

A STUDY ON COMPLICATIONS ASSOCIATED WITH MEASLES VACCINATION AMONG CHILDREN OF PATNA, BIHAR

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ABSTRACT

BACKGROUND

The aim of the study is to search out the incidence of complications of measles immunisation in malnourished children.

MATERIALS AND METHODS

Sample selected from OPD Paediatric Department, PMCH, Patna, over a period of 1st April, 2006, to 31st March, 2007, during my posting period.

Participants- Simple randomly selected 400 children (8-24 months) of Patna, immunised against measles.

Statistical Analysis- Proportion, percentage, incidence rate, Chi-square test were performed.

Design- Longitudinal study.

RESULTS

Total 400 children were followed up for one calendar year. There was no statistical association between age, sex and complications developed in children. Out of 400 children complications developed in 25 children among these malnutrition was the commonest risk factor (80%) and statistically significant ($P < 0.05$) followed by other associated factors.

CONCLUSION

Higher incidence of complications in malnourished vaccines illustrates the government and other healthcare providers to strengthen the surveillance for vaccine-associated complications.

KEYWORDS

Malnutrition, Measles Vaccines, Complication, Vitamin A Supplementation.

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BACKGROUND

The global eradication of measles by 2020 is the target set by the W.H.O. in new global health policy "Health for All" in 21st century.¹ Measles vaccination was added to UIP in 1985 and expanded to district wise coverage in planned manner and Patna district was covered under UIP in 1985. The programme aims to cover infants by right vaccine to right person at the right age in the right manner in right doses at the right intervals through right skills. According to W.H.O. - "An adverse drug reaction is defined as any response to a drug that is noxious and unintended and that occurs at doses used in man for prophylaxis, diagnosis or therapy."²

The end of century goals agreed to by the nations following the 1990 World Summit for Children as 'Social goals for the year 2000', which embodied- Achievement of

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90% immunisation among under ones, eradication of polio, elimination of neonatal tetanus, a 90% reduction in measles cases and a 95% reduction in measles death (compared to pre-immunisation level).

Measles vaccine is available as a freeze dried live attenuated vaccine constitute a potency of a single human dose is 1000 TCID₅₀ of virus. The storage temperature of the measles vaccine is recommended as - 20°C at which the potency is expected to last up to 3 months. The W.H.O. recommends a single subcutaneous dose of 0.5 mL of the reconstituted vaccine should be given as close to the age of 9 months as possible. A combined MMR vaccine is now widely used. An another live attenuated vaccine has been developed, which can be given by an intranasal aerosol in young babies and induces good antibody response irrespective of the presence of maternal antibodies.³

When the measles vaccine is injected into the body, attenuated virus multiplies and induces a mild infection with all primary symptoms of natural measles; but in reduced frequency and severity. Depending upon the strain of vaccine virus, 5-20% of the vaccines may develop mild-to-moderate fever about 5-10 days after vaccination and may last for 1-2 days. During this period, 1-5% of vaccines may



develop a few spots on the trunk, which last for 1-3 days. Subacute Sclerosing Panencephalitis (SSPE) is a very rare complication developed in vaccines in about 1 per million doses. It is far less than associated with natural measles (5-10 cases per million cases).³ In 1965, with introduction of killed measles vaccine, atypical measles syndrome had developed, which was characterised by- high fever, pneumonia and unusual rash without Koplik spots. Since, stoppage of the killed vaccine, this syndrome had disappeared except in those who had received killed vaccine.

Recently, a new complication of measles immunisation has been searched out as Toxic Shock Syndrome (TSS), which occurs due to the contamination when the same vial is used for more than one session on same day or next day. The vaccine should not be used after 4 hours of opening the vial. TSS is totally preventable and reflects poor quality of immunisation services. The symptoms of TSS are typical - severe watery diarrhoea, vomiting and high fever are reported within few hours of measles vaccination. There are usually a cluster of cases as all infants vaccinated from contaminated vial will be affected. This may cause death within 48 hours. Case fatality rates are very high.

Hence, this study has been designed with the following aim and objectives.

AIM AND OBJECTIVES

- To calculate the incidence of complications of measles immunisation in malnourished infants.
- To study and describe the morbidities/complications of measles immunisation.
- To identify the risk factors in the pathogenesis of such complications.
- To search out the features of any nutritional diseases especially vitamin 'A' deficiency in the vaccines.
- To provide the data essential to the planning, implementation and evaluation of services for prevention, control and treatment of the complications of measles immunisation.

Review of the global strategy for the eradication of measles by 2020, the measles vaccination contain once by all countries. It was decided to study the complications of this vaccine in view of the global strategy as well as for purposes outline above.

MATERIALS AND METHODS

Study Design- Longitudinal study.

