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ORIGINAL ARTICLE

Frequency of Meningitis in Cases with a History of Getting the MMR Vaccine within the Past 45 Days

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ABSTRACT

To estimate the frequency of meningitis in cases having history of receiving the MMR vaccine in last 45 days.

Methodology: This observational research evaluated 100 cases of meningitis in the final 45 days after MMR vaccination. All children admitted to Madinah Teaching Hospital's Paediatric unit were included. Duration of study was 12 months from Feb 2021 to March 2022. All 9-43-month-old male/female patients of any socioeconomic level and location were examined for meningitis. Meningitis was classified as a CSF WBC pleocytosis of 5/mm3. Clinical data was compiled using parents', patients', and hospital records' information. In addition to the normal CSF investigation, all frozen CSF samples were tested for enteroviruses (EV) and mumps using PCR (culture, cell count, sugar, and protein).

Results: In our study, 57% of the cases were less than 24 months old, 43% were between 25 and 43 months old, 48% were male, and 52% were female. Meningitis incidence in patients with recent MMR vaccination was 5%.

Conclusion: We observed 5% of meningitis cases (9-43 months) occur within 45 days after the initial MMR immunization.

Keywords: Children, MMR Vaccine, meningitis

INTRODUCTION

Despite the fact that vaccines are one of the most effective and cost-efficient public health therapies to reduce mortality and morbidity, vaccine-preventable diseases claim the lives of more than one million children around the world every year. [1-3] In spite of the fact that the incidence of diseases that can be prevented by vaccination has decreased significantly over the past few decades as a direct result of increasing vaccination coverage, discrepancies in vaccination coverage continue to exist..[4-5]

Measles is one of those diseases that can be prevented with vaccinations, but it is also one of the most contagious.[6] The vaccination against measles is typically administered in two doses as part of a combination vaccine known as measles, mumps, and rubella (MMR), which is regarded as both safe and effective.[7] A vaccination coverage level of at least 95 percent with two doses is required[8-10] in order to achieve community-level immunity and eradicate measles. In addition to preventing measles infection, research has demonstrated that the measles-containing vaccine (MCV) is also related with a lower risk of death from any cause.[5,11]

After a prolonged period of stability, large-scale measles outbreaks developed in a number of WHO regions in 2018,[13] contributing to the year's total of more than 140,000 deaths around the world. [12] It has been suggested that these outbreaks were caused by insufficient vaccination rates in certain circumstances[14] or groups of unvaccinated individuals[15], both of which can occur even in countries with high vaccination rates. The measles remains a problem for the public's health, particularly in today's increasingly globalized society in which individuals travel more frequently.[16] According to research conducted over the previous decade, people in countries with high incomes as well as countries with low incomes have lost faith in a number of vaccines, particularly the vaccine against measles.[17-18] The Wakefield affair, in particular, which incorrectly connected the MMR vaccine to autism[19], was a contributing factor in the fall in faith in the measles immunization.

To boost vaccination rates and target interventions in clusters of unvaccinated individuals, it is necessary to comprehend the factors related with vaccination uptake.[20-21]. Previous research has found a number of variables that may affect measles vaccination. For instance, the maternal education level,[2,4,5,22-24], marital status,[2,25] socioeconomic position such as the wealth index,[1,4,23,26,27] and mass media exposure[15,28] were discovered.

As a result of concerns about vaccine safety and non-availability people have been avoiding vaccination in the last decade leading to multiple measles outbreaks in various regions including our country.[17,29] Like in Kazakhstan in 2015–2016 with 2341 cases of the disease where the majority of patients were either unvaccinated or didn't have adequate evidence of their vaccination status.[6] It is vital to understand the elements that are linked with vaccination uptake in order to achieve one's goal of increasing and maintaining a high vaccination coverage.

Similarly Rubella vaccine rate has also decreased given along with measles. Non-immunized female patients who intend to become pregnant should be vaccinated against the MMR virus at least one month in advance, according to current recommendations.[30-32] Vaccination with the MMR vaccination as post-exposure prophylaxis (PEP) is appropriate for some patients.[33] In a statewide monitoring study for MMR neurologic sequelae, the incidence of meningitis caused by the vaccination was found to be 15/100,000.[34]

This study was to learn more about how the mumps virus is linked to meningitis in infants and children by looking at cases that occur within 45 days after receiving the MMR vaccine.

METHODOLOGY

This observational study evaluated the incidence of meningitis in 100 cases having history of receiving the MMR vaccine in last 45 days. We included all children admitted to a Madinah teaching hospital pediatric unit. All suspicious male/female cases of age 9-43 months, any socioeconomic class and place of living were evaluated for meningitis. All patients with postoperative, posttraumatic, or carcinomatous meningitis were eliminated from this survey. The treatment or intervention was given to confirmed participants of meningitis. Meningitis was defined in this study as white blood cell (WBC) pleocytosis in the cerebrospinal fluid (CSF) greater than 5/mm3. Direct information from parents, patients, and hospital records was used to compile clinical data. All frozen CSF samples underwent polymerase chain reaction (PCR) testing for enteroviruses (EV) and mumps in addition to the standard CSF examination (culture, cell count, sugar, and protein).

