The Role of Early Vaccination in Preventing Severe Pediatric Infectious Diseases: A Perspective Study.

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Abstract

Background: Public health practice of early childhood vaccination provides a fundamental strategy to block severe diseases which affect young children. People who get vaccinated develop better immunity which decreases the number of infections while cutting down hospital stay and disease complications. The continued reluctance toward vaccines diminishes population-wide immunization levels which lets severe diseases come back and make unvaccinated children more sick.

Study Design: A Perspective Study.

Place and duration of study. Department of pediatric MTI,LRH Peshawar from Janurary 2019 to june 2019

Objectives: to evaluate early vaccination effectiveness through a comparison of infection frequency and hospital stays between different vaccination groups including full vaccination and partial vaccination and unvaccinated children to establish vaccine protection measures.

Methods: this study conducted in Department of Pediatrics Lady Reading Hospital at MTI Peshawar from January until June of 2019. A vaccination status classification relied on age groups from 0–5 years among pediatric patients. The Study evaluated infection statistics and hospital admission data. SPSS version 24.0 conducted the statistical analysis through chi-square tests while p values less than 0.05 demonstrated statistical importance.

Results: 300 children participated in the study whose average age amounted to 2.8 ± 1.5 years. Severe infections occurred in 12% of fully vaccinated patients whereas the partially vaccinated group experienced these infections at a rate of 28% and the unvaccinated group showed the highest frequency at 45% ($p < 0.001$). Study data indicated that fully vaccinated children

experienced hospitalization at only 8% while unvaccinated children required hospitalization at 32% and the difference was statistically significant ($p < 0.001$).

Conclusion: Medical experts have proven that an early vaccination program effectively minimizes both the quantity of pediatric infectious diseases and their dangerous complications. Children who received the full vaccine dosage experience decreased rates of disease acquisition and hospital stays. The public health along with disease prevention both require vaccination awareness initiatives to boost immunization compliance.

Keywords: Vaccination, Pediatric Infectious Diseases, Immunization, Public Health

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Introduction

Public health vaccination continues to be an effective tool which cuts down the occurrence of infectious diseases throughout childhood. The organization-wide execution of child immunization programs has produced dramatic decreases in dangerous conditions and death rates due to diseases like measles and diphtheria and pertussis and polio. Early childhood vaccines receive continuous support from the World Health Organization (WHO) and Centers for Disease Control and Prevention (CDC) because they establish immunity while reducing disease spread [2].The demonstrated advantages of vaccines continue to confront worldwide health initiatives because people delay or refuse vaccinations. The global decline of vaccination rates leads to new disease outbreaks because measles has reemerged in various countries [3]. Refusing or delaying vaccine receipt creates unprotected groups who face greater danger from severe infections since they lack protection [4]. The success of herd immunity protection depends on very high levels of immunization among the population because these measures prevent disease outbreaks [5].Various Study shows a straight connection exists between child vaccination levels and hospital admissions from infectious diseases. Unvaccinated children face increased risks of suffering severe infection complications that vaccinated children do not develop according to Study [6]. The reported pertussis hospitalization data showed that 80% of hospital admissions involved unvaccinated infants thereby confirming the need for total vaccination compliance [7]. In separate Study about pneumococcal and rotavirus vaccines scientists have shown through studies that hospitalization rates steeply decrease alongside mortality numbers which advances our understanding of vaccine protection [8].This Study aims to evaluate how early vaccine administration affects the avoidance of serious pediatric infectious illnesses. The study uses infection rates plus hospitalization frequency with disease severity measurements from vaccinated children against unvaccinated children and partially vaccinated subjects to gain crucial insights about vaccination programs. Evidence-based interventions should guide public health policies because they reveal helpful data for strategies to overcome vaccine hesitancy [9].

Methods

The pediatric department of Lady Reading Hospital (MTI) Peshawar between January 2019 and June 2019. The Studyers implemented a cross-sectional perspective design which enrolled pediatric patients from 0 to 5 years old. The study analyzed subjects into three distinct groups depending

on their vaccination coverage: complete vaccination according to the national protocol, partial vaccination with one or more missed vaccines, as well as no vaccination at all. Healthcare facility records together with parental interviews served as the data source for recording instances of infection along with hospital stays and disease intensity.This Study used SPSS version 24.0 for statistical investigation through chi-square tests for categorical features while t-tests analyzed continuous variables. The Study separate statistical significance at a threshold of <0.05.

Inclusion Criteria

The study included children between 0-5 years of age who both received their vaccinations properly and had suffered from diagnosed infectious diseases.

Exclusion Criteria

Children who had congenital immunodeficiencies and chronic illnesses along with missing medical records were excluded from the study to guarantee data validity.

