International Journal of Science and Healthcare Research
Vol.7; Issue: 1; Jan.-Mar. 2022
Website: ijshr.com
Original Research Article *ISSN: 2455-7587*

Management of Multisystem Inflammatory Syndrome in Children (MIS-C) Admitted in a Tertiary Care Hospital of North India

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DOI: https://doi.org/10.52403/ijshr.20220117

ABSTRACT

Background: Multisystem inflammatory syndrome in children (MIS-C), while being rare and treatable, is the dreadful and mysterious face of the COVID-19 pandemic among children. This study aimed to describe, Management among children admitted as Multisystem Inflammatory Syndrome in Children (MIS-C) in Indira Gandhi Medical College, Shimla in Northern India.

Material & Methods: We conducted a cross sectional study of MIS-C from January to July 2021, in pediatric ward of Indira Gandhi Medical College Shimla in Himachal Pradesh. All children admitted with MISC were included. Data regarding socio-demographic factors& management was extracted and analyzed using Epi Info V7 software.

Results: In the present study, a total of 31 children admitted as MIS-C were included. Mean age of these patients was 7.12±4.78 years. Among the total 16(51.6%) were males while 15(48.4%) were females. In the present study, 24 (77.4%) patients were given IVIG, among these 22(91.67%) received 2 gm/kg while 2(8.33%) received between 1-2gm/kg. 10(32.3%) children received low dose methylprednisolone, 21(67.7%) received, methylprednisolone in high doses. low molecular weight heparin (LoMoH) was given to 17(54.8%) patients. 23 (74.2%) were given Aspirin, among these 21 (91.30%) were given adequate doses, while 2(8.70%) were given between half to full doses of aspirin. Only 1(3.2%) patient had drug reaction and that was fever. Respiratory support was given to 25(80.6%), Oxygen to 18(58.1%), ventilatory support was required by 7(22.6%) and inotropic support was given to 18 (58.1%) children.

Conclusion: Besides symptomatic treatment, IVIG, Methylprednisolone, Aspirin, LoMoH, O_2, respiratory support and inotropic support were the most important components of management. Comprehensive studies are required to understand the pathogenesis of MIS-C and determine the treatment regimens clearly.

Keywords: Management, Multisystem Inflammatory Syndrome in Children (MIS-C), Inotropes, Respiratory support, IVIG

INTRODUCTION

Multisystem inflammatory syndrome in children (MIS-C), while being rare and treatable disease, is the ugly and mysterious face of the COVID-19 pandemic especially for children. MIS-C is thought to be a post-infectious (SARS-CoV2) hyper-inflammatory illness secondary to a delayed immune response, besides a complete obscurity. The increasing number of MIS-C cases and new case series reports around the globe show that MIS-C is more common than initially thought.[1,2]

Some researchers suspected that MIS-C is caused by a delayed and abnormal immune response to the COVID-19 that somehow goes into overdrive, causing

inflammation that causes damage to various organ systems. Since only a small number of children and adolescents develop MIS-C, it is possible that there are certain genetic factors that make these children susceptible. Physicians use medicines such as intravenous immunoglobulin, steroids and other anti-inflammatory drugs to reduce the inflammation and protect the heart, kidneys and other organs from damage.[3,4]

Children who suffered from MIS-C needed to be hospitalized and needed specialized care. Some will need to receive care in the pediatric intensive care unit also. Characterizing its epidemiology, spectrum of illness, clinical course, treatments, and prognosis of MIS-C is important key for reducing morbidity & mortality.[5,6]

We have experienced that MIS-C patients can present with similar but also with different and unique characteristics. Therefore, the level of knowledge& awareness of all physicians, especially those dealing with pediatric patients, about MIS-C should be increased.[1,7]

To date, there is limited evidence to establish the optimal therapeutic approach to a child with MIS-C. Comprehensive studies are very much needed to understand and determine the treatment regimens clearly. There is a paucity of data regarding Management of MIS-C in this hilly region. Against this backdrop, the study was conducted to describe Management among children admitted as a case Multisystem Inflammatory Syndrome in Children (MIS-C) in Indira Gandhi Medical College, Shimla.

Aims & objectives

To evaluate the Management of multisystem inflammatory syndrome in children (MIS-C)

MATERIAL & METHODS

This was a descriptive, cross-sectional institution-based study, conducted in IGMC, Shimla, in the Department of Pediatrics. The study was done on all children admitted with a diagnosis of MIS-C, in the pediatric department, between January 2021 to July2021. Ethical clearance was obtained from the concerned authorities of Indira Gandhi medical College, Shimla.

