

## ORIGINAL RESEARCH

**A study of etiology, clinical features, and outcome in patients with Multi Organ Dysfunction Syndrome****<sup>1</sup>Dr. Koniki Priyanka, <sup>2\*</sup>Dr. Namburu Sindhura, <sup>3</sup>Dr. Katti Alekhya**<sup>1,2</sup>Assistant Professor, <sup>3</sup>Post-Graduate, Department of General Medicine, Guntur Medical College, Guntur, Andhra Pradesh**Corresponding Author**

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**Received: 25-11-2022 Revised: 20-12-2022****Accepted: 05-01-2023****ABSTRACT**

**Background:** Multiple organ Dysfunction Syndrome (MODS) is defined as the acute and potentially reversible dysfunction of two or more organs triggered by multiple clinical or non-clinical factors. There is a need to identify the common infections that leads to mortality in intensive care unit. Studies in India have focussed on patients with sepsis due to established causes. **Aim and Objective:** To know clinical presentation, Etiology and outcomes in patients with multiple organ dysfunction syndrome. **Materials and Method :** This was hospital based prospective observational study conducted in department of general medicine, Guntur Medical College, GGH, Guntur, for period of two years, in which 100 individuals admitted in ICU with multi organ dysfunction were included in the study. **Results:** 86% of the patients were form the age group of 31 – 70 years and among that also maximum patients were from 61-70 years of age, 48% of the patients were hypertensive and 32% were diabetic. 87% of the patients were admitted with fever and also with other clinical presentation. , 61% had LRTI, 9% had Bacteremia, 12% had Dengue, 5% had pancreatitis, 2% had Congestive heart failure, 6% had renal failure, 5% had hepatic failure. Among all the study population mortality due to MODS was observed among 26% of the patients. SOFA Score, Duration of ICU, Duration Hospital stay and ventilation use were more among non-survivals compared to survivals. **Conclusion:** Increase in the severity of organ dysfunction which was assessed by SOFA score is very much associated with higher mortality. Etiology of multiple organ dysfunction syndrome can be influenced by regional and seasonal trends. Rickettsial fever, leptospirosis and dengue are common causes of undifferentiated fever in patients with MODS.

**Keywords:** Multiple organ Dysfunction Syndrome, sequential organ failure assessment, ICU, LRTI

**INTRODUCTION**

Multiple organ Dysfunction Syndrome (MODS) is defined as the acute and potentially reversible dysfunction of two or more organs triggered by multiple clinical or non-clinical factors. The concept of MODS was first proposed in 1992, which was previously known as multiple organ failure (MOF).<sup>[1]</sup> Given that MOF could only be described statically, without showing a continuous process of multiple organ dysfunction, the concept of MODS came into being and gradually replaced MOF.<sup>[2]</sup> The organ or system most easily affected by MODS successively include lung, cardiovascular system, liver, kidney, blood system, gastrointestinal tract, and central nervous system. The mortality in MODS patients

increases with the number of organs involved. When only two organs become dysfunctional, the mortality is about 30%; when 3 or 4 organs are affected, the mortality will rise to 50–70%.<sup>[3,4]</sup>

Two primary causes of MODS are infectious and non-infectious factors, especially the former. Specifically, common causes, in addition to the most common cause of sepsis, include trauma, burn, surgery, shock, and so on.<sup>[3,5]</sup> Although an underlying pathophysiology for MODS remains elusive, global perfusion deficits,<sup>[6]</sup> widespread endothelial damage,<sup>[7]</sup> mitochondrial dysfunction/hibernation and associated energy deficit,<sup>[8]</sup> intestinal bacterial product translocation,<sup>[9]</sup> and apoptosis<sup>[10]</sup> have been implicated. These pathological mechanisms may aggravate the dysfunction of various organs.<sup>[11–14]</sup>

In India infections causing multiple organ dysfunction leads to burden of sepsis in ICU. Sepsis can be reversible but as it progresses to septic shock mortality rate increase substantially. Majority of the patients present with clinical features such as fever with myalgia, fever with arthralgia, fever with icterus, fever with rash, or acute encephalitis. Due to their varied presentation, multi system involvement, and lack of sensitivity tests to identify these infections add to diagnostic dilemma.

There is a need to identify the common infections that leads to mortality in intensive care unit. Studies in India have focussed on patients with sepsis due to established causes eg; malaria, leptospira, rickettsial infections. very few studies were done to study the clinical course of the disease in patients with acute undifferentiated fever.

Thus we have undertaken this study to know clinical presentation, Etiology and outcomes in patients with multiple organ dysfunction syndrome

## **MATERIAL AND METHODS**

This was hospital based prospective observational study conducted in department of general medicine, Guntur Medical College, GGH, Guntur, for period of two years, in which 100 individuals admitted in ICU with multi organ dysfunction were included in the study after following inclusion and exclusion criteria and getting informed consent and approved by institutional ethical committee of our Institute.