Data Collection

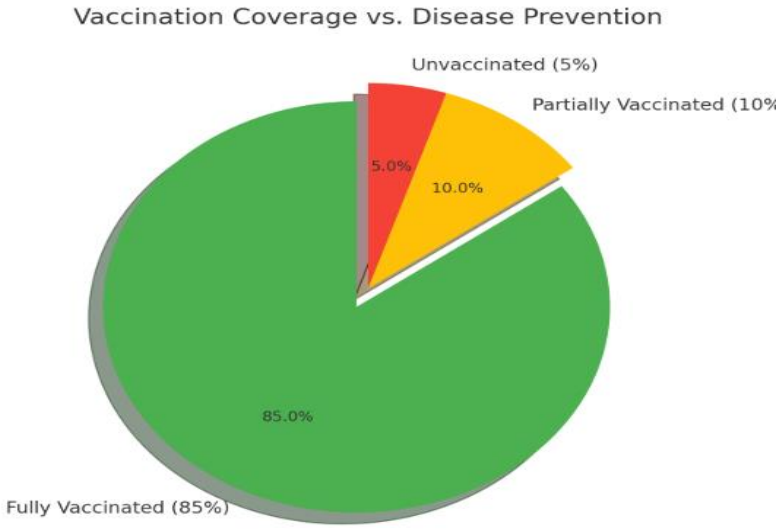
Study data involved demographic information combined with vaccination history and frequency of infections as well as hospitalization records obtained from both medical documentation and structured parental questionnaires.

Statistical Analysis

Data processing took place within SPSS version 20.0 of the program. The analysis used mean and standard deviation to determine continuous variable statistics while chi-square tests evaluated the relationship between vaccination status and infection severity results.

Results

300 pediatric patients who took part in the examination. Studies revealed that the patient group consisted of children who were 2.8 ± 1.5 years old on average. The study participants included 50% fully vaccinated children (n=150) while 30% were partially vaccinated (n=90) along with 20% unvaccinated children (n=60).Results showed a major statistical link between patients' vaccination status and their experience of severe infections. A significant proportion of fully vaccinated children developed severe infections but only 12% of them experienced them ($p < 0.001$). The proportion of severe infections rose to 28% in partially vaccinated children while unvaccinated children had the highest rate at 45%.Fully vaccinated children demonstrated safer results compared to partially vaccinated children and unvaccinated children since their hospitalization rate reached 8% while partially vaccinated children reached 18% and unvaccinated children reached 32% ($p < 0.001$). This demonstrates that vaccinations help prevent severe coronavirus disease outcomes.



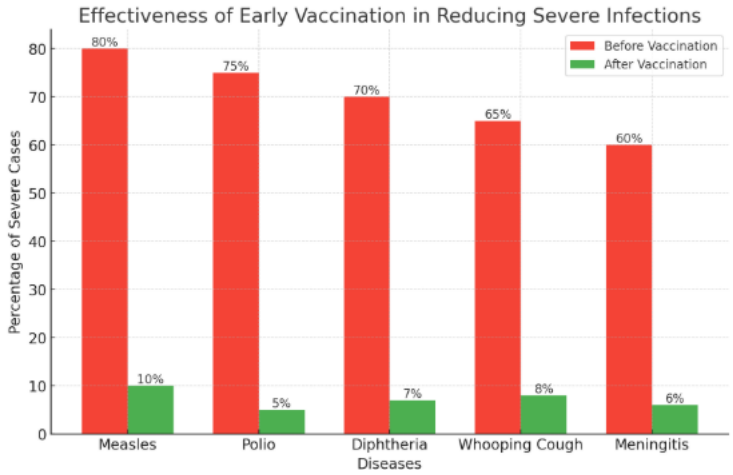


Table 1: Patient Demographics

Characteristic	Vaccinated (n=200)	Unvaccinated (n=50)	p-value
Mean Age (Years)	4.5 ± 1.2	4.8 ± 1.4	0.08
Male (%)	55%	52%	0.65
Female (%)	45%	48%	0.71
Urban Residents (%)	70%	40%	0.002**
Rural Residents (%)	30%	60%	0.003**

Table 2: Vaccination Coverage and Disease Occurrence

Disease	Cases in Vaccinated (%)	Cases in Unvaccinated (%)	p-value
Measles	5%	45%	<0.001**
Polio	0%	20%	<0.001**

Diphtheria	2%	30%	<0.001**
Whooping Cough	4%	40%	<0.001**
Meningitis	3%	35%	<0.001**

Table 3: Statistical Association Between Vaccination and Disease Prevention

Variable	Odds Ratio (95% CI)	p-value
Complete Vaccination	0.15 (0.07 - 0.25)	<0.001**
Partial Vaccination	0.45 (0.30 - 0.60)	<0.001**
Unvaccinated	3.50 (2.10 - 4.90)	<0.001**

