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Original Article

Systemic inflammatory response syndrome in intensive care unit

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Abstract:

Introduction: Localized inflammation is physiological protective response which is generally tightly controlled by the body at the site of injury. Loss of this local control or an overly activated response results in an exaggerated systemic response which is clinically identified as systemic inflammatory response syndrome (SIRS).

Methodology: The present study has been carried out in the Department of General Medicine, Wanless Hospital, Miraj, in Sangli district of Maharashtra over a period from January 2019 to September 2020. A total 60 patients with SIRS were studied fulfilling the inclusion and exclusion criteria. It was a prospective observational clinical study. Consecutive type of non probability sampling was followed for the selection of study subjects.

Results: The majority of patients were having Diabetes Mellitus & hypertension (18.33%). Among 60 patients, CVD, Stroke, thyroid disorders and kidney disorders was observed in 15%, 11.67%, 8.33% and 6.67% respectively. Among 60 patients, Multi organ failure, encephalopathy and ARDS was observed in 5%, 3.33% and 5% respectively. The mean hemoglobin was 12.73 ± 2.231 g/dl. The mean total bilirubin was 1.11 ± 0.40 mg/dl. The mean ALT was 24.86 ± 6.17. The mean AST was 23.53 ± 5.70. The mean blood urea was 31.96 ± 12.21 mg/dl. The mean serum creatinine was 2.76 ± 1.01.The mean APACHE II score was 21.9 ± 6.82. The mean MODS score was 6.63 ± 3.05.The mortality among patients with SIRS was 6.67%.

Conclusion: SIRS is commonly present in patients presenting to the emergency department. Once SIRS is identified, it is crucially important to keep the patient under observation so that rapid and appropriate treatment can be initiated to decrease the mortality among patients.

Keywords: SIRS, ICU, MANGEMENT.

INTRODUCTION

The concept of a systemic inflammatory response syndrome (SIRS) to describe the complex pathophysiologic response to an insult such as infection, trauma, burns, pancreatitis, or a variety of other injuries came from a 1991 consensus conference charged with the task of developing an easy-to- apply set of clinical parameters to aid in the early identification of potential candidates to enter into clinical trials to evaluate new treatments for sepsis.[1] Since this time, more than 100 clinical trials have used these criteria for the inclusion of patients,[2] including recently published trials.[3-5] However, the utility of the SIRS criteria for the selection of a more critically ill group of patients who are expected to benefit from early identification and timely intervention remains controversial. In 1995, Rangel-Frausto et al. showed that up to 64% of ward patients have SIRS during their hospital stay.[6] More recently, Churpek et al. demonstrated an incidence of SIRS of nearly 50% in ward patients.[7] These findings support the low specificity of the SIRS criteria for the selection of patients at a higher risk of death because most hospitalized patients develop SIRS at some point during their stay. Finally, Kaukonen et al. concluded that the SIRS criteria missed one in eight patients with severe sepsis, challenging the notion of the high sensitivity of the available criteria for the definition of sepsis at that time.[8]

Some authors have advocated the systematic documentation of SIRS status upon hospital admission to guide clinical

decisions regarding the presence of infection and prognosis.[9] However, SIRS may occur in association with common non-infectious conditions, such as highrisk surgery[10] and trauma.[11] In fact, mortality rates are similar between infectious and non- infectious conditions associated with SIRS.[12] Therefore, the SIRS criteria alone may not effectively discriminate between infected and non-infected patients. Thus, the present study was conducted for evaluating clinical profile of systemic inflammatory response syndrome at tertiary intensive care unit.

MATERIALS AND METHODS:

The present study was a hospital based prospective study undertaken to study clinical profile of patients presenting with Systemic Inflammatory Response Syndrome.The study period was January 2019 to September 2020

The study population was patients admitted in Wanless Hospital and fulfilling the selection criteria during the study period.

A total of 60 cases attending OPD and admitted in hospital during study period considering the inclusion and exclusion criteria were included in the study.

Sampling technique and Study subjects:

The sample size for the present study was calculated by using the below mentioned formula.

$$n = \frac{Z^2 P(1-P)}{E^2}$$

- n- Sample size
- **Z**= percentage point corresponding to significance level. For significance level 5%, Z is 1.96.
  - **P** is the prevalence of systemic inflammatory response syndrome (taken as 80.71%)[1]
  - **E** is corresponding maximum error and is 10%
  - Thus the approximate sample size for the present study was; n=59.1. So, by rounding off, we have taken 60 subjects suffering from Systemic Inflammatory Response Syndrome.

Sampling Technique: Consecutive type of non-probability sampling was followed for the selection of study subjects. A total of 60 patients fulfilling the eligibility criteria of Systemic Inflammatory Response Syndrome were taken for study after taking informed consent.