The data was collected from the record files of admitted children, compiled and entered in MS Excel, and analyzed using appropriate statistical tools in software Epi info V7 by applying appropriate statistical test in terms of frequencies and percentage

Operational definition for a case of MIS-C[5]

Children and adolescents 0-19 years of age with fever > 3 days

AND two of the following:

a. Rash or bilateral non-purulent conjunctivitis or muco-cutaneous inflammation signs (oral, hands or feet).
b. Hypotension or shock.
c. Features of myocardial dysfunction, pericarditis, valvulitis, or coronary abnormalities (including ECHO findings or elevated Troponin/NT-proBNP),
d. Evidence of coagulopathy (by PT, PTT, elevated d-Dimers).
e. Acute gastrointestinal problems (diarrhoea, vomiting, or abdominal pain).

AND

Elevated markers of inflammation such as ESR, C-reactive protein, or procalcitonin.

AND

No other obvious microbial cause of inflammation, including bacterial sepsis, staphylococcal or streptococcal shock syndromes.

AND

Evidence of COVID-19 (RT-PCR, antigen test or serology positive), or likely contact with patients with COVID-19.

RESULTS

In the present study a total of 31 children were diagnosed and admitted as a case of multisystem inflammatory syndrome in children (MIS-C) in the pediatric ward of Indira Gandhi Medical College Shimla in Himachal Pradesh between Jan 2021- July 2021.

Table-1: Socio-Demographic variables of MISC-C patients

		Frequency	Percent
Age Group	0-5	12	38.7
	6-10	10	32.3
	11-15	8	25.8
	15-19	1	3.2
Mean age		**7.12±4.78 years**	
Gender	Male	16	51.6
	Female	15	48.4
Rural/Urban	Rural	29	93.5
	Urban	2	6.5
Total		**31**	**100.0**

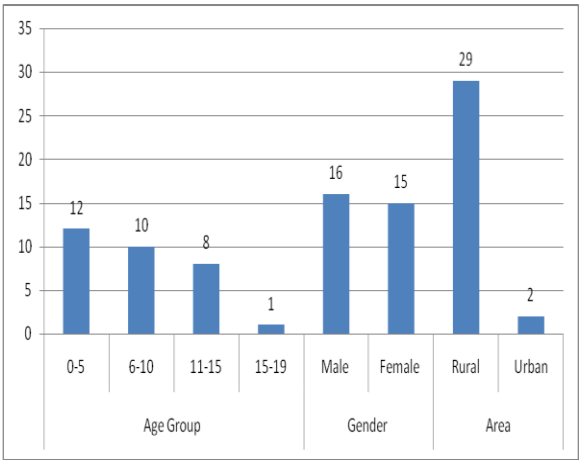

Figure -1: Socio-Demographic variables of MISC-C patients

In the present study age of the children diagnosed as multisystem inflammatory syndrome in children (MIS-C) was 7.12±4.78 years. Maximum 12 (38.7%) were of age group 5-10 years followed by 10 (32.3%) of age group 6-10 years, 8 (25.8%) of 11-15 years and 1 (3.2%) of 15-19 years age group. among the total 16(51.6%) were males while 15(48.4%) were females.29 (93.5%) were belonged to rural area while 2(6.5%) to urban area. (Table-1)(Figure-1)

In the present study, out of the 31 diagnosed cases, 24 (77.4%) children received IVIG, of these 22(91.67%) were given IVIG in a dose of 2 gm/kg while 2(8.33%) patients were given dose between 1-2gm/kg. Of the total 31 patients, 10(32.3%) received low dose methylprednisolone, while 21(67.7%) children were given high doses of methylprednisolone. Low molecular weight heparin (LoMoH) was given to 17(54.8%) children of the total diagnosed cases. In the study 23 (74.2%) children received aspirin among these 21 (91.30%) were given adequate dose of aspirin while 2(8.70%) patients were given between half to full doses of aspirin. In the study, only 1(3.2%) patient had drug reaction and that drug reaction was in the form off ever. (Table-2)

Table-2: Various Treatment Modalities

		Frequency	Percent
IVIG	Yes	24	77.4
	No	7	22.6
TOTAL DOSE N=24)	2gm/kg	22	91.67
	1-2gm/kg	2	8.33
METHYLPRED	High doses	21	67.7
	Low	10	32.3
LOMO	Yes	17	54.8
	No	14	45.2
ASPRIN	Yes	23	74.2
	No	8	25.8
DOSE N=23)	Adequate	21	91.30
	Half to full dose	2	8.70
DRUG REACTION	Yes	1	3.2
	No	30	96.8
DETAILS of DRUG REACTION	No drug reaction	30	96.8
	Fever	1	3.2

