ORIGINAL ARTICLE

Causes of Poor Vaccination Coverage in Children Under 5 Years of Age Presenting to a Tertiary Care Hospital

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ABSTRACT

Aim: To determine the various factors involved in poor-vaccination/non-vaccination in children
Study design: Cross-sectional observational study.
Place and duration of study: The Children's Hospital and Institute of Child Health Lahore, from November 2017 to January 2018.
Methodology: A total of 303 patients between age 1 month and 5 years (60 month) were recorded on a pre-designed proforma. Vaccination status of each patient appropriate for that age, educational and socioeconomic status of the parents, their knowledge of and access to vaccination and the reason/possible factors involved in case of non-vaccination or under-vaccination were documented. The data were entered and analysed in SPSS version 16.0.
Results: Out of 303 patients, 227 (74.9%) children were fully vaccinated with EPI antigens according to their age and 76(25.1%) were either partially vaccinated or not vaccinated at all. Out of those who were not totally unvaccinated or under-vaccinated, false contraindications (28/76=36.8%) was the largest group followed by those who had lack of awareness (18/76= 23.7%).
Parental education particularly that of the mother was strongly correlated to mother's knowledge about the vaccination schedule and to the child being fully vaccinated (p value0.000)
Conclusion: False contraindications to vaccination assumed by the parents particularly mothers and vaccinator are the most common cause of under-vaccination or non-vaccination in children. Mother's educational status is the most important denominator underlying under-vaccination or non-vaccination.
Keywords: Expanded Program on Immunisation(EPI), Immunisation, Under-vaccination, Vaccination.

INTRODUCTION

A vaccine is a product that stimulates a person's immune system to produce immunity to a specific disease, protecting the person from that disease, and, vaccination is the act of introducing a vaccine into the body to produce immunity to a specific disease[1].

The World Health Organisation (WHO) initiated Expanded Program on Immunisation (EPI) in May 1974 with the objective to vaccinate children throughout the world[2], initially against 6 diseases. In Pakistan the EPI program was launched in 1978[3]. Initiated by the WHO, it is run with the assistance from Government of Pakistan, United Nations Children Fund (UNICEF) and Global Alliance for Vaccines and Immunisation (GAVI).

The contribution of preventing vaccine preventable diseases (VPDs) to the growth and economy of a country needs to be emphasized as it is not readily visible to the unwary. In the first ever Poverty and Social Impact Analysis of EPI in Pakistan, it was estimated that the total numbers of lives saved up to year 2008 because of EPI were 3 lac and these saved lives contributed 11358 million rupees in 1993-94 prices[4]. It was estimated that increased growth due to added labor force led to an average of 8% reduction in poverty over the decade of 2000. Pezzotti et al in Italy, estimated that the lives saved in that country up to 2015 solely due to vaccination, were 4 million[5]. Still, worldwide annually 2 million deaths occur due to VPDs[6].

That Pakistan has fallen short of achieving targets in vaccination coverage needs not to be mentioned; polio is the most vivid example. Whereas in 1960s Pakistan had lower Infant Mortality and Under 5 mortality rates as compared to India, Nepal and Bangladesh (then East Pakistan), it has unfortunately lagged behind all these neighbours over the passage of time[4].

Pakistan Demographic Household Survey (PDHS) 2012-13 showed that only 53.8% children in Pakistan were fully vaccinated for all diseases covered by EPI (Punjab 65.65, Sindh 29.1%, KP 52.7%. Baluchistan 16.4%)[7]. According to 2016 estimates of WHO and UNICEF, individual vaccine coverage rates in Pakistan ranged between 70 and 80% for all antigens[8].

Pakistan is the largest recipient of the GAVI support and total committed funds as of 2017 were >1.16 billion US dollars. Yet Pakistan represents 10% of GAVI-country under-immunised children[8]. In the GAVI board meeting June 2017 it was observed that almost half of Pakistan was <50% immunised and only 12 districts of Punjab had >80% vaccination rate.

Increasing commitment is seen from the donor agencies and the Government[9] (the macro level) and while it is domain of the Government machinery to identify gaps in planning and implementation, we believe that the information collected at the user end (micro level) is vital to facilitate the success of the program. The objective of this study was to assess the relation of educational and economic status of parents to vaccination status of their children, their problems in access and interaction with the provider, and any unique factors that might have prevented them from getting the child vaccinated.

