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Spectrum of acute complications of measles in an associated hospital of Northern India

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Abstract

Background and Aims: Measles or Rubeola is an acute viral infection characterized by a final stage with a maculopapular rash erupting successively over the neck and face, trunk, arms, legs and accompanied by high fever. It is a highly contagious disease that results from infection with measles virus and is still responsible for more than 100 000 deaths every year, down from more than 2 million deaths annually before the introduction and widespread use of measles vaccine. The aim of this study was to assess the prevalence of acute complications of measles and relation of vaccine to the development of complications among the children between 6months to 5 years of age.

Material and Methods: A retrospective observational study was conducted in the Department of Pediatrics, Government Medical college and associated hospital ,Rajouri, Jammu and Kashmir , India with effect from february 2023 to May 2023 for a period of three months. This study includes 148 children aged between 6 months to 5 years admitted with measles. Detailed sociodemographic and clinical history, vaccination status, history of contact or exposure, whether vitamin A was given or not, was taken from the parents. Data was analysed and presented in tabulated and diagramatic forms.

Results: A total of 148 admissions of suspected measles cases were done in the Department of Pediatrics out of which 3(2.02%) deaths were reported. Of the 148 measles cases, 66.89% were males and 33.1% were females. The most commonly affected age group was 9 months to 2 years of age in both the sexes(51.35%). 28(18.91%) children belongs to urban area while rest belongs to rural areas. Vitamin A supplement was received by 50(33.78%) patients while 98(66.21%) has not received.67(45.27%) patients were vaccinated with MMR vaccine while 81(54.72%) were non vaccinated. The symptoms of measles were fever 148 (100%), cough119 (80.40%), conjunctivitis 87(58.78%), skin rash 142(95.94%), running nose 148(100%), and oral ulcers 138 (93.24%). However, 55(37.16%)patients developed acute complications i.e diarrhoea(23.63%), vomiting(23.63%), pneumonia(20%) , otitis media(12.72%) and encephalitis(7.27%). Among 55 acute complications, 16(29.09%) vaccinated children had developed complications while 39 (70.90%) children were non vaccinated. 145(97.97%) were recovered during hospitalization and 3(2.02%) resulted in death and all were non vaccinated. This study was statistically highly significant as p value is less than 0.05.

Conclusion: Most of the patients belongs to rural areas in our setup and parents councelling at the time of delivery of child regarding vaccination is the only way to aware them that how much it is important for their child. Routine Immunization of children needs to be strengthen to reduce the incidence of measles outbreak and mortality occuring due to severe complications.

Key words: Rubeola, Vitamin, Pnemonia, Skin Rash

Introduction

Measles is a highly contagious infection caused by the paramyxovirus of paramyxoviridae family and is transmitted through airborne respiratory droplets or by direct contact with upper respiratory tract secretions of infected individual [1]. After an incubation period of 8–12 days, the prodromal phase begins with a mild fever followed by the onset of conjunctivitis with photophobia, coryza, a prominent cough and increasing fever. The enanthem, Koplik's spots, is the pathognomonic sign of measles and appears 1 to 4 days prior to the onset of the rash [2,3]. Complications of measles affect most organ systems, with pneumonia accounting for most measles-associated morbidity and mortality. . Pneumonia, croup, tracheitis, and bronchiolitis are common complications in infants and toddlers with measles. Acute otitis media, sinusitis and mastoiditis also occur as complications 1 .

