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Original Research Article

A STUDY OF CLINICAL PROFILE AND SHORT TERM OUTCOME OF MULTISYSTEM INFLAMMATORY SYNDROME IN CHILDREN

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ABSTRACT

Background: Since its discovery in China in late 2019, SARS-CoV-2 has fastly spread worldwide, with significant outbreaks around the world. Multisystem Inflammatory Syndrome in Children (MIS-C), first identified in kids and young adults in April 2020, is likely to be related to SARS-CoV-2 infection. It is characterized by high fever and a range of symptoms affecting multiple organs. Diagnosis involves considering various criteria rather than a single test, and early diagnosis is crucial for timely treatment. The objective is to Study a)The Clinical profile and b)short term outcome of Multisystem inflammatory syndrome in children until 6 weeks follow up.

Materials and Methods: All children aged upto 14 years of age admitted in Pediatric department of Jubilee Mission Medical College, Thrissur who fulfill the diagnostic criteria of MISC were enrolled after getting informed consent from their parents/guardian till sample size is achieved. Detailed history were taken, and clinical examination including general physical examination, relevant anthropometry and system examination were done and noted as per the proforma. Investigation reports and treatment protocol were noted. Patient was followed until 6 weeks after discharge. Those who lost to follow up were excluded from the study.

Results: This study investigated the impact of Children's Multi systemic Inflammatory Syndrome (MIS-C) among 42 children, predominantly aged 1 to 5 years, with a male majority. Cutaneous and gastrointestinal symptoms were most common, followed by respiratory and neurological symptoms. Half of the children had a history of COVID- 19, and most were fully immunized. Inflammatory markers were elevated in all cases, with anemia, leucocytosis, and thrombocytopenia being common. Electrolyte imbalances, particularly hyponatremia, were also noted.

Conclusion: MISC presents a novel challenge, particularly in communities with specific KD characteristics. Its significant cardiac impact at onset, coupled with the need for immunomodulatory treatments and frequent intensive care, is a cause for concern. While short-term outcomes are positive, with low mortality and recovery from cardiac problems, long-term effects remain understudied. Further research is crucial to understand MISC's pathophysiology and prognosis, and clinical trials are needed to establish optimal treatment strategies.

Keywords: Misc, clinical profile, treatment, outcomes, steroids, IVIG.

INTRODUCTION

Since it was originally discovered in China in late 2019, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection has spread quickly throughout the world. It is unknown if the low detection rate in kids is because the disease is primarily silent or mild. Previous studies of Covid infection suggested that young kids were disproportionately spared from infection.[1-3]

The phrase "multisystem inflammatory syndrome in children" (MIS-C) refers to a novel syndrome that first appeared in kids and adolescents in the later part of April 2020. It is most likely related to an infection with SARS-CoV-2.[4]

It is linked to high grade fever and a range of symptoms affecting different body systems. The criteria for diagnosis are taken into consideration rather than relying solely on a single test for the diagnosis. In order to start a specific treatment, an early diagnosis is crucial. It will not only prevent the long term mortality but significantly reduce the long term sequelae especially involving the cardiovascular systems.[5]

Here we are studying regarding clinical profile and short term outcome of MIS-C. (1) MIS-C presents a serious risk to children's health and could have dire consequences. MISC being a relatively newly described clinical syndrome with an onset of SARS COV- 2 pandemic, early diagnosis and successful treatment for MIS-C may be a challenge at times. This study attempts to improve understanding of the clinical profile and short-term consequences of the condition. When MISC first emerged, it was regarded as a devastating illness. However, better results have been observed as the disease's understanding has grown. The numerous therapy options for this and their results are the main topics of this study.

MATERIALS AND METHODS

It was a Prospective study conducted for a period of 18 months in Paediatric department of Jubilee Mission Medical College and Research Institute, Thrissur among Children aged upto14 years admitted in Pediatric department of Jubilee Mission Medical College, Thrissur with the diagnosis of MISC.

Sample size: Based on the proportion of clinical outcome and sociodemographic factors observed in an earlier publication of Multisystem Inflammatory Syndrome in U.S. Children and Adolescents conducted on June 29, 2020 in the New England journal of medicine, with 95% confidence level and 20 percent relative allowable error, minimum sample size comes to 42.[4]

n=(Z1-α/2)2p.q/d2

WhereZ1-α/2=1.96,p=0.7,q=1-0.7 =0.30, d=20%ofp

N= 1.96 x 1.96 x 0.7 x 0.3/ 0.14 x

0.14= 42

Sampling method–Consecutive sampling

Inclusion criteria

All children up to 14 years old who were admitted to the Pediatric Department at Jubilee Mission Medical College and meet the diagnostic criteria for MIS-C

Exclusion criteria

Children who were lost to follow-up.

Children whose parents did not give consent for participation in the study.