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METHODOLOGY

This was a descriptive cross-sectional study and was conducted over a period of three months from November 2017 until January 2018. The place of study was Children's Hospital and the Institute of Child Health Lahore. Approval for conducting study was taken from the ethical committee of the hospital. A total of 303 patients were recruited to the study; the sample size calculated on the basis of expected frequency of 73%[8]with confidence level of 95% and confidence limits of 5%. Patients of both sexes between the ages of 1 month and 5 years (60 months) admitted in the Indoor block for various conditions were recruited to the study. A pre-designed proforma was used and demographic data including sex, age, weight as well as marital status, education, earning of the family were recorded. The parent/parents were required to respond by recall whether the child was fully vaccinated according to the EPI schedule, appropriate for his age and if not had they knowledge up to what age child needed to be given vaccination. They were required to give reason in case of under/non vaccination. Any undue beliefs, fears regarding vaccines, distance of vaccination centre from home as well as attitude of the vaccinator were recorded. Analysis was done using Statistical Package for Social Sciences (SPSS) version 16.0. Categorical variables were summarized using frequency and percentage. Chi-square test was used for association between categorical variables. P value of less than 0.05 was considered as significant.

RESULTS

There were a total of 303 patients; 193(63.7%) were male, and, 110(36.3%) were female. Mean age was 15.78 months with standard deviation=15.24. Five (1.7%) families lived below poverty line, 248(81.8%) belonged to lower class, 44(14.5%) to lower middle class, 5(1.7%) were in the upper middle class and 1 (0.3%) family belonged to the upper class. Two hundred ninety eight (98.3%) parents were living together, 3(1%) separated and 2(0.7%) widowed. As for educational status of the parents (table 1), 122(40.3%) mothers and 89 (29.4%) fathers never went to school. 227(74.9%) children were fully vaccinated with EPI antigens according to their age and 76(25.1%) were either partially vaccinated or not vaccinated at all.

Increasing levels of educational status of mother and father were independently significantlycorrelated to the child being vaccinated (P values <0.000); interestingly, higher levelof earning was not significantly correlated with the child being fully vaccinated (p value 0.59).

Irrespective of the vaccination status of the child, only 162(53.5%) mothers had knowledge up to what age vaccination according to government (EPI)schedule should be done; 141(`46.5%) had no orientation in this regard. Father's level of education significantly correlated with the mother's knowledge about vaccination schedule (p value 0.008) but mothers own educational status had very strong correlation with her knowledge about the vaccination schedule (p value 0.000).In turn, with mother's knowledge of the vaccination schedule had very high correlation with the child being fully vaccinated (p value 0.000).

Vaccination centre was within 5 kilometers (km) of homes of 225(74.3%) children, between 5 to 10 km for 43(14.2%) and >10 km for 35(11.6%). Two hundred and seventy five (90.8%) mothers were house wives, whereas 28(9.2%) worked in addition to their household responsibilities.

Table I: Educational status of parents

Education level	Mother	Father
Nil	122(40.3%)	89 (29.4%)
Primary	58(19.1%)	41 (13.5%)
Middle	31(10.2%)	45 (14.9%)
Matriculation	54(17.8%)	83 (27.4%)
Intermediate	18(5.9%)	24 (7.9%)
Bachelors	7 (2.3%)	17 (5.6%)
Masters	13 (4.3%)	4 (1.3%)
Total	303(100%)	303 (100%)

Only 138(45.5%) children were normally nourished; 59(19.5%) were first degree malnourished, 48(15.8%) second degree and 58(19.1%) were third degree malnourished. Girls were more malnourished as compared to boys for all degrees except first degree malnutrition (p value 0.005).It was significant to note that, with increasing level of parents' education malnutrition of all degrees steadily decreased; this was more significantly correlated to mother's educational status (p value 0.022) as compared to father's (p value 0.038).

Table II Reasons of Under/Non Vaccination

False contraindications	28 (36.8%)
Lack of knowledge of importance	18 (23.7%)
Belief that vaccination is hazardous	5 (6.6%)
Parent's illness	3 (3.9%)
Depending only on outreach	4 (5.3%)
Migration of the family	5 (6.6%)
Vaccine shortage/ absence of staff	3 (3.9%)
Bad attitude of vaccinator	5 (6.6%)
Miscellaneous	5 (6.6%)
Total	76 (100%)

Among 28 cases where false contraindication was the reason for non/under-vaccination, 21 (75%) were assumed by parents; mother alone assumed vaccination was contraindicated 10 counts, father alone 1, both parents 1, grandparents 3 ,and all parents (father, mother and grandparents) 1.In 7 cases of false contraindications (25%) it was vaccinator who thought vaccination could not be done. In case of 21 children where parents were responsible, 7 were minor febrile illnesses, 1 Cerebral Palsy with seizures, 2 had chronic diarrhea, 1 had pulmonary TB and 10 were third degree malnourished. In 7 counts where the vaccinator thought vaccination was contraindicated 1 had Upper Respiratory Tract Infection with fever, 1 had jaundice, 1 hyperactive airway disease, 1 developmental delay and 3 werethird degree malnourished. Of the 5 cases where it was believed by parents that vaccination was hazardous, 1 parent (father) believed vaccines contained contraceptives as Fatwa was given by an Imam Masjid ; the other 4 did not come up with any particular reason (or did not disclose their thoughts).

