

# To Study the Serum Cholesterol Levels in the Patients of Sepsis and Prognostic Significance

Saminder Chaudhary<sup>1</sup>, Sumit Kant Jha<sup>2</sup>, Sonam Choudhary<sup>3</sup>, Girish Dubey<sup>4</sup>

## ABSTRACT

**Introduction:** Sepsis is today's overwhelming and life threatening response to infection and recent studies reveal that serum cholesterol may be a useful prognostic marker of sepsis.

**Aim:** To study the serum cholesterol levels in the patients of sepsis and its prognostic significance.

**Material and methods:** This was an Prospective Observational study done at CSS Hospital, SVSU Subharti Medical College Meerut U.P. 100 Patients qualifying by fulfilling all inclusion and exclusion criteria and were enlisted in the study after informed consent. Serum cholesterol levels were done on the day of presentation and the 3<sup>rd</sup> day.

**Result:** In the instant study, out of 100 subjects, 48 showed the rise in the cholesterol with sepsis where as in 52 subjects showed decline of cholesterol level. During the study, 52 subjects survived whereas 43 subjects expired during the course of treatment, 5 subjects left the study group.

**Conclusion:** Monitoring the total cholesterol level can be used as prognostic tool in ICU patients. The level of total cholesterol at the time of presentation and then the trend which is followed by the total cholesterol (increasing trend in total cholesterol level indicates better prognosis of disease outcome and vice versa), is a better marker for prognosis of the patient with septicemia in ICU patients

**Keywords:** Serum Cholesterol Levels, Sepsis and Prognostic Significance

## INTRODUCTION

Sepsis is today's overwhelming and life threatening response to infection. Early intervention with antibiotics, intravenous fluids and other supportive treatment, improves chances to survive.<sup>1</sup> For since very long, the terms sepsis and septicemia have been referred to the ill effects or complications presenting in a patient with bacteremia. The definitions have not differed vastly since 1914, when Schottmueller defined it as, "Septicemia is a state of microbial invasion from a portal of entry into the blood stream which causes sign of illness."<sup>2</sup> In response to an infection, body's immune system reacts and protects but sometimes it goes into overdrive, attacking the body itself. This overactive toxic response of the body causes the clinical syndrome of sepsis rather than the direct effects of micro organisms. Sepsis and its complications denote a continuum of clinical and pathophysiologic severity.<sup>3</sup> Damage due to sepsis can range from organ dysfunction to organ failure.<sup>4</sup> Gram positive bacteria and in immunocompromised, fungal organisms have been recognised as common causes of sepsis.<sup>5</sup>

In recent studies, it is shown that cholesterol metabolism is highly influenced by a state of widespread inflammation,

which is usually secondary to bacteraemia. Such changes in the values of serum cholesterol have been correlated to clinical outcome and thus can be used as a useful prognostic marker of sepsis. Some studies have shown that levels of lipoproteins decreased where as levels of triglycerides increased in patients of sepsis regardless of other comorbidities. These changes have been seen to occur within hours of the inflammatory cascade related with sepsis. A fall in level of serum cholesterol was also negatively correlated to clinical outcome and length of stay, which carries additional mortality risk.

## MATERIAL AND METHODS

This was an Prospective Observational study done at CSS Hospital, SVSU Subharti Medical College Meerut U.P. 100 Patients qualifying by fulfilling all inclusion criteria and were enlisted in the study after informed consent. Patients admitted to the ICU under diagnosis of sepsis were enrolled into the study. SOFA score was also used to assess the patient's clinical outcome. Serum cholesterol levels were done on the day of presentation and the 3<sup>rd</sup> day. The trend in the change in value was noted. The role of sepsis on the cholesterol metabolism results in these changes in the values.

### Inclusion criteria

- Patients with age more than 18 years and satisfying the criteria for sepsis in Harrison's textbook of internal medicine 19th edition and scoring system SOFA score that into consideration the severity of illness.
- Patients diagnosis with Sepsis
- 2 out of the following criteria
- Fever (oral temperature > 38°C [ $>100.4^{\circ}\text{F}$ ]) or hypothermia (< 36°C [ $96.8^{\circ}\text{F}$ ]);
- Tachycardia (heart rate >90 beats/min)
- Tachypnoea (>24beats/min)

<sup>1</sup>3rd year Resident, Department of Medicine, <sup>2</sup>Associate Professor, Department of Medicine, <sup>3</sup>Senior Resident, Department of OBS and GYNAE, <sup>4</sup>3rd year Resident, Department of Medicine, SVSU Subharti Medical College, Merrut, Up, India

**Corresponding author:** Dr. Sumit Kant Jha, Associate Professor, Department of Medicine, SVSU Subharti Medical College, Merrut, Up, India

**How to cite this article:** Saminder Chaudhary, Sumit Kant Jha, Sonam Choudhary, Girish Dubey. To study the serum cholesterol levels in the patients of sepsis and prognostic significance. International Journal of Contemporary Medical Research 2019;6(2):B14-B16.