Study Sample- It included 400 children (8th-24th months) immunised against measles during the stipulated period of one calendar year.

Selection of Sample- The included children in sample were selected by simple random method from OPD, Paediatric Department, Patna Medical College and Hospital, Patna. Among 400 children, 200 were males and 200 were females.

Inclusion Criteria

- Age group of 8th-24th months of children were selected for the study.
- Only those who had the documented proof of measles vaccination were selected for study.
- Those who had made at least six visit in the follow-up.
- Those parents/guardians who gave the consent for the study.

Exclusion Criteria

- Those who received MMR vaccine for measles immunisation were excluded for study.
- Those who had made less than six visits in the follow-up were excluded for study.
- Those who were not permanent resident of Patna were excluded.

Duration of Study

The study was conducted from 1st April, 2006, to 31st March, 2007. Then, the selected children were followed-up for one year to study for any complications developed in measles vaccines.

Methodology

At least six attempts to contact the parents of selected children were made (to call the children at OPD, Paediatric, PMCH, Patna, once weekly for two weeks, then once in month for subsequent month and once at home visit and/or by mobile/telephone).

Sources of Information

The study was carried out with the help of informants who were composed of paramedical workers, local link persons of the area and parents of the children. The parents of the children after giving voluntary and informed consent were interviewed. The questionnaire included, which was standard for EPI cluster surveys that was adapted from the Indian vaccination schedule. Details were recorded on the standard format.

Statistical Methods

The data obtained from the survey were compiled, tabulated and subjected to statistical analysis. Data entry and analysis was centralised and performed at the Department of Community Medicine, Patna Medical College, Patna (India). Tests of significance has been applied whenever necessary to establish the association of various correlates. The finding has been interpreted according to draw meaningful conclusions.

RESULTS

The study was carried out in simple randomly selected children with a sample size of 400 children (8-24 months) immunised against measles during the year from 1st April, 2006, to 31st March, 2007. Among 400 selected children, 200 were males and 200 were females. 25 children had developed different types of complications. The study of these 25 children were stratified in relation to various factors

to reach the complications developed in children immunised against measles in the areas. None of the study participants had received vitamin A supplementation. The different observations has been cited below.

Number of Selected Children	Children who Developed any Type of Morbidity	Percentage of Morbidity
400	25	6.25%

Table 1. Number of Children (8-24 Months) Who Developed Morbidity

Table 1 shows the study of 400 children after measles immunisation, complications observed in only 25 cases (6.25%).

Complication	Number of Children Suffered	(Percentage) of Complications
Fever (alone)	20	5%
Fever and rashes	02	0.5%
Fever rash and diarrhoea	01	0.25%
Fever and diarrhoea	01	0.25%
Redness at the site of inoculation	01	0.25%
Total	25	6.25%

Table 2. Number of Distribution of Different Types of Complications

Above data shows fever (alone) is the most common complications developed after measles immunisation. Fever associated with rash ranks second, which account for 0.5%. Then, fever, rash and diarrhoea, fever associated with diarrhoea and redness at the site of inoculation, which has documented 0.25%; 0.25% and 0.25%, respectively.

Number of Children	Age (Months)	Sex	Weight (kg)	Feature of Vitamin "A" Deficiency	Other Complications
1	9	F	4.25	Bitot's spot	Fever, rash and diarrhoea

Table 3. Clinical Features of Vitamin "A" Deficiency

Table 3 shows Bitot's spot was observed in only one female child among 400 selected children. She had also developed fever and rash associated with diarrhoea. She was 9 months old and her body weight was 4.25 kg, which was lower than the standard body weight (7.5 kg) for age. Although, malnutrition is one of the cause of vitamin "A" deficiency, but Bitot's spot, which appears later. It maybe

say that measles immunisation potentiate the factor, which is responsible for the appearance of vitamin "A" deficiency.

Sex	Number of Selected Children	Complications Developed in Children	(Percentage)
Male	200	14	7%
Female	200	11	5.5%

Table 4. Sex of the Children and Complications

($\chi^2=0.384$; d.f. = 1; P >0.05).

Table 4 shows complications developed in male children after measles immunisation was slightly higher than the female children. The association between sex of the children and complication (developed in measles vaccines) was not found to be statistically significant.

Age Group (Months)	Number of Selected Children	Number of Children in Which Complications Developed	Percentage of Children in Which Complications Observed
<9	4	01	25%
9-15	320	21	6.5%
16-24	76	03	3.9%
	Total = 400	Total = 25	

Table 5. Age of Children and Complications

($\chi^2=3.41$; d.f. = 2; P >0.05).

The study revealed that the complications after measles immunisation was significantly higher in children below 9 months of age. It was found 25%. Complications was lowest in age group 16-24 months. This was 3.9% and the age group 9-15 months were account for 6.5%. That statistical association between the age of children and complications was not significant.

