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Research Article

Measles: Is It Still A Killer Disease?

Dr.Charul R. Mehta, Dr. Jay Patel, Dr. Navin, Dr. Diwakar Kr. Singh

Assistant Professor
3rd yr Resident Doctor
2rd Yr Resident Doctor
1st yr Resident Doctor

Abstract: To study the incidence of measles, its complications among immunized & unimmunized and mortality in patients admitted at a tertiary care center of western part of India. This prospective study was conducted in the Department of Pediatrics at a tertiary care hospital from December 2015 to December 2017 . All the patients of age less than twelve years befitting the case definition of measles after a written informed consent from parents were included in the study. Detailed history including immunization status, physical examination, search for morbidity, nutritional status was done and outcome studied and compared among immunized & unimmunized patients in the form of complications and mortality.

Keywords : prevalence, measles, maculopapularrash, complications, immunization.

INTRODUCTION

Measles, is a highly contagious, acute viral disease of the paramyxovirus family[1.] The measles virus normally grows in the cells that line the back of the throat and lungs. It is characterized by fever with rash with or without cough, coryza, conjunctivitis and pathognomicenanthema (koplik spots). It is one of the leading causes of childhood morbidity and mortality in the world despite the availability of a safe, effective and relatively inexpensive vaccine [2].

Approximately 1, 58 000 people died from measles in 2011 – mostly children under the age of five, the majority in low income countries with weak health infrastructures[2]. In spite of all the notable advances made in the field of anti bacterial agents, acute gastro enteritis and pneumonias still constitute major morbidities related to measles infection.

Most measles-related deaths are caused by complications associated with the disease. Complications are more common in children under the age of five. The most serious complications include blindness, encephalitis (an infection that causes brain

swelling), severe diarrhea and related dehydration, ear infections, or severe respiratory infections such as pneumonia[2]. Unvaccinated young children are at highest risk of measles and its complications, including death[2]. People who recover from measles are immune for the rest of their lives.

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MATERIALS AND METHODS:

This observational prospective study was conducted in the

Department of Pediatrics at a tertiary care hospital from December 2015 to December 2017 to determine the incidence of measles and its complications among immunized and unimmunized groups. The secondary outcome variable was to determine the mortality in patient and compare the survival curve among immunized and unimmunized groups.

All patients with age less than twelve years that satisfied the WHO case definition of clinical measles[3]i.e fever and macula-papular rash with cough or coryza or conjunctivitis were included in our study. Written informed consent was obtained from the parents before inclusion in the study. After informed consent, detailed history was elicited and physical examination was done with active search for morbidities in form of various systemic and nutritional complications.

Immunization status was confirmed by immunization card and patient was considered immunized for measles, only if it was confirmed with record available. 54 patients had their immunization card with complete record available.

The primary outcomes studied were various complications and mortality whereas secondary outcome studied was in form of duration of hospitalization. Data was collected in MS Excel and analysis was done using SPSS version 16. The rate of complications, mortality and duration of hospitalization was compared between immunized and unimmunized group. Duration of hospitalization was described as "time to discharge" from hospital in terms of survival analysis. "Time to discharge" from hospital in immunized and unimmunized measles cases was analysed using Kaplan Meier survival curves as well as log rank test.

RESULTS and DISCUSSION

Out of the total 13,352 admissions from December 2015 to December 2017, number of cases having measles was 118(0.88%). Number of measles' patients measles having complications were 101(85.6%) out of the total patients of measles. Mean age of patients was 2.7 years and majority of cases were below five year age group. There was a slight higher male preponderance with male and female ratio of 1:4 (Table 1).