Diarrhea and vomiting are common symptoms associated with acute measles .Febrile convulsions occur in<3% of children affected with measles. Encephalitis occurs in 1-3 /1000 cases[2]. Myocarditis is a rare complication. The management of patients with measles includes provision of vitamin A. Measles is best prevented through vaccination, and the major reductions in measles incidence and mortality have renewed interest in regional elimination and global eradication. However, urgent efforts are needed to increase stagnating global coverage with two doses of measles vaccine through advocacy, education, and the strengthening of routine immunisation systems. Use of combined measles-rubella vaccines provides an opportunity to eliminate rubella and congenital rubella syndrome. Ongoing research efforts, including the development of point-of-care diagnostics and microneedle patches, will facilitate progress towards measles elimination and eradication[4]. The global measles vaccination program has been extraordinarily successful in reducing measles-related disease and deaths worldwide. Eradication of measles is feasible because of several key attributes, including humans as the only reservoir for the virus, broad access to diagnostic tools that can rapidly detect measles-infectious persons, and availability of highly safe and effective measles-containing vaccines (MCVs). All 6 World Health Organization (WHO) regions have established measles elimination goals. Globally, during 2000-2018, measles incidence decreased by 66% (from 145 to 49 cases per million population) and deaths decreased by 73% (from 535 600 to 142 300), drastically reducing global disease burden. Routine immunization with MCV has been the cornerstone for the control and prevention of measles. Two doses of MCV are 97% effective in preventing measles, qualifying MCV as one of the most effective vaccines ever developed. Mild adverse events occur in <20% of recipients and serious adverse events are extremely rare. The economic benefits of measles vaccination are highlighted by an overall return on investment of 58 times the cost of the vaccine, supply chains, and vaccination. Because measles is one of the most contagious human diseases, maintenance of high (≥95%) 2-dose MCV coverage is crucial for controlling the spread of measles and successfully reaching measles elimination; however, the plateauing of global MCV coverage for nearly a decade and the global measles resurgence during 2018-2019 demonstrate that much work remains. Global commitments to increase community access to and demand for immunizations, strengthen national and regional partnerships for building public health infrastructure, and implement innovations that can overcome access barriers and enhance vaccine confidence, are essential to achieve a world free of measles[5]. Measles infection can be diagnosed clinically and confirmed by a positive serologic test, including immunoglobulin (Ig) M antibody, a significant increase in measles IgG antibody or isolation of measles virus from clinical specimens, such as urine, blood, throat or nasopharyngeal secretions [6]. The present study was conducted to assess the prevalence of acute complications of measles and relation of vaccine to the development of complications among the children between 6months to 5 years of age.

Materials and Methods

A retrospective observational study was conducted in the Department of Pediatrics, Government Medical college and associated hospital ,Rajouri, Jammu and Kashmir , India with effect from february 2023 to May 2023 for a period of three months. A total of 148 patients of measles admitted with complications were studied. Detailed sociodemographic and clinical history, vaccination status, history of contact or exposure, whether vitamin A was given or not, was taken from the parents. Data was analysed and presented in tabulated and diagramatic forms. P value of 0.05 or less was regarded as statistically significant.

Results: A total of 148 admissions of suspected measles cases were done in the Department of Pediatrics out of which 3(2.02%) deaths were reported. Of the 148 measles cases, 66.89% were males and 33.1% were females. The most commonly affected age group was 9 months to 2 years of age in both the sexes(51.35%). 28(18.91%) children belongs to urban area while rest belongs to rural areas. Vitamin A supplement was received by 50(33.78%) patients while 98(66.21%) has not received. 67(45.27%) patients were vaccinated with MMR vaccine while 81(54.72%) were non vaccinated. The symptoms of measles were fever 148 (100%), cough119 (80.40%), conjunctivitis 87(58.78%), skin rash 142(95.94%), running nose 148(100%), and oral ulcers 138 (93.24%). However, 55(37.16%)patients developed acute complications i.e diarrhoea(23.63%), vomiting(23.63%), pneumonia(20%) , otitis media(12.72%) and encephalitis(7.27%). Among 55 acute complications, 16(29.09%) vaccinated children had developed complications while 39 (70.90%) children were

non vaccinated. 145(97.97%) were recovered during hospitalization and 3(2.02%) resulted in death and all were non vaccinated.

Table: 1 Sociodemographic profile of the patients

Gender	No. of patients	Percentage
Male	99	66.89%
Female	49	33.10%
Age Group		
6-9 months	18	12.1%
9months -2 years	76	51.35%
2years -5years	54	42.18%
Area of residence		
Urban	28	18.91%
Rural	120	81.08%

Table : 2 Symptoms developed during the disease

Symptoms	No. of patients	Percentage
Fever	148	100%
Cough	119	80.40%
Conjuctivitis	87	58.7%
Skin rash	142	95.94%
Running nose	148	100%
Oral ulcers	138	93.24%

Table :3 Vaccination status, history of exposure and vitamin A supplementation of the patient

		No. of patients	Percentage
Vaccination status	Vaccinated	67	45.27%
	Non vaccinated	81	54.72%
History of exposure	Family	102	68.91%
	Hospital	14	9.45%
	Unknown	32	21.62%
Vitamin A supplementation	Received	50	33.78%
	Not received	98	66.2%

Table: 4 Vaccination status with complications

Vaccination status	No. of patients	Percentage	No. of patients with complications	Percentage
Vaccinated	67	45.27%	16	(29.09%)
Non vaccinated	81	54.72%	39	(70.90%)