**DOI:** <http://dx.doi.org/10.21276/ijcmr.2019.6.2.19>

- Leucocytosis (> 12,000/ $\mu$ L), Leucopenia(< 4000/ $\mu$ L), or
- >10%bands

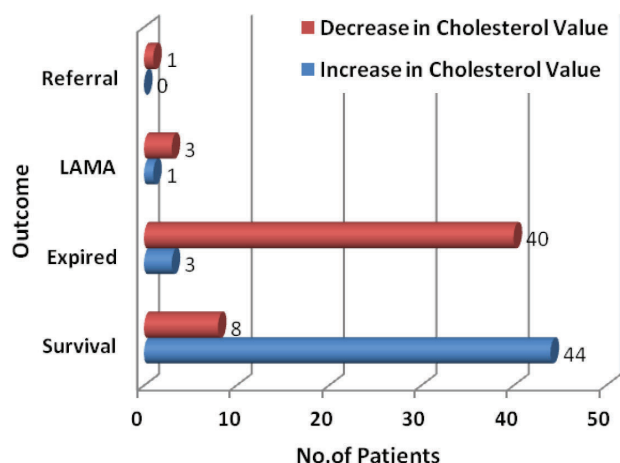
**Exclusion criteria**

- Chronic liver disease
- Thyroid dysfunction
- Diabetes Mellitus
- Patients on treatment with statins
- Severe anaemia
- Malignancy
- CVA
- BURNS
- Coronary Artery Disease
- Patients with known chronic inflammatory condition like(SLE, RA)
- Patients diagnosed to have malabsorption disorders

**Investigation:** CBC, KFT, ABG and Serum Cholesterol level on day of presentation (day 1) and 3<sup>rd</sup> day (day 3).

**RESULT**

In our study, maximum 44 (84.6%) patients survived with



**Figure-1:** Parallel bar chart depicting Distribution of patients according to Change in Cholesterol Value Versus results

increased level of cholesterol Whereas 3(7.0%) patients were expired. No referral were noticed and only 1 (25.0%) patient went LAMA with increased level of cholesterol.

Maximum 40(93.0%) patients with decreased level of cholesterol expired whereas 8 (15.4%) patients survived. 3 (75.0%) out of 4 LAMA patients were having decreased level of cholesterol whereas only 1 (100.0%) patient was referred (Table 1, Figure 1)

In our study 52 out of 100 people survived and 43 expired due to sepsis related complications. Mean serum cholesterol level on day 1 in patients who survived was noted as 152.12 with the std. deviation of 34.675 and p value of .000 followed by mean serum cholesterol level in expired patients on day 1 as 127.93 with the std. deviation of 24.880 and p value .000. Mean serum cholesterol level on day 3 in survived patients was 175.94 with the p value of .000 followed by mean serum cholesterol on day 3 in expired patients as 90.70 with std. deviation of 25.548 and p value 0.000 (Table-2).

**DISCUSSION**

This study was conducted at department of Medicine of SVSU Subharti Medical College Meerut U.P. and associated hospital from August 2016 to August 2018 as prospective observational study to evaluate the serum cholesterol level and its prognostic significance in patients of Sepsis. In this study we enrolled 100 patients of age 18 years to maximum age of both sexes. In this study we evaluated the changes serum level of cholesterol in patient with sepsis. The results of this study will help physicians to take more appropriate and informed decision about level of cholesterol usage and will ultimately help in optimization of healthcare resources. In the instant study, out of 100 subjects, 48 showed the rise in the cholesterol with sepsis where as in 52 subjects showed decline of cholesterol level. These findings are in consistency with the findings of study conducted by Concepcion Alvarez and Alvarez Ramos (1986), in their study sepsis was found to cause concentrations of total cholesterol, high-density lipoprotein cholesterol, and apoproteins A and B in serum to decrease, whereas triglycerides increase.<sup>6</sup> Similarly C.

