

Effects of Immunization on Childhood Asthma: A Tertiary Hospital Based Study in Eastern India

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Abstract

Introduction: Immunization not only can prevent some specific infectious diseases for which patients are immunized, it has got some protective or provocative effects on other diseases as well. Childhood asthma is like one of the diseases. Therefore this tertiary hospital based case control study was proposed to observe the effects of immunization on the prevalence of childhood asthma.

Methods: Patients of 3-12 years of age presented to our institute, were tested for reversibility (PEFR) and/or variability wherever feasible, were given anti-asthma drug trials and were followed up to observe the improvement and thus were diagnosed as childhood asthma excluding other differential diagnoses. In the present study, a total of 94 children with asthma were studied. After matching 94 children were included in the control group. Immunization history was recorded from immunization cards. Status of immunization in the case and control group was compared by using chi-square test.

Results: Among the asthma group 67 children (71.28%) were fully immunized, 18 children (19.15%) were incompletely immunized and 9 children (9.57%) were non-immunized whereas in control group 78 (82.98%), 11 (11.70%) and 5 (5.32%) children were fully immunized, incompletely immunized and non-immunized respectively as per the Indian National Immunization programme (BCG, OPV, DTPw and Measles). Immunization coverage

in asthma patients was 71.28% which was lower than that of the control group (82.98%) and the difference was statistically significant (Chi-square=3.65, $p=0.03$). The odds ratio for being asthmatics who were fully immunized, compared to incompletely immunized and non-immunized asthmatics, was 0.5 (OR=0.5, 95% CI=0.25-1.02).

Conclusion: Immunization has got protective effects on childhood asthma and it may have indirect benefit of health education and awareness regarding immunization habits while visiting immunization centers. Further longterm, multi-center study with large sample size is required to establish association of immunization with childhood asthma.

Keywords: Asthma, Childhood Asthma, Immunization, Provocative Factor, Protective Factor

Introduction

Childhood asthma is a chronic inflammatory respiratory airway disease. It is responsible for many mortality and morbidity among pediatric patients.¹ Immunization not only can prevent some specific infectious diseases for which patients are immunized, it has got some protective effects on other diseases also.² Immunization has got some very rare provocative effects on some allergic and autoimmune diseases too.³ On childhood asthma, immunization has many protective and a few provocative effects as well.^{4,5,6}

Therefore a tertiary hospital based case control study has been proposed to find out whether there are any effects of immunization on childhood asthma which is a highly prevalent disease in Sub-Himalayan Terai Region of North Bengal.

Materials and Methods

This tertiary hospital based case control study was carried out over from 1st February, 2009 to 31st January, 2010 in the Department of Pediatrics, North Bengal Medical College & Hospital and the drainage area of the study population is North Bengal Terai Region which includes Cooch behar, Jalpaiguri & Terai area of Darjeeling district. Permission from the ethical committee was taken before doing this study and proper history and clinical examination findings were written in typed proforma in OPD and inpatient department also after getting proper written consent from the guardians of the children. Normal healthy children who are the neighbours of the patients were taken as control only after getting written consent from the guardians.

Selection of cases: Patients of 3-12 years of age who presented to the OPD or inpatient department with signs and symptoms of asthma were tested for reversibility (PEFR) and/or variability wherever feasible, given anti-asthma drug trial and were followed up to observe the improvement and history of allergens and triggers were taken and thus diagnosed as asthma after excluding other important differential diagnoses. The Children belonging to North Bengal Terai region of the selected age group, presenting with pulmonary symptoms which are due to any acute or chronic illness other than asthma were excluded from the study group. Patients having both asthma as well as any acute or chronic illness other than asthma were excluded from the study.

Selection of Control: The healthy children (3 years to 12 years) of the above mentioned area, who were visiting the OPD or inpatient department and who did not have any infections of respiratory tract or any pulmonary diseases or any known diseases which might impair pulmonary function and alter other parameters of the study, were included in the control group after getting written consent. Any children with any kind of respiratory or other illnesses which might affect the clinical and laboratory criteria of asthma were excluded from the study.

Matching: Matching of Age: One healthy child who was within 3 -12 year age group and nearest to a patient by age was taken as his / her control.

Matching of Sex: Male children were taken for male patients and female children were taken for female patients as controls.

Immunization History: It was noted in typed proforma and was cross-checked from immunization records.