Table : 5 Vaccination status with mortality

Vaccination status	No. of patients(%)	Mortality
Vaccinated	67(45.27%)	0
Non vaccinated	81(54.72%)	03(2.02%)

Table: 6 Relation of the complications to vaccination status of the patients

Complications	Vaccination status	No. of patients	P value
Pneumonia	**Vaccinated**	**2**	X^2=7.655 P VALUE=0.003900
	Non vaccinated	**9**	
Otitis media	**Vaccinated**	**1**	X^2=3.544 P VALUE=0.03510
	Non vaccinated	**6**	

Encephalitis	**Vaccinated**	**0**	X^2=3.474 P VALUE=0.04283
	Non vaccinated	**4**	
Diarrhoea	**Vaccinated**	**3**	X^2=3.186 P VALUE=0.04240
	Non vaccinated	**10**	
Vomiting	**Vaccinated**	**9**	X^2=4.142 P VALUE=0.02597
	Non vaccinated	**4**	
Multiple complications	**Vaccinated**	**1**	X^2=2.983 P VALUE=0.05102
	Non vaccinated	**6**	

DISCUSSION

Measles was an inevitable infection during the human development with substantial degree of morbidity and mortality. The severity of measles virus (MV) infection was largely contained by the development of a live attenuated vaccine that was introduced into the vaccination programs[7]. Attenuated measles virus (MV) is one of the most effective and safe vaccines available, making it attractive candidate vector to prevent infectious diseases. Attenuated MV have acquired the ability to use the complement regulator CD46 as a major receptor to mediate virus entry and intercellular fusion[8].In measles endemic areas, breakthrough cases represent less than 10% of total infections, while in areas with high vaccination coverage these are over 10% of the total. Two different vaccination failures have been described: primary vaccination failure, which consists in the complete absence of humoral response and occurs in around 5% of vaccinated individuals; and secondary vaccination failure is due to waning immunity or incomplete immunity and occurs in 2-10% of vaccinees. Vaccination failures are generally associated with lower viral loads and milder disease (modified measles) since vaccination limits the risk of complicated disease. Vaccination failure seems to occur between six and twenty-six years after the last vaccine dose administration[9].This study has showed that children between 9 months to 2 years of age are affected more with measles, this may be due to lack of knowledge regarding immunization in rural areas of our set up. This agrees with Rice AL et al they found that most of affected children with measles are between one and two years [10]. Males were affected more than females in our study(62.5%) which was consistent with the study conducted by Wang et al [11]. Out of 148 patients that were admitted , 120 of them (81.08%) were form rural areas and 28(18.91%) were form urban areas, and 81 cases (54.72%) were not vaccinated for measles, this may be due to lack of awareness and low vaccination coverage in rural areas . Cherry et al studied patients in California and reported that 95.3% of measles patients presented Contact history was absent in 32 cases (21.62%) as measles can be transmitted in a considerable cases by air[12] ,while history of contact in hospital was 9.45% and most of the cases were of exposure in family (68.91%) which might be because of most of the people belongs to rural areas and of poor families living in small congested houses with poor ventilation. The most common complications were diarrhea and vomiting , occurred in two third of cases , (26 cases ,47.27%) followed by 11 cases pneumonia(20%) this is agreed with Deivanayagam N et al in India who found that most common complications that occur and for which patients seek for medical help were diarrhea and pneumonia [18] . Encephalitis occurred in 4 cases (7.27%) which doesn't agree with other studies which found that encephalitis as a complication of measles virus does not occurs more than one per thousand cases (0.1%) [19]. Other complications like otitis media occurred in 7 cases (12.72%) which almost agrees with the study done by Hamad KO who found that otitis media occurs in about(8.8 %) of cases[20]. The present study dshowed a mortality rate of 2.02 % among admitted children with measles. Mortality due to measles is reported to be very high in study conducted by Bai P et al[21] and nearly negligible in most of the studies[22]. In our study there was found a strong association between the vaccination and development of complications as p value is less than 0.05. It depicts that complications are very less in patients who have done vaccination and there is no mortality among them.

Conclusion: This study was statistically highly significant and depicts strong association between vaccination and development of complications of disease . Routine immunization of children is very important for the prevention and control of epidemic of a disease. Vaccination awareness compaigns and door to door vaccination should be done for the eligible age group as most of the population belongs to rural areas and farmers by occupation having least exposure to newer techniques in health research work in our set up. Mass immunization is very important to prevent the development of disease and complications which ultimately reduce the rate of mortality.

Conflicts of interest: Nil

Source of funds: Nil

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