ORIGINAL ARTICLE

MYOCARDITIS IN CHILDREN PRESENTING WITH MEASLES- DATA FROM A TERTIARY CARE HOSPITAL IN PAKISTAN

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ABSTRACT

Objectives: Measles is one of the most familiar contagious diseases in children associated with numerous systemic complications. The aim of this study is to find the frequency of Myocarditis in children suffering from measles.

Materials and Methods: This cross-sectional study was conducted in the department of pediatrics, MTI Lady Reading Hospital Peshawar from 6th December 2019 to 5th June 2020. Ninety-six patients of both genders and ages ranging from 1-12 years having measles for more than one week were enrolled in the study after informed consent. Ethical approval for the study was obtained from the Ethical Review Board. Patient demographic data were collected on a structured proforma and the frequency of children having clinical presentation of myocarditis was recorded. Data were entered and analyzed using SPSS 22.

Results: The frequency of Myocarditis was 7.3% in children presented with Measles. The mean age was 6.6± 3.06 years. There were 47.9% males and 52.1% females. Most patients belonged to middle socioeconomic status i.e. 61.5%. Maternal education was 49% in the 6-10 age group. In sampled population, 46.9% belonged to urban areas and 5.1% belonged to rural areas. There were 18.8% vaccinated children and 81.3% were not vaccinated for measles. Myocarditis was significantly associated with the younger age group (p-value 0.028), however, there was no difference in gender (p-value 0.781). Children with low socioeconomic status had significantly higher frequency (p-value 0.05) of myocarditis.

Conclusion: Myocarditis is commonly presented in children having measles especially patients in younger age groups and belonging to poor socioeconomic status.

Keywords: Children, Low socioeconomic status, Measles, Myocarditis

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INTRODUCTION

Measles is a contagious and rapidly spreading disease caused by the Measles virus. [1] It is a major public health problem and a leading cause of morbidity and mortality. [2] It is characterized by high fever associated with cough, coryza, and conjunctivitis. [3] Measles virus belongs to the family of Paramyxoviridae and genus Morbillivirus, which is a single-stranded, lipid-enveloped RNA virus. The virus enters the host body through the respiratory tract or conjunctivae by droplet aerosols from infected persons. [4-6] According to the World Health Organization (WHO), measles is the leading cause of childhood mortality with around 140,000 deaths annually where almost 95% occur in low-income countries with poor health infrastructure. [7] In a study conducted in Pakistan, 14000 measles cases were reported in 2021 with 210 patients dying of it. [5, 8, 9]. Measles infection is associated with many complications like bronchopneumonia, otitis media, encephalitis, diarrhea, croup, febrile seizures, and myocarditis. [10, 11]

Complications of measles are more likely to occur in persons younger than 5 years or older than 20 years, and complication rates are increased in persons with immune deficiency disorders, malnutrition, vitamin A deficiency, and inadequate vaccination. Immunocompromised children and adults are at increased risk for severe infections and super-infections. [12]

Myocarditis is the inflammation of the myocardium in association with myocellular necrosis and degeneration that is typically caused by a viral infection such as measles. It can either be focal or diffuse and can lead to cardiac dysfunction. [13] Previously published literature reported that complication of measles such as myocarditis is not rare in developing countries. where there is a high prevalence of malnourished and unvaccinated children. [14-16] Results of a recent study conducted by Hussain S et

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al. showed that myocarditis is present in 4.16% of the children infected with measles and 100% of the patients with myocarditis were malnourished and unvaccinated. [15]

The prevalence of measles is very high in Pakistan especially Khyber Pakhtunkhwa province [16]. There is a significant number of children who are unvaccinated and malnourished. [17] Hence, it is of great concern for healthcare professionals to estimate the prevalence of myocarditis in these children, which is a fatal complication. This would help the physicians to devise strategies for early diagnosis of such fatal complications. If study results showed a high frequency of myocarditis in children with measles, routine cardiac enzyme and ECG testing for myocarditis will be recommended. Prompt management of myocarditis in these children would result in a reduction in morbidity and mortality associated with it.

MATERIAL AND METHODS

This cross-sectional study was conducted in the Pediatrics department of Lady Reading Hospital Peshawar. The study duration was 6 months from December 6, 2019, to June 5, 2020. Prior to conducting the study, approval was taken from the hospital ethics committee. Patients were enrolled from the pediatric wards of Lady Reading Hospital, Peshawar. Informed written consent was obtained from all the parents/guardians. A total of 96 patients of both gender and age 1 month to 12 years having measles for more than one-week duration were included in the study because cardiac complications do not appear in the first week of infection. All the children underwent a complete history and clinical examination. Measles was diagnosed clinically if the child had a fever and a generalized maculopapular rash and was further confirmed by measles serological testing. X-Ray chest PA view was done. Twelve lead ECGs were recorded and blood samples were drawn for estimating the level of cardiac enzyme (troponin-I). All the demographic details including age, gender, vaccination status, parents' education, residence, socioeconomic condition, and study results were recorded using data collection proforma.