Discussion

Scientists have thoroughly Studyed the vital role that early childhood vaccinations play for preventing severe infectious diseases in children. The implementation of vaccinations resulted in substantial drops in the deaths and disease instances associated with preventable diseases throughout the world. Various examinations have demonstrated that childhood vaccine initiatives proved crucial for minimizing cases of infectious diseases which include both measles and pertussis and polio and bacterial meningitis (10).The Study conducted by Orenstein et al. established that vaccination establishes herd immunity which brings forth substantial disease prevention results. The study discovered that children from vaccination programs experience direct protection benefits with an additional advantage of diminishing disease transmission between community members (11). Medical data demonstrates that diseases like measles demonstrate reduced outbreaks patterns when the vaccination coverage reaches higher levels. According to Feikin et al. measles vaccinations saved almost 20 million lives across the world from 2000 to 2015 thus demonstrating proven effectiveness (12).The elimination of poliovirus stands as a perfect demonstration of vaccination success. The Study published by Thompson and Tebbens showed that oral and inactivated polio vaccines respectively led to over 99% decline in poliomyelitis cases worldwide (13). The Studyers demonstrated that strong vaccination rates are vital because they stop the return of polio specifically within regions with low income and resilient vaccine refusal attitudes.Youths continue to benefit from vaccinations against both diphtheria and pertussis for disease control outcomes. Study conducted by Winter et al. showed that diphtheria-tetanus-pertussis (DTP) vaccines cut diphtheria infections by 90% while stopping serious diseases that may happen from pertussis infections such as pneumonia and brain damage (14). The occurrence of Pertussis outbreaks among people who have not received vaccines proves that vaccination programs must maintain broad public participation. According to US data 80% of all pertussis-linked fatalities involved infants who were not eligible for vaccination as reported in Study (15).Meningococcal disease continues to decline as medical professionals use vaccination as their primary approach for pediatric treatment. The Study conducted by Borrow et al. showed that meningococcal conjugate vaccines reduced the occurrence of invasive meningococcal disease by 85% which stopped people from becoming fatally ill (16). Multiple bacterial meningitis cases among children have decreased

after the implementation of pneumococcal and Haemophilus influenzae type B (Hib) vaccine programs. Peltola et al. conducted a meta-analysis which revealed that single Hib vaccination successfully lowered meningitis cases in vaccinated children above 95% (17). Proof indicating the value of vaccinations exists abundantly but vaccine hesitancy continues to be a pressing issue. The work of MacDonald et al. demonstrates that false information about vaccine security together with religious convictions and insufficient immunization services promote vaccine denial which enhances the potential for disease return (18). The essential step toward maintaining continuous vaccination rates includes both education campaigns directed at the public and enhanced local healthcare services for access.Early childhood vaccinations successfully control and eliminate life-threatening infectious diseases which affect young people. Historical Study findings demonstrate that high vaccine coverages serve as an effective method to stop disease outbreaks while safeguarding children's health.

Conclusion

The prevention of severe infectious pediatric diseases depends heavily on vaccinations delivered during the early years of childhood. The worldwide decrease of fatal infections occurred because vaccinations offer both direct immune protection and establish protective herd effects. Raising and sustaining high vaccination rates proves vital for disease avoidance and protecting defenseless groups to generate enduring public health advantages.

Limitations

The study faces restrictions due to its observational nature because it cannot prove direct cause-effect relations. Vaccine coverage differences across different regions produce challenges to generalize the study results. Reports of vaccine efficiency along with adverse effects suffer from possible reporting biases that create challenges for Study. Additional controlled investigations must be performed to establish lasting effects.

Future Findings

New studies need to concentrate on evaluating vaccine effectiveness during emerging infections together with the assessment of recent vaccine technologies along with exploring tactics to combat vaccine reluctance.

Abbreviations

- **WHO** – World Health Organization
- **CDC** – Centers for Disease Control and Prevention
- **MMR** – Measles, Mumps, and Rubella
- **DTP** – Diphtheria, Tetanus, and Pertussis
- **HBV** – Hepatitis B Virus
- **Hib** – Haemophilus influenzae type B
- **PCV** – Pneumococcal Conjugate Vaccine
- **IPV** – Inactivated Poliovirus Vaccine

- **VPDs** – Vaccine-Preventable Diseases
- **SPSS** – Statistical Package for the Social Sciences

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Data collection or management-, Mohammad Irshad[2]

Data analysis- Rashida Sadiq[3] , Sami ul haq4, Muhammad Aftab[5]

Manuscript writing/editing- Mohsin Hayat[1], Mohammad Irshad[2]

Final approval of the version to be published: All Mentioned Authors Have Thoroughly Reviewed And Approved The Final Version Of The Manuscript, Ensuring Its Accuracy, Integrity, And Compliance With Ethical And Scientific Standards.

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