



A STUDY OF SERUM HDL CHOLESTEROL LEVEL IN SEPSIS PATIENTS AND ITS PROGNOSTIC SIGNIFICANCE IN COIMBATORE MEDICAL COLLEGE HOSPITAL

General Medicine

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ABSTRACT

Background: Sepsis is the one of the leading causes of mortality in the ICU. In spite of advances in aggressive management, sepsis endures to have a high mortality rate, hence a prognostic marker is indispensable. Of late HDL-cholesterol was found to be have noteworthy association between mortality and its levels. Hence, this study is being conducted to assess the association between sepsis and HDL-C levels.

Methods: It is a prospective study conducted in Government Coimbatore medical college involving 100 sepsis patients. Among them 82 people survived, and 18 people died. Serum HDL-cholesterol levels and variables required for SOFA score are measured at two intervals, one during admission and on day 5 of admission. The correlation between SOFA scores and HDL-C levels were assessed.

Results: Among non-survivors SOFA score was found to be high and low in the survived patients. Similarly, HDL-C values, were high in survived patients and low in dead patients. The correlation between SOFA scores and HDL in both survivors and non survivors, both at the time of admission and at day 5 were found to be statistically significantly correlated.

Conclusions: We revealed a decrease of HDL levels in non-survivors of sepsis compared with survivors during the first 5 days after hospitalization and found that an decrease in HDL from baseline is an independent risk factor for mortality. Although further studies are needed to elucidate the role of changes in HDL as a risk factor in patients with sepsis, HDL can be used as an additional and complementary maker with several established measures of illness severity such as SOFA score, APACHE II score, CRP, albumin, and lactate.

KEYWORDS

HDL-cholesterol, Sepsis, SOFA score

INTRODUCTION

Sepsis is a major cause of morbidity and mortality, Second leading cause of death in the world.¹ Sepsis can be a clinical manifestation of infection acquired both in community settings or health care facilities. Sepsis is life threatening condition that occurs when body's response to an infection injures its own tissues and organs².

As of date many investigations are available for sepsis but it lacks specificity and sensitivity. Blood culture is considered to be the gold standard test but shows positive result in less than 20 – 40 % of the patients³. So we also depend on various bio markers for diagnosing a case of clinical sepsis. The bio-markers are CRP, procalcitonin, lactate and markers of endothelial damage such as adhesion molecules. It may be necessary to combine the bio-markers, clinical suspicion and blood culture in diagnosis of sepsis.

High-density lipoproteins characterized by their ability to transport cholesterol from peripheral tissues back to the liver that confers to them an anti-atherogenic protective effect. Many experimental studies emphasize on other pleiotropic properties of HDLs, including anti-inflammatory, antiapoptotic, or antioxidant functions. Furthermore, HDLs have the property to bind and neutralize lipopolysaccharide (LPS) that could be particularly relevant in septic conditions.⁴

Based on this aim of our study is to determine the use of HDL-cholesterol in sepsis patients for illness severity and prognosis also to compare the effectiveness of HDL-cholesterol with Sequential Organ Failure Assessment (SOFA) score in determining severity of sepsis.

MATERIALS AND METHODS

This study was done in Government Coimbatore Medical College and Hospital, Coimbatore as prospective study from January 2019 to July 2020 for a period of 18 months. Around 100 patients with sepsis admitted in Government Coimbatore Medical College and Hospital with age from 18-75 years of both gender, with length of hospital stay more than 72 hours and patients having positive growth on culture were included in the study. Wheras patients under the age of 18 and more than 75 yrs., patients with chronic kidney disease and chronic liver disease, patients with diabetes mellitus, patients who was using anti dyslipidemic drugs, pregnant women and those who are not capable of giving consent and not willing to participate in the study were excluded from the study.

The proposed study was conducted after getting clearance from the institutional research and ethics board. The study was conducted after

obtaining informed signed consent from all the patients. Confidentiality was ensured. All ethical principles was adhered throughout this study.