Data were entered and analyzed on computer software Statistical Package for Social Sciences version 22. Quantitative variables like age were measured as mean ± SD. Frequencies and percentages were calculated for all qualitative variables like gender, socioeconomic status, maternal education status, residential status, vaccination status, and myocarditis. Effect modifiers like age, gender, socioeconomic, maternal education, residential, and vaccination status were controlled by the stratification. Post-stratification chi-square test was applied and p-value ≤0.05 was considered as significant.

RESULTS

The demographic parameters of the study population including age, gender, socioeconomic status, vaccination status, and residence are summarized in table-1. Children in the upper age group were found more susceptible measles (52%) while younger children (1-6 years) had lower frequency (44%) of measles. A high percentage of myocarditis was observed in poor and middle-class children of less educated parents however children of highly educated and economically good families had lower frequency. However, no mortality was recorded due to myocarditis during the study duration. Stratification of myocarditis with respect to gender, age residence, vaccination status, socioeconomic status, and maternal education is

Table 1: Demographics of the study population (n=96)

Age Distribution	Number	Percentage
1-6 years	44	(45.8%)
7-12 years	52	(54.2%)
Gender		
Male	46	(57%)
Female	50	(43%)
Maternal Education		
≤ 5 years of education	24	(25%)
6-10 years of education	47	(49%)
11-12 years of education	19	(19.8%)
> 12yrs of education	6	(6.3%)
Socioeconomic status		
poor	30	(31.3%)
Middle class	59	(61.5%)
Rich	7	(7.3%)
Residence		
Rural	45	(46.9%)
Urban	51	(53.1%)
Vaccination status		
Vaccinated	18	(18%)
Unvaccinated	78	(82%)

Table 2: Stratification of myocarditis with respect to various parameters

Myocarditis	Age (1-6 : 7 -12)	Gender Male : Female	Vaccination status vaccinated : unvaccinated	Parent education ≤5yrs:6 10yrs:11 12yrs:>12yrs	Socioeconomic Status Poor : middle : rich	Residence Rural : urban
Present	6:1	3 : 4	1: 6	2:4:1:0	5 : 2 : 0	1 : 6
Not Present	38:51	43 : 46	17 : 72	22 : 43:18:6	25 : 57 : 7	44 : 45
p-value	0.028	0.781	0.75	0.86	0.05	0.07

given in table 2. Children under the age of 6 years and rural families were having myocarditis more than others.

Similarly, older children were having significantly more myocarditis however the results were non-significant for maternal education, residential status, and vaccination status as shown in table-2

DISCUSSION

The incidence of cardiac complications in children following measles is not well reported in the literature, however serious complications related to cardiac function such as myocarditis cannot be ignored. This study was carried out to look at the frequency of myocarditis in children presenting with measles.

In the present study, the mean age of study participants was 6.6± 3.06 years. There were more females (52.1%) than males. Most patients belonged to middle socioeconomic status i.e. 61.5 followed by poor class 31.3% and 7.3% belonged to the high class. Maternal education was 6-10 years of education in 49% of mothers and 25% of mothers had less than 5 years of education. In sampled population, 46.9% belonged to urban areas and 5.1% belonged to rural areas. Myocarditis was present in 7.3% of children. There were 18.8% vaccinated children and 81.3% were not vaccinated for measles. Data stratification for age was significant, myocarditis was significantly associated with the younger age group, p-value of 0.028 significant. Data stratification was not significant for gender, with a p-value of 0.781. Myocarditis was present in children belonging to the poor class, p-value of 0.05. Data stratification was not significant for maternal education, residential status, and vaccination status.

Similar results were published in a study from the Polish Journal of Microbiology, where 52% of patients were females, although their mean age was 15.06 (± 9.4) months, while 48 % were males with a mean age of 15.94 (± 9.7) months. [10] Similarly, the parents' educational status was assessed and 43% were uneducated, while 28% had secondary education and 22% had only primary education. As far as the socio-economic status of the patients is concerned, 50% belonged to low-income families, while 38% were from the middle class and 7% from the upper class. In male patients, myocarditis was present in 4.1% of patients and, in female patients' myocarditis was present in 1.9%, making a total frequency of 6% in the studied population which is close to our study.

A study conducted by Khan et al. showed that among 302 measles patients,180 (60%) were males, and 122 (40%) were females. The mean age of children was 26.8 months and the majority 138(45.69%) were between 1-3 years' age. They showed that myocarditis was present in 0.66% of children which is quite less than the present study. [18] This difference could possibly be due to the high vaccination frequency in their population as myocarditis is more common in the unvaccinated children. The population selected by Khan et al. were having high vaccination rate as compared to our study population so the rate of myocarditis was lower than our study.

CONCLUSION

Myocarditis affects the function of the heart and is a common complication of measles. It is especially present in patients of younger age groups and belonging to poor class socioeconomic status. Similarly, measles vaccination is important as myocarditis was more in un-vaccinated children.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under

Hussain M: Concept, Critical appraisal, and Discussion Writing

Irshad M: Data collection, compilation of results, formatting of the article

Adeeb H: Data Collection, Manuscript writing

Hayat M: Manuscript Writing, Bibliography

Ullah I: Overall compilation of the article

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.