In 2 cases family migrated often between city and village and therefore lost the track of vaccination, in 1 case vaccination was missed because the mother went on to live with her parents for some time, in one case reason was

permanent change of abode and 1 family which was from KPK had gone to reside in suburbs of Peshawar where no team visited.

In miscellaneous causes one mother said she was working woman and did not have time to go for vaccination, 1 said it was distance, 1 because of fear of side effects (pain), 1 said she did not have enough money to travel and 1 said she was not motivated by in-laws and husband.

Of 5 counts of bad attitude of vaccinator, 4 said vaccinator was harsh and discouraging and 1 was reported corrupt and demanded money.

DISCUSSION

The percentage of fully immunized children in our study was 74.6%; in Pakistan Demographic Household Survey 2012-13 overall national full child vaccination coverage was only 53.8% andfor Punjab it was 65.6%.[7] In 3 large surveys in India pooled together 53% were fully immunized[10]. In a study done in Peshawar on 300 patients age 1 month to 5 years (comparable to our study) 80% were fully vaccinated according to age[11] while in a Nigerian study on 223 children age 12-59 months 46.2% were completely immunized. [12]

In our study parental education status was strongly correlated with the vaccination status of the study cases. Both father's and mother's educational status were independently correlated so. Many studies have reported association of education of both parents to full immunization of their children[12,13,14]. But more abundant literature concludes that mother's education is strongly associated with the child being fully immunized.[10,15,16,17,18] Our study more logically proved this correlation as father's education status indirectly but mother's education status directly influenced mother's knowledge of vaccination schedule which led to child being fully vaccinated. Not having prior knowledge of vaccination schedule somehow influenced family's following the schedule completely.

It seems like stating the obvious that economic status would influence the vaccination status and many studies emphasise this[10,11,12,19]. But our study, interestingly did not find it a significant factor (p value 0.059).

Amongst children who were unvaccinated/under-vaccinated largest group was those who were not vaccinated because of false contraindications.Several studies have reported dales contraindications as causes of under or nonvaccination[13,20,21]. Some studies take false contraindications only as perceived by the healthcare provider (vaccinator) and others take those perceived by both healthcare provider and parents. In our study we have included both because we think it is to be addressed in particular, separate from the broad category of parents' awareness regarding vaccination. WHO and other leading health organisations have given clear accounts of true and commonly encountered false contraindications.[22,23]All the contraindications encountered in our study are commonly encountered false contraindications and categorically mentioned in these recommendations.

Lack of knowledge of importance of vaccination was the second commonest reason for under/non-vaccination.

Education, no doubt be counted as a denominator underlying the factors responsible for under/non-vaccination but this is a long term strategy for policy makers to address (macro level). What we have concluded from this study is that micro level problems remain even in the most affluent nations but they address these issues to complete the picture. We believe addressing the left outs can dramatically increase vaccination rate; using media including social media to educate the public on importance of vaccination and addressing individual false contraindications one by one and negating them, providing the vaccinators with a list of false contraindications and arranging repeated refresher courses for them which should also address the conduct, advising them not to refuse client from another centre or the one with no card, proper counseling of the mother, keeping a complete record of vaccinee children and approaching them in case they miss the dose. Feedback from families and community leaders and monitoring missed and under-vaccinated children and assessing and addressing the cause is vital to the success of such a program.[24] Many countries have adopted and applied missed opportunities of vaccination (MOV) strategies which can be very helpful in this regard; e.g., with this strategy Peru reduced missed opportunities of vaccination in children <2 yr. from 52% in 1990 to 13% in 1995 after implementing corrective strategies[20].

The limitation of our study was that we dealt with the under-vaccinated and totally unvaccinated as one category; it would be relevant to see the percentage of under-vaccinated and unvaccinated separately. Secondly we did not include the area of residence of our subjects; it would have been useful to know differences in urban and rural and between different parts of urban areas.

CONCLUSION

This study reinforces the importance of education particularly that of women but more importantly found that false contraindications to vaccination either assumed by the parents or the vaccinator is an area which if addressed rigorously can improve the situation dramatically.

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