Change in Cholesterol Value	Statistics	Result				Total
		Survival	Expired	LAMA	Referral	
Increased	Count	44	3	1	0	48
	% within result	84.6%	7.0%	25.0%	.0%	48.0%
Decreased	Count	8	40	3	1	52
	% within result	15.4%	93.0%	75.0%	100.0%	52.0%
Total	Count	52	43	4	1	100
	% within result	100.0%	100.0%	100.0%	100.0%	100.0%

Chi Square= 58.694, P value< 0,05 (Significant)

**Table-1:** Distribution of patients according to Change in Cholesterol Value Versus Outcome

	result	N	Mean	Std. Deviation	Std. Error Mean	P value
schol	Survival	52	152.12	34.675	4.809	.000
	Expired	43	127.93	24.880	3.794	.000
schol3	Survival	52	175.94	39.860	5.528	.000
	Expired	43	90.70	25.548	3.896	.000

**Table-2:** Comparative Quantitative parameters of sepsis Survived patients Versus Expired patients

Iribarren and his associates (1998) found inverse relationship between sepsis and cholesterol level which is in consistent with the instant study.<sup>7</sup> Giovannini I and his associates (1999) assessed and correlates hypocholesterolemia in moderate to critical surgical illness and observed cholesterol level decreased after surgery, in sepsis, liver failure. They found that dynamics of the development, clinical relevance, and a fall in level of serum cholesterol was also negatively correlated to clinical outcome and length of stay, which carries additional mortality risk.<sup>8</sup> During the study, 52 subjects survived whereas 43 subjects expired during the course of treatment. 5 subjects left the study group. (Table 2) C Michael Dunham and his associates (2003) concluded that patients who survived had higher cholesterol at intensive care discharge ( $143 \pm 35$  mg/dl) when compared to admission ( $112 \pm 37$  mg/dl;  $P < 0.0001$ ) as compared to patients who died in those patients admission cholesterol was  $175 \pm 62$  mg/dl and the cholesterol at death was  $117 \pm 27$  mg/dl.<sup>9</sup> In the instant study also, cholesterol level in the 44 subjects who survived showed 84.6% rise in the cholesterol level and there was decrease in 15.4% in the cholesterol level in 8 subjects who all survived (Table 1). Robert F Wilson and his associates (2003) found that hypocholesterolemia is an important observation following trauma, they observed that in critically ill trauma patients, mean cholesterol levels were significantly lower ( $119 \pm 44$  mg/dl) than expected values ( $201 \pm 17$  mg/dl) and in patients who died, final cholesterol levels fell by 33% versus a 28% increase in survivors.<sup>10</sup>

## CONCLUSION

Monitoring serum cholesterol levels on hospital admission could provide a very novel, inexpensive tool that has the potential to start early and aggressive therapy in patients most at risk for death, thus decreasing the mortality rate secondary to sepsis. It is clear from present study that monitoring the total cholesterol level can be used as prognostic tool in ICU patients. The level of total cholesterol at the time of presentation and then the trend which is followed by the total cholesterol (increasing trend in total cholesterol level indicates better prognosis of disease outcome and vice versa), is a better marker for prognosis of the patient with septicemia in ICU patients.

## REFERECES

1. Mammen EF. Antithrombin III and sepsis. *Intensive Care Med.* 1998;24:649-50.
2. Brun-Buisson C, Doyon F, Carlet J, et al. Incidence, risk factors, and outcome of severe sepsis and septic shock in adults. A multicenter prospective study in intensive care units. French ICU Group for Severe Sepsis. *JAMA.* 1995;274:968-74.
3. Wheeler AP, Bernard GR. Treating patients with severe sepsis. *N Engl J Med.* 1999;340:207-14.
4. Hotchkiss RS, Karl IE. The pathophysiology and treatment of sepsis. *N Engl J Med.* 2003;348:138-50.
5. Nguyen HB, Rivers EP, Abrahamian FM, Moran GJ, Abraham E, Trzeciak S, et al. Severe sepsis and septic shock: review of the literature and emergency

department management guidelines. *Ann Emerg Med.* 2006;48:28-54.

6. Alvarez C, Ramos A. Lipids, lipoproteins, and apoproteins in serum during infection. *Clinical chemistry.* 1986;32:142-45.
7. Iribarren C, Jacobs DR, Jr, Sidney S, Claxton AJ, Feingold KR. Cohort study of serum total cholesterol and in-hospital incidence of infectious diseases. *Epidemiol infect.* 1998; 121: 335-47.
8. Giovannini I, Boldrini G, Chiarla C, Giuliante F, Vellone M, Nuzzo G. Pathophysiologic correlates of hypocholesterolemia in critically ill surgical patients. *Intensive Care Med.* 1999;25:748-51.
9. Dunham, C. M., Fealk, M. H., & Sever, W. E. Following severe injury, hypocholesterolemia improves with convalescence but persists with organ failure or onset of infection. *Critical Care* 2003;7:R145-R153.
10. Robert F Wilson, Jeffrey F Barletta, James G Tyburski. Hypocholesterolemia in sepsis and critically ill or injured patients. *Crit Care.* 2003;7: 413-414.

**Source of Support:** Nil; **Conflict of Interest:** None

**Submitted:** 08-01-2019; **Accepted:** 09-02-2019; **Published:** 20-02-2019