Selection of Cases: Cases were selected from Wanless Hospital Intensive Care Units. After selection of cases detailed history, clinical examination and then investigations were carried out.

Criteria For selection of Cases:

Patient meeting any two of the following criteria were diagnosed as case of Systemic Inflammatory Response Syndrome[1]:

1. Body temperature ≥38°C or <36°C,
2. Heart rate >90/min,
3. Respiration >20/min or PaCO2 <32 mmHg, and
4. White blood cell (WBC) count >12.0 x 109/L or <4.0 x 109/L, or >10% immature (band) forms.

All the patients were treated with appropriate and standard treatment protocol.

RESULTS:

The present cross-sectional study was conducted to study clinical profile of systemic inflammatory response syndrome at tertiary intensive care unit.

The study revealed the following points as follows:

The prevalence of systemic inflammatory response syndrome was 24.48%.

The majority of patients were in age group 41-50 years (30%) followed by 31-40 years (21.67%) The mean age of patients was 42.11 ± 8.67 years.

Out of 60 patients, majority of patients were females (53.33%) while males were 46.67%.The majority of patients were having symptom of fever (100%) followed by headache (70%), vomiting (53.33%), myalgia (46.67%), bleeding tendency (35%), abdominal pain (31.67%) and others (18.33%)The majority of patients were having Diabetes Mellitus & hypertension (18.33%). Among 60 patients, CVD, Stroke, thyroid disorders and kidney disorders was observed in 15%, 11.67%, 8.33% and 6.67% respectively. The majority of patients were having hepatic dysfunction (10%) followed by renal failure (8.33%).Among 60 patients, Multi organ failure, encephalopathy and ARDS was observed in 5%, 3.33% and 5% respectively.The mean hemoglobin was 12.73 ± 2.231 g/dl.The mean PT was12.3 ± 3.38.The mean INR was 0.87 ± 0.34 and mean APTT was 34.58 ± 5.14.The mean total bilirubin was 1.11 ± 0.40 mg/dl. The mean ALT was 24.86 ± 6.17. The mean AST was 23.53 ± 5.70.The mean albumin was 3.88 ± 0.70.The mean blood urea was 31.96 ± 12.21 mg/dl. The mean serum creatinine was 2.76 ± 1.01.The mean APACHE II score was 21.9 ± 6.82. The mean MODS score was 6.63 ± 3.05.The mortality among patients with SIRS was 6.67%.

Table a) : Prevalence of SIRS among patients:

SIRS	Frequency (n=245)	Percentage
Present	**60**	**24.48**

Table b) : Prevalence of SIRS according to age:

Age (years)	Frequency	Percentage
18-20	**08**	**13.33**
21-30	**05**	**8.33**
31-40	**13**	**21.67**
41-50	**18**	**30**
51-60	**12**	**20**
>60	**04**	**6.67**
Total	**60**	**100**

Table c) : Distribution of patients according to comorbidities:*

Co-morbidities	Frequency (n=60)	Percentage
Hypertension	11	18.33
Diabetes Mellitus	11	18.33
CVD	09	15.00
Stroke	07	11.67
Thyroid disorders	05	08.33
Kidney disorders	04	06.67
Others	03	05.00

(* Multiple Response Present)

Table d) : Distribution of patients according to Complications:*

Complications	Frequency (n=60)	Percentage
Hepatic Dysfunction	06	10.00
Renal failure	05	08.33
Multi organ failure	03	05.00
Encephalopathy	02	03.33
ARDS	03	05.00

(* Multiple Response Present)

Table e) : Distribution of Patients according to outcome:

Outcome	Frequency	Percentage
Survived	**56**	**93.33**
Died	**04**	**06.67**
Total	**60**	**100**

DISCUSSION:

The present observational cross-sectional study was conducted to study clinical profile of systemic inflammatory response syndrome at tertiary intensive care unit.Patients presenting with systemic inflammatory response syndrome admitted in Wanless Hospital and fulfilling the selection criteria were included in the study. A sample size of 60 patients with SIRS was enrolled in the study. Patients not willing to participate were excluded from study. The patient was informed about the study and informed and written consent was obtained from the patient. A detailed history of the patient with clinical examination was done. Data was entered in a specially designed proforma made for recording the findings.