Sampling procedure

All children up to 14 years of age admitted to the Pediatric Department at Jubilee Mission Medical College, Thrissur, who meet the diagnostic criteria for MIS-C were enrolled in the study upon receiving informed consent from their parents or guardians, until the required sample size is reached. A comprehensive history was recorded, along with a thorough clinical examination, including general physical assessment, relevant anthropometric measurements, and system evaluations, as specified in the study protocol. Investigation results and treatment plans were documented. Patients were monitored for up to six weeks following discharge. Those who are lost to follow- up were excluded from the study.

Data collection procedures

Institutional Ethics and Research committee approval was sought. This study was carried out in Jubilee Mission Medical College, Thrissur for a period of 18 months. Patients admitted in Pediatric department of Jubilee Mission Medical College, Thrissur during the study period meeting inclusion criteria was enrolled after obtaining informed consent from a parent/legal guardian.

Relevant history was taken from the patient and bystanders by direct interview, clinical examination was done and noted as per the proforma.

The investigation reports and treatment protocol was collected from case sheets. The patients were followed up until 6 weeks in the OPD and the relevant data was noted.

Outcome measurement

Outcome were measured by the following ways:

1. Complete cure without any systemic complications at the time of discharge
2. Complete cure of the complications at 6 weeks follow up
3. Presence of sequelae at 6 weeks follow up.
4. Death

Data entry and analysis: To study the clinical profile and outcomes of MIS-C, frequency and percentage was used for categorical variable and mean and standard deviation for numerical variable.

Ethical considerations: Prior approval was obtained from the ethics committee of our institute and a written informed consent from all patients in their mother tongue. Participant information sheet were given to all the study subjects in their native language informing them about the procedure involved also making them aware that they can withdraw from the study any time they want and that this study would in no way influence their management in the hospital. All data collected was kept strictly confidential.

RESULTS

In this study, the average age was 3.852 with standard deviation 2.663. The minimum and maximum age was 2 months and 10 years respectively. Around 66 percent of the children with MISC were males in this study. Most of the children with MISC had cutaneous symptoms followed by Gastrointestinal symptoms followed by others which mainly included respiratory

and nervous system. 50 percent of the children had history of covid. In this study, the average duration of stay was 5.310 days with standard deviation 0.715. The minimum and maximum duration of stay was 4 and 7 days respectively. In this study, the average duration of stay was 5.310 days with standard deviation 0.715. The minimum and maximum duration of stay was 4 and 7 days respectively.

Table 1: Demographic details and COVID history

Parameter	Category	Frequency	Percent
Age	< 1 Year	8	19.0%
	1 – 5 Years	23	54.8%
	6 – 10 Years	11	26.2%
Gender	Male	28	66.7%
	Female	14	33.3%
Symptoms	Cutaneous	31	73.8%
	GIT	28	66.7%
	Others	16	38.1%
History of COVID	No	21	50.0%
	Yes	21	50.0%
Immunization	Fully Immunised	32	76.19%
	Partially Immunised	7	16.6%
	Unimmunised	3	7.14%
Duration of Stay	4 Days	4	9.5%
	5 Days	23	54.8%
	6 Days	13	31.0%
	7 Days	2	4.8%

Table 2: Association between CVS abnormality and Outcome in children with MISC

Outcome	CVS		p - value
	Absent	Present	
Complete Cure without Systemic Complications	24 (68.6%)	0 (0.0%)	0.000
Complete Cure of Complications at 6 Weeks Follow up	10 (28.6%)	3 (42.9%)	
Presence of Sequelae at 6 Weeks Follow up	0 (0.0%)	4 (57.1%)	
Death	1 (2.9%)	0 (0.0%)	

Here the p-value is less than the significance level 0.05; the association between CVS and outcome is significant. The table shows that the cases with complete cure without systemic complications are significantly higher in cases with no CVS (68.6%) compared to the cases with CVS (0.0%).

Table 3: Association between PT/APTT/INR and Outcome

Outcome	PT/APTT/INR		p - value
	Normal	Increased	
Complete Cure without Systemic Complications	22 (95.7%)	2 (10.5%)	0.000
Complete Cure of Complications at 6 Weeks Follow up	1 (4.3%)	12 (63.2%)	
Presence of Sequelae at 6 Weeks Follow up	0 (0.0%)	4 (21.1%)	
Death	0 (0.0%)	1 (5.3%)	

Here the p-value is less than the significance level 0.05; the association between PT/APTT/INR and outcome is significant. The table shows that the cases with complete cure without systemic complications are significantly higher in cases with normal PT/APTT/INR (95.7%) compared to the cases with increased PT/APTT/INR (10.5%).