Table 1. BASELINE CHARACTERISTICS		
1.	Age (mean)	2.7 years
2.	Male: Female ratio	1:4
3.	Socio-Economic status (Modified Kuppuswamy Class)	
	Lower	25(21.3%)
	Upper lower	56 (47.4%)
	Middle	37 (31.3%)

Table 2. CLINICAL SIGNS		
1.	Fever	118 (100%)
2.	Macula-papular rash	118 (100%)
3.	Koplik spots	10 (8.6%)
4.	PEM grade3-4 (SEM)	53 (45.0%)
5.	Anemia	68 (57.6%)
6.	Vitamin A deficiency	40 (34%)

Befitting the case definition, clinical signs of fever and macula-papular rash were present in all patients. While Severe Acute Malnutrition (SAM) was found in 53(45.0%), anemia in 68(57.6%), vitamin A deficiency was seen in 40 (34%) patients. According to WHO and UNICEF criteria, SAM) is considered when weight for height is <3 SD and/or severe visible wasting and /or bilateral pedal edema and /or MUAC <115 mm.

Table 3. COMPLICATIONS AMONG IMMUNIZED AND UNIMMUNIZED PATIENTS

No.	Complications	Immunized (n=66)	Unimmunized (n=52)	Odds Ratio (OR)	95% CI	P-value
1.	Bronchopneumonia	16 (24%)	26 (50%)	0.32	0.15 - 0.70	0.003*
2.	Otitis media	10 (15%)	02 (3.8%)	4.46	0.94 - 21.36	0.04*
3.	Bronchitis	4 (6%)	1 (1.9%)	3.29	0.36 - 30.37	0.265
4.	Pleural effusion	5 (7.5%)	1 (1.9%)	4.18	0.48 - 36.95	0.16
5.	AGE	11 (16.6%)	21(40%)	0.296	0.13 to 0.70	0.004*
6.	Acute encephalitis	0	3(5.7%)	0	0	0

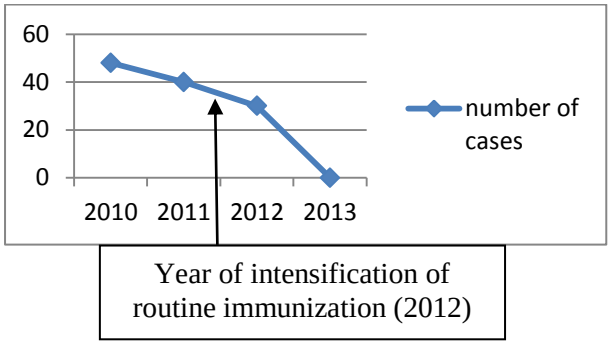
Table 3 shows the comparison of complications between the immunized versus unimmunized subjects with measles using chi-square test along with their p-values , odds ratio (OR), as well as their 95% CI. Respiratory complications were present in 65 patients with bronchopneumonia topping the list with 42 (41.2% out of complicated measles patients). The incidence of respiratory complications among immunized 16 (25%) was almost half than unimmunized 26 (50%) (p=0.003). Also there was increased incidence of otitis media 12 (10.69%) and bronchitis 05 (4.2%) in unimmunized group. Second most common complication encountered were pertaining to alimentary system in 37 patients with gastroenteritis heading the list 32 (27.1%). The incidence of gastroenteritis among immunized was 11(16.6%) and unimmunized 21(40%) (p=0.004), indicating increased incidence of gastro enteritis in unimmunized population. Acute measles encephalitis was present in only 3 patients (2.5%).

In present study 58 (49.1%) patients required less than 1 week of hospital stay to be cured of measles or its complications and only 9 (7.6%) required more than 3 weeks of hospitalization as shown in table 4.

Table 4. DURATION OF HOSPITAL STAY		
	Duration in weeks	No. of patients (%)
1.	≤ 1 week	58 (49.1%)
2.	1-2 weeks	51 (43.2%)
3.	≥ 3 weeks	09 (7.6%)

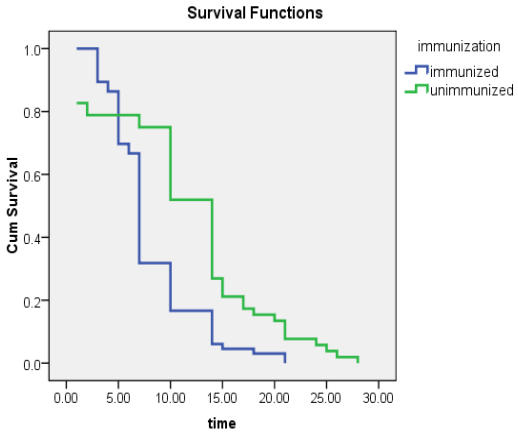
The case fatality rate of measles in our study was 9.32 %. There was no mortality observed in immunized patients. There was a steady decline of measles cases from 48 cases in the year 2010, 40 in 2011, 30 in 2012 and nil in 2013. (Graph 1)