### **Inclusion Criteria**

- Willing patients with MODS defined as the presence of altered organ function in two or more organ systems.

### **Exclusion Criteria**

- Patients not willing for study
- Patients below 18 years of age
- Do not resuscitate state
- Patients with immunosuppressive state including malignancy and HIV infection, organ transplantation
- Patients with chronic underlying diseases such as CKD,CLD
- Congenital & acquired heart diseases
- SARS CoV-2 Infection

### **Method**

Patients admitted in ICU were included in the study, detailed history was obtained from patient/relative regarding onset duration and progression of symptoms. Complete physical examination was done. Baseline investigations was done for every patient. Additional investigations including those for ruling out cause of fever, imaging studies (xray, ultrasound) was done based on indication for individual patient. Daily investigations were recorded and the progress of patient was assessed by sequential organ failure assessment score (SOFA) till discharge or death or a maximum period of 14 days. The outcome in terms of morbidity and mortality was documented, etiology was identified based on serology and culture.

The patients were divided into subgroups for analysis –survivors vs non survivors and were then compared in terms of demographic data, signs, symptoms, clinical course and outcome of the disease.

### Statistical Analysis

Collected data were entered in the Microsoft excel 2016 for further statistical analysis. Qualitative data were presented in frequency and proportion while quantitative data were expressed as mean and standard deviation. Mean difference of quantitative data between the groups were assessed by using t-test. P-value<0.05 considered as statistically significant. Statistical analysis was done by using statistical software SPSS version 25.

## RESULTS

Overall in the study we have included 100 patients with MODS in ICU, there demographic distribution shown in bellow table 1.

**Table 1: Distribution of demographic profile among study population**

Parameters	Frequency	Percentage
<b>Age (Years)</b>		
21 – 30	8	8
31 – 40	14	14
41 – 50	22	22
51 – 60	24	24
61 – 70	26	26
71 – 80	6	6
Mean ± SD	51.85 ± 13.12 Years	
<b>Gender</b>		
Male	52	52
Female	48	48
<b>Comorbid Condition</b>		
Diabetes Mellitus	32	32
Hypertension	48	48

It was observed that majority (86%) of the patients were form the age group of 31 – 70 years and among that also maximum patients were from 61-70 years of age, and mean age of the patients was more than 50 years. Also among population male predominancy was observed compared to female. And overall 48% of the patients were hypertensive and 32% were diabetic.

**Table 2: Clinical presentation and GCS of study population**

Parameters	Frequency	Percentage
<b>Clinical Presentation</b>		
Fever	87	87
Myalgia	58	58
Dyspnoea	49	49
Nausea/Vomiting	49	49
Cough	56	56
Arthralgia	51	51
Headache	48	48
Abdominal pain	39	39
Altered sensorium	28	28

Loose stools	16	16
Jaundice	10	10
Rash	18	18
Glasgow Coma Scale		
9 – 12	73	73
>13	27	27
Mean $\pm$ SD	11.25 $\pm$ 1.78	

We have observed 87% of the patients were admitted with fever and also with other clinical presentation like myalgia, cough, arthralgia, dyspnoea, nausea/vomiting, headache, abdominal pain shown as above Table 2.

Table 3 showed distribution of etiology and outcomes of study population, in which we have observed that, 61% had LRTI, 9% had Bacteremia, 12% had Dengue, 5% had pancreatitis, 2% had Congestive heart failure, 6% had renal failure, 5% had hepatic failure. Among all the study population mortality due to MODS was observed among 26% of the patients.

**Table 3: Distribution of Etiology and outcome among study population**

Parameters	Frequency	Percentage
Etiology		
LRTI	61	61
Bacteraemia	9	9
Dengue	12	12
Pancreatitis	5	5
Congestive heart failure	2	2
Hepatic failure	5	5
Renal failure	6	6
Outcome		
Dead	26	26
Survived	74	74

**Table 4: Distribution of Etiology and outcome among study population**

Vitals	Survived	Dead	P-value
Pulse	98.22 $\pm$ 15.81	66.53 $\pm$ 3.88	0.001*
SBP	119.43 $\pm$ 14.75	71.63 $\pm$ 7.80	0.001*
Respiratory Rate	30.12 $\pm$ 3.41	38.03 $\pm$ 1.10	0.001*
Temperature	100.37 $\pm$ 0.88	102.3 $\pm$ 0.34	0.001*
SOFA Scale	9.07 $\pm$ 2.12	13.83 $\pm$ 0.77	0.001*
ICU Stay	10.37 $\pm$ 4.47	21.33 $\pm$ 1.41	0.001*
Duration of fever	9.58 $\pm$ 2.25	14.23 $\pm$ 0.76	0.001*
Duration of hospital stay	15.84 $\pm$ 4.97	27.53 $\pm$ 1.55	0.001*
Duration of ventilator use	3.69 $\pm$ 1.46	6.463 $\pm$ 0.51	0.001*
GCS	12.00 $\pm$ 1.44	9.123 $\pm$ 0.33	0.001*

\*p-value<0.05, statistically highly significant at 5% level of Significance

From table 4, it was observed that all the vitals were statistically significant between survival and non-survival. Respiratory rate among non-survival was more compared to survivals. SOFA Score, Duration of ICU, Duration Hospital stay and ventilation use were more among non-survivals compared to survivals. Mean Glasgow coma scale was observed moderate among non-survival patients.