A semi structured proforma will be used for data collection. It will collect details such as baseline characteristics, medical history and physical examination. HDL-cholesterol and SOFA score was calculated on admission, and 5th day of post admission. SPSS Version 21 was used for statistical analysis, Chi square and Unpaired T test was used for analysis with p value less than 0.05 considered significant. Person Correlation test was also used to analyse the correlation.

RESULTS

In our study population of 100 sepsis patients done in Coimbatore medical college, we started with analysis of age distribution and in our study 37% (n=37) of patients were from 51 to 60 years age group followed by 33% (n=33) patients more than 60 years. While 23% (n=23) patients were between 41- 50 years while rest 7 was less than 40 years. Male predominance was seen in our study with a male: female ratio of 1.85:1.

We next analyzed the clinical diagnosis of all patients and most common was pneumonia in 43 patients followed by urosepsis in 33 patients, whereas other findings like liver abscess, lung abscess, cellulitis, empyema, peritonitis was seen in rest of cases. In our study around 31 % of patients required hospital stay less than ten days while rest 69 patients needed stay more than 10 days.

In our study C reactive protein was positive in 87 patients and negative in rest 13 patients, complaints of fever was present in 83 patients in our study group. Leukocytosis was high in 90 patients and normal in rest. Serum lactate was high in 87 patients in our study while only 13 patients were having normal serum lactate. We next analysed the mean HDL on day 1 and day 5, it was 36.5 ± 2.61 on day 1 and 37.25 ± 2.53 on day 5 and there was no significant difference with p value of 0.812.

We did pus, blood, urine and sputum culture in all patients, pus culture was positive in 17 patients and blood culture was positive in 23 patients, urine culture was positive in 33 patients, sputum culture was positive in 47 patients. In our study 39 patients required ventilator during hospital stay and 20 patients required hemodialysis, Mortality was seen in 18 patients in our study while rest 82 patients survived.

We further analysed all the factors with outcome of the patients as survivor (n=18) and non-survivor (n=82). To start with the mean age in

survivor group was 55.78 ± 9.4 and patient who died was 54.16 ± 8.69 , this was not statistically significant. Similarly, there was no significant influence of gender on outcome. Similarly, when we analysed CRP, in both groups most of them were positive with no significant difference.

There was significant difference number of days of hospital stay vs outcome, with mean number of days in survivor was 11.45 ± 2.64 and in non-survivor it was 15.94 ± 2.89 .

Moving on to the main part of study we analysed HDL level in both groups on day one and day 5. Both on day one and day five non survivor group had lower level of HDL than survivor group which was also statistically significant.

HDL LEVEL			
DAY	SURVIVOR	NON-SURVIVOR	P VALUE
DAY 1	37.53 ± 2.62	31.77 ± 2.32	0.001
DAY 5	39.61 ± 2.71	26.66 ± 1.92	0.001

Table 1: HDL on Day 1 & 5

Next, we analysed the SOFA score on both days in both groups, And on both day one and five, it was significantly much higher in non-survivor group

SOFA SCORE			
DAY	SURVIVOR	NON-SURVIVOR	P VALUE
DAY 1	3.71 ± 1.73	5.77 ± 1.92	0.001
DAY 5	2.65 ± 1.36	9.66 ± 2.91	0.001

Table 2: SOFA score on day 1 & 5

We next analysed other factors with the outcome, to start with Most common clinical diagnosis was pneumonia (n=43, 43%) and it was also the leading cause of mortality (n=9, 50%). Patients with hospital stay of more than 10 days had significant increase in mortality (P = 0.017). As expected, increased CRP, total count and serum lactate were associated increased mortality. Serum albumin was low among non survivors (2.54 ± 0.16).

Patients acquiring additional supportive therapies like ventilator/hemodialysis were also associated with increased mortality. Thus significance of requiring additional therapies were also associated with increased severity of disease, with P value of 0.027 for hemodialysis, P value of 0.001 for ventilatory support, while comparing survivors and non survivors. Patient with moribund illness require ventilator support and hemodialysis as a part of life saving resuscitative measures hence its association with non survivors is considered as spurious. We finally analysed the HDL level and SOFA core for severity of sepsis which showed significance at all time period from admission to day 5, non-survivor to survivor, there was a significant correlation.