Risk Factor	Number of Children (Complications Observed in Children)	Percentage
Malnutrition	20	80%
Other associated diseases (T.B. lymphadenitis)	01	4%
Other vaccine (DPT) given at the time of measles immunisation	04	16%
	Total = 25 (Complications observed in)	

Table 6. Risk Factors Associated with Complications

The follow-up study revealed that out of 25 children (complications), malnutrition was the commonest risk factor (80%), followed by DPT vaccine given at the same time (16%) and other associated diseases (T.B. lymphadenitis-4%).

Total Number of Children	Complications Observed in Children	Percentage
Malnourished -210	20	9.5%
Normal body weight for age -190	5	2.6%
Total	25	

Table 7. Prevalence of Complication in Malnourished Children

$\chi^2 = 8.09$; d.f. = 1; P-value = 0.004.

Data shows the prevalence of complications in malnourished vaccines was 9.5%. The statistical association between malnutrition and complications was more significant.

DISCUSSION

On analysing the data, it was observed that out of 400 children, complications had developed in 25 vaccines (6.25%). Fever alone was most common developed in 20 vaccines (5%); fever and rash in 2 (0.5%); fever, rash and diarrhoea in 1 (0.25%); fever and diarrhoea in 1 (0.25%); Bitot's spot in 1 (0.25%). The study revealed that the complications was significantly higher in children below 9 months of age (25%), lowest in age group (16-24 months) (3.9%) and the age group 9-15 months account for 6.5%. The statistical association between the age and complications was not significant. On review of sex distribution, complications was slightly higher in male (7%) than female (5.5%) children. There was no statistical association among sex.

The follow-up study revealed that out of 25 children (complications), malnutrition was the commonest risk factor (80%), followed by DPT vaccine given at the same time (16%) and other associated diseases (T.B. lymphadenitis-4%).

Data shows the prevalence of complications in malnourished vaccines was 9.5%. The statistical association between malnutrition and complications was more significant. The clinical feature of vitamin 'A' deficiency (Bitot's spot) observed in only one children of 9 months old. Her body weight was very low (4.25 kg) and she had also developed other complications- fever, rash and diarrhoea (Table 3). I have concluded that malnutrition is a factor, which is responsible for development of vitamin 'A' deficiency feature and it is further enhanced by the simultaneous inoculation of measles vaccine. This may also be due to the depression of vitamin 'A' concentration following measles vaccination as reported by Yalcin et al.⁴

Reviewing the different types of complications, it was observed that there are new reflects diarrhoea and redness at the site of inoculation. Although, its percentage is very low, but it can be kept in consideration for further study.

The higher risk of complication observed in present study calls for immediate scrutiny by health planners, administrator and all those who engaged in health development and evolving strategy for further reduction of complication in measles vaccines.

In the present study, age regarding complications, although the sample size was very small for the age group below 9 months, I have observed complication in 25% children. Since, the sample size was very small, so the value of this high rate complication in this category was not important statistically. Complication observed in age group 9-15 months was 6.5% and the complication was found lowest in age group 16-24 months. Although, overall age group was statistically not significant.

The complication developed in measles vaccines has been significantly associated with malnutrition (80%). Other risk factors include other vaccine (DPT) given at the same time of measles vaccine inoculation (16%) and complication developed in children having T.B. lymphadenitis (4%). I have concluded that the incidence of complication is very high (100%) in vaccines when DPT vaccine was given on the same time of measles inoculation. On the follow up study of 210 malnourished children (Table 7), complications observed in only 20 children (9.5%). Hence, complications observed in only 9.5% malnourished children; it is neither important to omit nor delay for immunisation in malnourished children. K. Park had reported mortality is very high (up to 400 times) in malnourished children, contract with measles. My study indicates that measles immunisation is very essential for this vulnerable group. Complication is very less in comparison to its protective value.

CONCLUSION

On the follow-up study of 400 measles vaccines, morbidity was significantly associated with malnutrition (80%). Study reveals among 210 malnourished children, complications observed in only 20 children (9.5%). Hence, it is neither important to omit nor delay for immunisation in malnourished children. Mortality is very high (up to 400 times) in malnourished children contacted with measles.⁵ our study indicates that measles immunisation is very essential for this vulnerable group. Complications is very less in comparison to its protective value.

RECOMMENDATIONS

1. Vitamin "A" supplementation should be given to all measles vaccines, especially to malnourished children.
2. To improve the nutritional status of children prior to measles immunisation.
3. There was no follow-up checkup of vaccines. One of the important action, which need to be taken in this regard is to routine and efficient follow-up of all vaccines by health workers and/or doctors to be ensured.

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