studies which should be considered. Firstly, such a study does not allow interpretation of a clear relation between the associated factors such as those found in this study and lack of immunization; Secondly, many of the associated factors in same population are interdependent and they also have summation or synergistic effect (e.g., low income, low literacy, lack of information) making it difficult to build a clear relationship between individual variables due to lack of strict control. Improving one factor can improve the other, so future approaches to such studies should give importance to the complex interdependent nature of these variables. Studies in urban areas, especially of Khyber-Pakhtunkhwa, should also consider high migration rates of people as they can give misinterpretation about immunization of a specific area.

CONCLUSION

The main reasons for non-immunization are lack of awareness, poor economic conditions, family problems/ parents being busy, misconceptions regarding immunization and low literacy rate. The immunization staff is facing problems of small salaries, transportation, insecurity and lack of availability of vaccine. Addressing these issues especially health education will help to eradicate Polio.

REFERENCES

1. WHO Fact sheet No. 114 November 2010. Retrieved from: http://www.who.int/mediacentre/factsheets/fs114/en/index.html
2. Mastny, Lisa (January 25, 1999). Eradicating Polio: A Model for International Cooperation. Worldwatch Institute. http://uk.ask.com/wiki/Sabin_polio_vaccine. Retrieved 7-01-2011.
3. Salisbury D, Ramsay R, Noakes K. Joint Committee on Vaccination and Immunisation. Immunisation Against Infectious Disease. Edinburgh: TSO Stationery Office; 2006. p. 313–29.
4. Nishtar S. Pakistan Poilitics and Polio. Bull World Health Organ 2010;88:159–60.
5. Global Polio Eradication Campaign .December 14, 2010 from Data and Monitoring. http://www.polioeradication.org/ Dataandmonitoring/Poliothisweek.aspx
6. Nuwaha F, Kabwongyera E, Mulindwa G, Barenzi E. National immunisation days for polio eradication in Uganda: did immunisation cards increase coverage? East Afr Med J 2000;77(2):66–70.
7. Desai VP, Kowli SS, Chaturvedi RM, Sunder SS, Kumar RR, Bhalerao VR. Effectiveness of polio vaccination coverage in reducing the incidence of paralytic poliomyelitis in a highly endemic area of Bombay city. J Postgrad Med 1984;30(1):1–4.
8. Tarin E, Khalil M, Mustafa T, Alvi ZM, Sy ITS, Thomson SJ, *et al*. Impact of community-based intervention on immunization coverage against vaccine preventable diseases in Pakistan. Pak J Health 1999;36(1–2):53–6.
9. Siddiqi N, Khan A, Nisar N, Siddiqi AE. Assessment of EPI (expanded program of immunization) vaccine coverage in a peri-urban area. J Pak Med Assoc 2007;57(8):391–5.
10. Shaikh S, Shaikh S.. Immunization status and reasons for low vaccination in children, attending OPD at Liaquat University Hospital. Pak Paed J 2003; 27: 81–6.
11. Bhattacharjee J, Gupta RS, Jain DC, Devadethan, Datta KK. Evaluation of pulse polio and routine immunisation coverage: Alwar District, Rajasthan. Indian J Pediatr 1997;64:65–72.
12. UNICEF information by country: Pakistan Accessed on 6 January, 2011. Availabel from: http://www.unicef.org/ infobycountry/pakistan _51582.html

13. Prislin R, Dyer JA, Blakely CH, Johnson CD. Immunization status and sociodemographic characteristics: the mediating role of beliefs, attitudes and perceived control. Am J Public Health 1998;88:1821–6.
14. Kimbro RT. On-the-job moms: work and breastfeeding initiation and duration for a sample of low-income women. Matern Child Health J 2006;10(1):19–26.
15. Childhood immunizations in four districts in rural Pakistan: A comparison of immunization uptake across study years (1994 and 1997) and an analysis of correlates. Department of Community Health and Epidemiology, University of Saskatchewan, Saskatoon. http://library2.usask.ca/theses/available/etd-0713200742633/ unrestricted/CMHORNMScTHESISrevised.pdf
16. Sultana A, Jahan S, Ahmad I. Knowledge, Attitude and Practice of Immunization in an Urban Population. Pak Armed Forces Med J 2001;51(2):177–81.
17. Jamil K, Bhuiya A, Streatfield K, Chakrabarty N. The immunization programme in Bangladesh: impressive gains in coverage, but gaps remain. Health Policy Plan 1999;14(1): 49–58.
18. Mansuri FA, Baig LA. Assessment of immunization services in perspective of both the recipients and the providers: A reflection from focus group discussions. J Ayub Med Coll Abbotabad 2003;15(1):14–8.
19. UNICEF Information By Country: IRAQ. Available at: http://www.unicef.org/infobycountry/iraq_39473.html [Accessed 7 January, 2011.]

Address for Correspondence:

Dr. Mohammad Naeem, Department of Community Medicine, Khyber Medical College, Peshawar, Pakistan. **Cell:** +92-300-5901841
Email: eaglebook86@gmail.com