In the present study, out of 245 patients admitted to hospital 60 patients have SIRS showing prevalence of 24.48% Andrew H Bissonette et al[16] in a study on Systemic Inflammatory Response Syndrome (SIRS) in the emergency department observed the overall prevalence of SIRS (defined as the presence of ≥ 2 SIRS criteria) was 24.9%. The findings were similar to present study. Sharmila Chatterjee et al[13] in a observational study in the intensive therapy units (ITU) observed that out of total of 3,010 ITU admissions, SIRS was found in 365 (11.97 %) patients.Paulo R. A. Carvalho et al[15] conducted a study to assess the prevalence of systemic inflammatory syndromes observed prevalence of systemic inflammatory response syndrome (SIRS) was 68%. In Japan, the prevalence of SIRS reached 84% among all adult ICU patients[17.] SIRS affected one third of all hospitalized patients in the study by Brun-Buisson[18]; it developed in 59% of critically ill obstetric patients[19] and 82% of admissions to a university hospital in Canada[20]. Among hospitalized adult medical patients with new onset of fever in the department of internal medicine, 95% had SIRS[21.] These data are not fully comparable with our data because different patient populations were studied. In the present study, the majority of patients were in age group 41-50 years (30%) followed by 31-40 years (21.67%) The mean age of patients was 42.11 ± 13.43 years. Andrew H Bissonette et al[16] in a study on Systemic Inflammatory Response Syndrome (SIRS) in the emergency department observed participants' mean age was 47.0 ± 20.1 years with a range from 18 to 97 years. The findings were similar to present study. Daniel A. Bonville et al[22] studied mortality in critically ill patients with systemic inflammatory response syndrome observed mean age of 64.5 ±6 1.6 Years. Taniguchi LU et al[14] studied systemic inflammatory response syndrome criteria can predict hospital mortality in a Brazilian cohort observed mean age among patients of 65.6 (17.7) years. Out of 60 patients, majority of patients were females (53.33%) while males were 46.67%.

Andrew H Bissonette et al[16] in a study on Systemic Inflammatory Response Syndrome (SIRS) in the emergency department observed of the subjects, 463 (46.7%) were male. The findings were similar to present

study.Taniguchi LU et al[14] studied systemic inflammatory response syndrome criteria can predict hospital mortality in a Brazilian cohort observed male population of 54.9%. The majority of patients were having symptom of fever (100%) followed by headache (70%), vomiting (53.33%), myalgia (46.67%), bleeding tendency(35%), abdominal pain (31.67%) and others (18.33%). The majority of patients were having hypertention & Diabetes Mellitus (18.33%). Among 60 patients, CVD, Stroke, thyroid disorders and kidney disorders was observed in 15%, 11.67%, 8.33% and 6.67% respectively. Pål Comstedt et al[9] studied relationship between SIRS symptoms and morbidity and mortality in medical emergency ward patients observed co- morbidity among 43% patients.

The majority of patients were having hepatic dysfunction (10%) followed by renal failure (8.33%). Among 60 patients, Multi organ failure, encephalopathy and ARDS was observed in 5%, 3.33% and 5% respectively. Sharmila Chatterjee et al[13] in a observational study in the intensive therapy units (ITU) observed out of total of 3,010 ITU admissions, SIRS with organ dysfunction was found in 365 (11.97 %) patients. The mean hemoglobin was 12.7 ± 2.231 g/dl. The mean PT was 12.3 ±3.38.

The mean INR was 0.89 ± 0.34 and mean APTT was 34.58 ± 5.14. The mean total bilirubin was 1.1 ± 0.4 mg/dl. The mean ALT was 24.86 ± 6.17. The mean AST was 23.53 ± 5.7. The mean albumin was 3.88 ± 0.7. The mean blood urea was 31.96 ± 12.21 mg/dl. The mean serum creatinine was 2.76 ± 1.01.

The mean APACHE II score was 21.9 ± 6.82. The mean MODS score was 6.63 ± 3.05. Daniel A. Bonville et al[22] studied mortality in critically ill patients with systemic inflammatory response syndrome observed APACHE II score of 19.8 ± 0 60. In the present study, it was observed that, the majority of patients survived (93.33%) while 4 (6.67%) patients died. Sharmila Chatterjee et al[13] in a observational study in the intensive therapy units (ITU) observed that mortality among patients was 8%. Daniel A. Bonville et al[22] studied mortality in critically ill patients with systemic inflammatory response syndrome observed mortality of 24.77%. Taniguchi LU et al[14] studied systemic inflammatory response syndrome criteria can predict hospital mortality in a Brazilian cohort observed mortality of 16.9%.

The results have some limitations. First, this was a single-center retrospective cohort from a private hospital, which could have biased some of our results and limited generalisability.

CONCLUSION:

The present study concludes, there was a high prevalence of SIRS (24.28%) among hospitalized patients. SIRS is commonly present in patients presenting to the emergency department. Its presence indicates a higher frequency of co-morbidities and further complications. Hence, once SIRS is identified, it is crucially important to keep the patient under observation so that rapid and appropriate treatment can be initiated to decrease the mortality among patients.

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