RNA detection kit was used, and the extraction of nucleic acid was carried out in accordance with the instructions provided by the manufacturer and PCR was performed in volume of 25 µl. These kits provide an easy-to-use, pre-configured RT-PCR method

for detecting mumps and EV in a real-time PCR setting. One-step real-time RT-PCR is used to perform the reaction. Fluorescent quencher BHQ1 is used in fluorimeter channel FAM for the detection of amplified DNA fragments from mumps and enteroviruses. Both positive and negative controls were utilised during the reactions. During the study period, several preschoolers were still getting their second MMR injection, recommended giving the vaccine at 12 months of age and again at 18 months.

RESULTS

According to the findings of this study, 57 (57%) of the cases were less than 24 months old, 43 (43%) of the cases were between 25 and 43 months old, 48 (48%) of the cases were male, and 52 (52%) of the cases were female. Most of the cases, or 49 (49%) of them, belong to a low socioeconomic class, followed by a middle class, or 37 (37%) of the cases, and only 14 (14%) of the cases had an upper class of socioeconomic, 62%(62) were urban area residents whereas 38(38%) were rural population. The frequency of incidence of meningitis in cases having history of receiving the MMR vaccine in last 45 days was 5(5%).

Table 1:

Particulars	No. of patients	%
Age		
Upto 24 months	57	57
25-43 months	43	43
Gender		
Male	48	48
Female	52	52
SES		
Poor	49	49
Middle	37	37
Upper	14	14
Residential Area		
Urban	62	62
Rural	38	38

Table 2: Frequency of Meningitis in Cases Having History of Receiving the MMR Vaccine in Last 45 Days

Particulars	Yes(%)	No(%)	P value
Age			
Upto 24 months	3	54	0.88
25-43 months	2	41	
Gender			
Male	2	46	0.71
Female	3	49	
SES			
Poor	2	47	0.88
Middle	2	35	
Upper	1	13	
Residential Area			
Urban	4	58	0.39
Rural	1	37	

DISCUSSION

Vaccine-preventable infections kill more than one million children every year around the globe. This occurs despite the fact that vaccinations are one of the most effective and cost-efficient public health therapies to decrease mortality and morbidity. In spite of the fact that the incidence of illnesses that may be prevented by vaccination has significantly decreased over the last several decades as a direct consequence of increasing vaccination coverage, there are still discrepancies in the vaccination coverage that remain.

By examining instances that take place within 45 days after getting the MMR vaccination, the purpose of this research was to gain a better understanding of the mechanism by which the mumps virus is associated with the development of meningitis in babies and young children.

In our study, the frequency of incidence of meningitis in cases having history of receiving the MMR vaccine in last 45 days was 5(5%). A retrospective research authored by Mamishi and carried out at Children's Medical Center (Tehran) is the only study that has been published on the subject of virologically proven MMR meningitis in Iran.[35] They had 481 instances of meningitis over the course of seven years (2006-2012), of which 125 (27%) were aseptic. Furthermore, the PCR of CSF samples from 49 of those 125 cases tested positive for the mumps virus. After receiving the MMR vaccine, symptoms of post-MMR meningitis might appear anywhere between 10 and 33 days later. In that particular research, the annual incidence of aseptic meningitis linked to the MMR vaccine ranged from 0.2 per 1,000 to 1 per 1,000 over the years.[35]

There were no reports of aseptic meningitis, encephalitis, or convulsions found in any of the 453,119 children who received the MMR vaccination manufactured by Serum Institute of India in a recent case-control study that was carried out in Egypt. This vaccine is also used in Iran. This is in line with the results of a research that was carried out in Iran that was quite similar to this one and found that there were no incidences of aseptic meningitis, encephalitis, or convulsions. The design of the research was based on the participation of parents in the recording of adverse events for a period of up to 42 days after immunisation. The author of the article's correspondent, who is also an employee of the firm that manufactures vaccines, has theorised that the strain of the measles vaccine known as Leningrad-Zagreb (L-Z) that is utilised by many manufacturers may have been altered over the course of time. This approach may help to explain the disparity between these current results in Egypt and previous research (conducted in 1990 and prior), which revealed that the incidence of post-LZ vaccination meningitis ranged from 1 case per 900 doses in Japan to 1 case per 120,000 doses in France.[36-39]

Finally, strong epidemiologic evidence in support of mumps vaccine caused meningitis may be found in the disproportionate rise of aseptic meningitis that occurred following the initial MMR vaccination. To have a better understanding of the prevalence of post-MMR meningitis in our country, more research is necessary. In order to improve the accuracy of the diagnosis of mumps meningitis, we suggest that future research also make use of samples of oral secretions in addition to CSF.

CONCLUSION

This study aimed to clarify the mechanism by which the mumps virus is linked to the development of meningitis in newborns and young children by analysing cases that occur within 45 days of receiving the MMR vaccine. Children between the ages of 9 and 43 months old had a 5% increased risk of contracting meningitis within 45 days after receiving their first MMR vaccine. Further literature reviews should be written and survey should be done in this regard. Limitation of this was that it is a single center data, study should be carried out at multiple other centers with a larger sample size and large scale data to reach a conclusion.

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