Table 4: Association between IVIG and Outcome

Outcome	IVIG		p - value
	Not Received	Received	
Complete Cure without Systemic Complications	20 (100.0%)	4 (18.2%)	0.000
Complete Cure of Complications at 6 Weeks Follow up	0 (0.0%)	13 (59.1%)	
Presence of Sequelae at 6 Weeks Follow up	0 (0.0%)	4 (18.2%)	
Death	0 (0.0%)	1 (4.5%)	

Here the p-value is less than the significance level 0.05; the association between IVIG and outcome is significant. The table shows that the cases with complete cure without systemic complications are significantly higher in cases with IVIG was received (100.0%) compared to the cases with IVIG was not received (18.2%).

Table 5: Association between Aspirin and Outcome

Outcome	Aspirin		p – value
	Not Taken	Taken	
Complete Cure without Systemic Complications	16 (100.0%)	8 (30.8%)	0.000
Complete Cure of Complications at 6 Weeks Follow up	0 (0.0%)	13 (50.0%)	
Presence of Sequelae at 6 Weeks Follow up	0 (0.0%)	4 (15.4%)	
Death	0 (0.0%)	1 (3.8%)	

Here the p-value is less than the significance level 0.05; the association between aspirin and outcome is significant. The table shows that the cases with complete cure without systemic complications are significantly higher in cases with aspirin taken (100.0%) compared to the cases with aspirin not taken (30.8%).

DISCUSSION

Children's multisystemic inflammatory syndrome (MIS-C) is a devastating and sometimes lethal disease that often presents as a cytokine storm that affects multiple organs widely.[6,7] Fever, gastrointestinal symptoms, rash, conjunctivitis, cardiac and renal dysfunction, shock, and coagulopathy are among the symptoms of MIS-C; some are severe enough to need intensive care unit therapy.[8]

Since the start of the COVID-19 pandemic, there has been a noticeable increase in MIS- C cases worldwide, and a temporal correlation between the two entities has been theorized. MIS-C has been linked to the COVID-19 virus and has been observed in children two to four weeks following the start of the infection.[10] Here in this study we took total population of 42 children. Most of the children were in the age group of 1 to 5 years, and the minimum and maximum age was 2 years and 10 years respectively. 66 % of the children were males and the others were females. Cutaneous symptoms predominated followed by Gastro intestinal symptoms and others which mainly included Respiratory and neurological symptoms. Cutaneous symptoms like rashes (maculopapular, gastrointestinal like vomiting, diarrhea, abdominal pain, respiratory like cough, rhinitis, and neurological like headache, seizures. 50 percent of the children had history of covid. 76 % of the children were fully immunized, 16 % of them were partially immunized and 7 % of them were unimmunized. None of them received covid vaccine. Findings similar to studies conducted in different regions.[11-13]

Ventricular dysfunction and arrythmias were the main findings. Among investigations All had high inflammatory markers like ESR, CRP, D Dimer (100 %), Followed by anemia in 95 percent of the cases and leucocytosis in 92 % of the cases. Thrombocytopenia was found in 78 % of the cases.[14] Coagulation profile was deranged in 45 % of the cases and trop I elevated in 40 % of the cases. Electrolyte imbalances were seen in many, mainly in the form of hyponatremia (40 %) and hypokalemia in some. Other abnormalities included hypocalcemia, Increased Pro calcitonin and ferritin in some. All the children were Covid Antibody positive. Regarding treatment most of them were treated with Antibiotics and steroids (92 %) each. 61 Percent received Aspirin and 52 % received IVIG. Coming to the outcomes – 57 % of them had complete cure without systemic complications. 31% had complete cure of complications at 6 weeks follow up. Presence of sequelae were seen in 9.5 % of the cases and one death was noted. The average duration of stay of these children were 5.3 days. An association was found between CVS abnormalities and outcomes of the children (p value< 0.05). Complete cure without systemic complications were significantly higher in Children without CVS complications. (68 %). An association was found between coagulopathy and outcome; p value (< 0.05). Complete cure without any complications were higher (95 %) in children without any coagulopathy.[15,16]

Also significant association was seen in Children Who received IVIG and aspirin than the ones that didn't receive in the form of better cure rate. (p-value < 0.05).

The study has few limitations as follows:

Differences in treatment protocols and approaches between institutions can lead to variability in outcomes and complicate comparisons. Missing or incomplete medical records may impact the quality and comprehensiveness of the data. This study is restricted to hospital admissions. Limited data is available on this topic as it is a upcoming disease entity.

CONCLUSION

Primarily in widespread communities with distinctive KD traits, MISC is a very new and emerging challenge. The substantial cardiac involvement of MISC at presentation, along with the necessity for immunomodulatory medication and recurrent intensive care, raises concerns. Despite a paucity of information regarding long-term problems in the literature, short-term outcomes appear to be good, with low mortality rates and recovery from heart dysfunction. In particular, further research is required to assess the pathophysiology and prognosis of MISC, and clinical trials are necessary for determining the best course of treatment.

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