In the present study, 25 children (80.6%) required some form of Respiratory Support, like Oxygen therapy was given to 18(58.1%) and, 7 (22.6%) required ventilator support, on the other hand, circulatory support in the form of inotropic support was required by 18 (58.1%) children.(Table-3)

Table-3: Cardio-Respiratory Support Measures

		Frequency	Percent
Respiratory Support	Yes	25	80.6
	No	6	19.3
O2 Requirement	Yes	18	58.1
	No	13	41.9
Ventilatory Support	Yes	7	22.6
	No	24	77.4
Inotropic Support	Yes	18	58.1
	No	13	41.9

DISCUSSION

It has been observed in this study, that only a small number of children seem to develop signs and symptoms of MIS-C, and most of them recoveredquickly.[3,8]

In the present study, a total of 31 children diagnosed and admitted as a case of multisystem inflammatory syndrome in children (MIS-C) were included. Mean age of these patients was 7.12±4.78 years. Among the total, 16(51.6%) were males while 15(48.4%) were females29 (93.5%) belonging to rural area while 2(6.5%) to Urban area. Mean weight of the participants were 20.11±11.60Kg.

In our study, 24 (77.4%) children received IVIG, among these 22(91.67%) were given dose of 2 gm/kg while only 2(8.33%) were given dose between 1-2gm/kg. Of the total of 31 diagnosed MIS-C cases, 10(32.3%) were given low dose methylprednisolone, 21(67.7%) were administered high doses methylprednisolone. Low molecular weight heparin (LoMoH) was given to 17(54.8%) children. In this study 23 (74.2%) received Aspirin among these 21 (91.30%) were given adequate dose of aspirin while 2(8.70%) patients were given between half to full doses of aspirin. Only 1(3.2%) patient had drug reaction and that drug reaction was fever. Respiratory support was given to 25(80.6%) children, Oxygen support was given to 18(58.1%), ventilatory support was required by 7(22.6%) and inotropic support was given to 18 (58.1%) patients. Similar results were observed in the studies done by Levi Hoste et al[9], Fouriki A et al[7], Leora R et al[10] and M. Ahmed et al[11].

Depending on the child's sign and symptoms, and laboratory test results, treatment may include steroids to help reduce the inflammatory effects, Intravenous immune globulin (IVIG), a "biologic" immunomodulator, intravenous fluids, cardiac support in the form of inotropes or low-dose aspirin.[12,13]

A comprehensive comparison of organ involvement in MIS-C in children and adolescents, including the timing of resolution of cardio-respiratory dysfunction, could help in refining the MIS-C case definition to improve the specificity for using immune therapies, diagnostic testing, and follow-up.[6,14]

The spectrum of clinical manifestations and severity of MIS-C is very wide. Although the early effects of MIS-C are known but we still don't have enough data about the long-term consequences. Since the currently available information, along with the ability of the virus to mutate easily, the changing response to the available treatment, does not allow us to formulate well-established guidelines or recommendations for MIS-C treatment, comprehensive studies are very much needed to understand the pathogenesis of this disease and determine the treatment regimens moreclearly.[4,14]

CONCLUSION

Besides, the usual symptomatic treatment, IVIG, Methylprednisolone, aspirin, LoMoH, O_2 support and inotropic support were the essential components in the management of MIS-C patients. Prompt recognition and timely intervention are crucial to achieve good outcomes. Comprehensive studies are required to understand the pathogenesis of the disease and determine the treatment regimens clearly, especially with the emergence of newer mutant variants. Thus, the final decision about the optimal management should be taken by the treating physician, based on the clinical characteristics and severity of each & every individual patient.

Limitations

Present study was a cross sectional study that includes all MIS-C patients admitted during the study period in IGMC Shimla. It describes the clinical experience on a small group of patients (observational, descriptive research design), contains socio-demographic& clinical information about them. The patients were treated in the order in which they were identified, without a

group control. Also, the present study describes the observations from only one health center.

Acknowledgement: None

Conflict of Interest: None

Source of Funding: None

Ethical Approval: Approved

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How to cite this article: Sharma R, Sood A, Kumar P et.al. Management of multisystem inflammatory syndrome in children (MIS-C) admitted in a tertiary care hospital of North India. *International Journal of Science & Healthcare Research.* 2022; 7(1): 99-103. DOI: *https://doi.org/10.52403/ijshr.20220117*

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