GRAPH 1:No. of cases of Measles/ year:



Log rank between survival curves among immunized and unimmunized groups revealed a statistically significant difference, respective survival curves are shown in graph 2 ($\chi 2 = 15.68$; $p<0.01$).

GRAPH 2. Kaplan-Meier curve for 'time to discharge'



DISCUSSION:

Measles is one of the commonest infectious diseases in infancy and childhood especially in developing countries and for long it has been the leading cause of mortality and morbidity. Epidemiological and clinical surveys indicate definite relationship of age to the incidence of measles. The incidence of measles is about 0.88% as per the present study.

Most of our patients were below 5 year age group. This is a significant finding suggesting measles being the commonest cause of under-5 morbidity and leading cause of mortality due to its various complications.

Maculopapular rash and fever which are mandatory criteria for diagnosis of measles according to WHO were present in all patients[3]. But pathognomic of measles i.e. koplik's spots was present in only 10 (8.6%) patients. It is an enanthema, so even if it is a pathognomic sign, in studies in community settings, it is difficult to rely upon to confirm diagnosis of measles.

Measles is one of the most excellent and interesting demonstrations of the interaction of nutrition and infection in a child. 73 patients (71%) in our study have associated PEM. Out of which 53(45.0%) had severe form of malnutrition (IAP grade III and IV) or severe acute malnutrition (SAM).

Complications are more common among children under 5 years of age[3]. In our study the maximum incidence of complications (84%) is seen among 1-5 years of age group. Post measles bronchopneumonia and pneumonia are quite common as was seen in our study where bronchopneumonia accounts for 41.2% of cases[4]. Otitis media is a frequent complication occurring approximately in 5-15% of reported measles cases [4]. This is correlating well with our study where 13.69% patients had otitis media. Diarrhea occurs in approximately 10% of persons with measles [4]. The incidence of diarrhea in our study is 27.11% which is almost double in amount.

Acute measles Encephalitis which occurs in approximately 1 to 2 of every 1000 cases of measles is a dreaded complication because of its high morbidity and high mortality[4]. 3 of our patients had acute measles encephalitis; all of them succumbed to this disease. Ulcerative keratitis, iritis and panophthalmitis are other uncommon complications which were fortunately not seen in any of our patients.

Case fatality rate in our study was 9.32%. Studies in India have shown median case-fatality ratio (CFR) of 3.8% (range: 0% to 30%) among children with measles[5]. Mortality was invariably higher among unimmunized patients. Unvaccinated young children are at highest risk of measles and its complications, including death[2]. In India measles is still considered an important contributor to child mortality and morbidity. The primary reason for continuing high measles morbidity and mortality is the failure to deliver at least one dose of measles vaccine to all infants. Strengthening routine immunization is the way to reduce measles associated mortality- still a killer.

Also adding a second dose at around 15 to 18 months in form of MMR vaccine will protect nearby 15% of children who exhibit primary vaccine failure[4] .

There was no case of measles reported in our hospital in the year 2015upto December end. This result may be due to the intensification of routine immunization that was done in the year 2012.Measles supplementary activities with second round of measles vaccine was done in a phasic manner in the whole Ahmedabad district. Accelerated immunization activities have had a major impact on reducing measles deaths[2] .

Also to find out true impact of this activity studies in community settings are required which is the major drawback in our study which is a hospital based study. *Significant

CONCLUSION:-

Measles is highly infectious vaccine preventable disease. The primary reason for continuing high measles morbidity and mortality is the failure to deliver at least one dose of measles vaccine to all infants. Strengthening routine immunization is the way to reduce measles associated mortality- still a killer.

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