Table 3: CORRELATION – HDL AND SOFA SCORE

CORRELATION- HDL AND SOFA SCORE		
TIME POINT	R VALUE	P VALUE
ON ADMISSION	0.357	0.01
DAY 5	0.212	0.012
SURVIVOR D1	0.652	0.001
SURVIVOR D5	0.31	0.001
NON SURVIVOR D1	0.105	0.012
NON SURVIVOR D5	0.256	0.001

DISCUSSION

Sepsis is one of the leading causes of mortality worldwide. There is need for development of more sensitive biomarkers for early detection of sepsis. In this study of 100 patients, all were positive for culture, 65 were male, 35 were female. Most common age group was between 51 – 60 years of age, constituting about 35 % of our study population. This can be attributed to the additional risk factors for sepsis in the elderly when compared to the young age group with good immunity and health. In an observational study using hospital discharge data, Martin GS et al⁵, determined that incident rates of sepsis in older adults aged 65 years above increased 20.4% faster than in those aged less than 65 years (mean increase 11.5% vs 9.5% per year, P<0.001). Age and sex had no statistical significance between survivors and non-survivors. In a similar study done by Sunayana P et al⁶, among 70 patients, 42 were male and 28 were female and survival rate was 72.8%. In a study conducted by Naresh et al, had total of 111 patients, of which 67 (60.4%) were males and 44 (39.6%) were female with survival rate of 54%.⁷

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In our study we measured HDL cholesterol on day 1 and day 5 and it was compared with SOFA score of day 1 and day 5 to determine the severity of the disease. SOFA score is used in defining sepsis and as the SOFA score increases, severity and mortality of the disease increases. Mean SOFA score on day 1 (3.72 ± 1.5 in survivor), (5.77 ± 1.26 in non-survivors) with p value of 0.001. SOFA score on day 5 (2.6 ± 1.57 in survivor), (9.66 ± 1.78 in non-survivors) with p value of 0.001. In a similar study conducted by Naresh et al⁷, APACHE 2 score was used and was found to be 22 (median) among non survivors and 14 among survivors.

Non survivor exhibited lesser day 1 HDL than survivor (31 ± 2 vs 37 ± 2 ; P = 0.001). HDL levels was decreased significantly within 5 days in non- survivors and increased in survivors. HDL cholesterol and SOFA were statistically significant in non survivors. In a similar study conducted by Jeyasuriya et al, mean HDL level in non-survival group (at day 0, 3) were found to be 33 and 31 mg% with a non-significant p value of 0.137 and survival group of 31 and 36 mg% and was statistically significant with a p value of 0.033.⁸ In a similar study conducted by Naresh et al, mean HDL value among non survivors was 5.8 and survivors 11.8 mg%.⁷ In a study conducted in Kerala by Sunayana P et al⁶, the HDL values were compared between sepsis and severe sepsis patients and found to have mean HDL was 52. 17 mg/dl, 41.81 mg/dl and 40.08 mg/dl respectively. Similarly in pearson correlation too was significant for various variables. In a similar study conducted by Naresh et al, has used APACHE 2 score and had a correlation of -450 among survivors and -163 among non survivors with p value of <0.003 and was statistically significant.

CONCLUSION

We revealed a decrease of HDL levels in non-survivors of sepsis compared with survivors during the first 5 days after hospitalization and found that an decrease in HDL from baseline is an independent risk factor for mortality. Although further studies are needed to elucidate the role of changes in HDL as a risk factor in patients with sepsis, HDL can be used as an additional and complementary maker with several established measures of illness severity such as SOFA score, APACHE II score, CRP, albumin, and lactate. Moreover, repeating measurement of HDL may be helpful to predict the prognosis of patients with sepsis. Guardedly, we suggest that physicians should be more attentive to septic patients with lower baseline HDL and tendency of decrease in HDL.

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