Results and Analysis

The collected data of immunization among asthma and control was edited and entered into excel sheet 2010 Beta and analyzed by using SPSS version 16 software and Epi Info software. Findings were tabulated in frequency distribution table and the risk factor was analyzed by calculating exposure rate in cases and control group. Odds Ratio was also calculated for immunization in the asthma and control group. Immunization status of cases and controls was compared by using chi-square test. P value <0.05 was considered as significant statistically.

Table 1: Immunization status among asthma and control group

Groups		Immunization			Total
		FI	II	NI	
Asthma	Count	67	18	9	94
	%	71.28%	19.15%	9.57%	100%
Control	Count	78	11	5	94
	%	82.98%	11.70%	5.32%	100%
Total	Count	145	29	14	188
	%	77.13%	15.43%	7.45%	100%

Table no.1 shows that among the asthma group 67 children (71.28%) were fully immunized (FI), 18 children (19.15%) were incompletely immunized (II) and 9 children (9.57%) were non-immunized (NI) whereas in control group 78 (82.98%), 11 (11.70%) and 5 (5.32%) children were fully immunized, incompletely immunized and non-immunized respectively as per the Indian National Immunization programme (BCG, OPV, DTPw and Measles).⁷ Immunization coverage in asthma patients (71.28%) was lower than that of the control group (82.98%) and the difference was statistically significant ($p < 0.05$). The odds ratio for being asthmatics who were fully immunized, compared to incompletely immunized and non-immunized asthmatics, was 0.5 (OR=0.5, 95% CI=0.25-1.02). So immunization has got protective effects on occurrence childhood asthma in this study.

Discussion

Among the asthma group (n=94), 67 children (71.28%) were fully immunized (FI), 18 children (15.15%) were incompletely immunized (II) and 9 children (9.57%) were non-immunized (NI) whereas in control group (n=94), 78 (82.98%), 11 (11.70%) and 5 (5.32%) children were fully immunized, incompletely immunized and non-immunized

respectively as per Indian National Immunization Schedule (BCG, OPV, DTPw and Measles).⁷ Immunization coverage in asthma patients was 71.28% and this was lower than that of the control group (82.98%). ($\chi^2=3.65$, $p < 0.05$). In this study immunization was found to be protective (OR=0.5, 95% CI=0.25-1.02) and immunization with the above mentioned vaccines had no provocative influence on asthma etiology.

Gruber et al demonstrated a weak protective effect of BCG vaccination against asthma. The adjusted odds ratio (95% CI) for asthma was 0.85 (0.71-1.00) for BCG-vaccinated individuals.⁵

Bernsen et al. showed that there is reduced risk of atopic diseases with pertussis vaccination. Adjusted ORs ranged 0.23–0.40.⁴

Nakajima et al. reported that diphtheria immunization was weakly associated with an increased risk of asthma by age 7 years and there was no evidence of any association with asthma for receiving tetanus, pertussis, polio vaccines.⁶

Destefano, et al. observed the relative risks (95% confidence intervals) of asthma were: 0.92 (0.83 to 1.02) for diphtheria, tetanus and whole cell pertussis vaccine; 1.09 (0.9 to 1.23) for oral polio vaccine; 0.97 (0.91 to 1.04) for measles, mumps and rubella (MMR) vaccine.⁸

Balicer, et al. in a meta-analysis observed no association, (provocative or protective), between receipt of the BCG or whole-cell pertussis vaccine and risk of asthma in childhood and adolescence.⁹

Some studies^{4,5} showed some vaccines as protective which is as per our study, whereas two studies^{6,9} reported some vaccines had no protective or provocative effects on asthma. Some studies^{6, 8, 10} showed mixed patterns where some vaccines were protective and some vaccines were provocative.

In our study immunization coverage is less among asthma patients than that of the control group. This can be due to avoidance of immunization for their chronic illness, lack of awareness regarding health benefits of immunization, poor socio-economic conditions, etc.

Limitations

- Risk-benefit ratio for each vaccine has not been seen separately.
- Some vaccines like Hepatitis B and Haemophilus influenzae type b came later in National Immunization Programme.

Conclusion

In this study immunization has got protective effects on childhood asthma and it may have indirect benefit of health education and awareness regarding immunization habits while visiting immunization centers. But longterm, multi-center study with large sample size is required to establish association of immunization with childhood asthma.

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