## DISCUSSION

The incidence of MODS depends on the criterion used for MOF as there is no consensus on a single definition as the gold standard.<sup>[15]</sup> The reported incidence of MODS among critically ill trauma patients varies widely from 28% to 88%.<sup>[16]</sup> MODS is also considered as the frequent cause of mortality in patients admitted to the ICU and the rate of mortality and length of hospital stay correlated with the number of organs involved and the severity of MODS.<sup>[17]</sup> An earlier study reported 15% mortality among high-risk surgical patients admitted to the ICU; of which more than half the patients died primarily due to MOF.<sup>[18]</sup> Apart from higher mortality, critically ill patients that developed MODS stayed three times longer in the ICU and necessitated greater mechanical ventilatory support than those without MODS.<sup>[19]</sup> To date, various MOF scoring systems have been proposed to assess severity and risk stratification in critically ill patients.<sup>[20]</sup> Therefore, it is challenging to compare the incidence of heterogeneous populations using various MODS scoring systems. In addition, there is a lack of consistent data for the course of MODS, the mechanisms of organ dysfunction, and the early prediction of MODS in critically ill patients admitted in different ICUs.

According to a multiyear survey of SICU patients, 54% developed MODS.<sup>[21]</sup> It was found that hypoperfusion without shock, sepsis without shock, and shock of any etiology were the most common risk factors for MODS development. The most common cause of death in surgical intensive care units (SICUs) is MODS, and its severity is strongly correlated with mortality and hospitalization length.<sup>[22]</sup>

In the present study we have observed that 87% had fever, 58% had myalgia, 49% had dyspnea, 49% had Nausea/Vomiting, 56% had cough, 51% had arthralgia, 48% had headache, 39% had abdominal pain, 28% had Altered sensorium, 16% had Loose stools, 10% had jaundice, 18% had Rash. Study conducted by Bhanukumar Muthaiah et al., observed that fever being universal (100%) among these patients, other common presenting symptoms included vomiting/loose stools (45%) and yellowish discoloration of eyes (30.6%), cough (15%), dyspnea (26.6%)

In the current study we have observed with, in which we have observed that, most common etiology was LRTI(61%) followed by Bacteremia, Dengue, pancreatitis, Congestive heart failure, renal failure, hepatic failure. According to the BhanukumarMuthaiah et al.,[23]most common aetiology for acute febrile illness with MODS was dengue fever in 22 (29.3%) patients followed by leptospirosis in 17(22.7%) patients. one more another study conducted by Desai SR & Lakhani JD et al observed that Cholecystitis (12%), UTI (10%), Meningitis (8%) and Pancreatitis (8%).

In our study we observed mortality among 26% of the patients. According to the BhanukumarMuthaiah et al. patients with central nervous involvement predict highest mortality which was 100% in there study.Desai SR & Lakhani JD et al[24] found, 39 patients of MODS, of which 22 died. Hence the mortality rate of patients who had MODS was 56.4%, they found that overall mortality rate was 48% which was higher compared to other studies. But they had more patient of MODS (78% patient) which might have accounted for higher mortality rate. The mortality rate for sepsis, severe sepsis and MODS was 100%, 10% and 56.4% respectively. they had only one patient of sepsis, which was of burns (85% burns) which might account for false high mortality rate in sepsis group. Otherwise the difference in mortality rate between severe sepsis (10%) group and MODS (56.4%) group was statistically significant (p=0.000). Hence, as the number of organ involved increases, it should give alarming sign to the physician.

In our study we have use sequential organ failure assessment (SOFA) scoring system, to asses the organ failure and we have found that SOFA score was more among non-survival patients compared to survival and this difference in the score was statistically highly

significant (p-value<0.01). also we have found mean ICU stay and duration of hospital stay among non-survival was significantly higher compare with moderate GCS scale compared to survival patients.

## CONCLUSION

From overall observation after discussing with various studies we can conclude that, Septic shock at admission is associated with higher mortality. Increase in the severity of organ dysfunction which was assessed by SOFA score is very much associated with higher mortality. Etiology of multiple organ dysfunction syndrome can be influenced by regional and seasonal trends. Rickettsial fever, leptospirosis and dengue are common causes of undifferentiated fever in patients with MODS.

## CONFLICT OF INTEREST

Nil

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