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A Study of Serum High Density Lipoprotein (HDL) as a Prognostic Marker in Sepsis

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Abstract

Background: In this study, we wanted to evaluate the serum high density lipoprotein (HDL) as a prognostic marker in sepsis. **Material and Methods:** This was a hospital based descriptive study conducted among 100 patients who presented with sepsis to the Institute of Internal Medicine, Madras Medical College and Rajiv Gandhi Government General Hospital, Chennai, over a period of 6 months, after obtaining clearance from Institutional Ethics Committee and written informed consent from the study participants.**Results:** Hyperthermia was observed to be of 54% of study sample. Systolic BP less than 100 mmHg was observed in 53% of samples. Respiratory rate less than 22 was observed in 69% of samples. Patients without ventilator support were found to be 58%. 80% of samples were found to have low HDL levels. GCS, total count, platelet count, serum bilirubin, serum creatinine, acute physiology and chronic health evaluation (APACHE II) and sequential organ failure assessment (SOFA) scores were found to have significant correlation with HDL levels.**Conclusion:** Significant correlation was present between the patients with sepsis and serum HDL level. Low HDL values were observed in patients with severe sepsis and in those having severe organ dysfunction. Serial monitoring of patients with SOFA score, APACHE II score and HDL values are essential for better than a single value, for better prognostication and best clinical outcome in patients with sepsis.

Keywords: Serum High Density Lipoprotein (HDL), Prognostic, Marker, Sepsis.

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Introduction

Sepsis is one of the commonest cause for hospital admissions worldwide. It's a major health concern affecting millions of people around the world. In developing countries like India, infections cause more mortality and morbidity. Sepsis and related organ dysfunction reduces the quality of life of people, thereby reducing the productivity of the country. The speed and appropriateness of therapy administered in the initial hours are likely to influence the outcome. Early recognition of sepsis before the development of organ impairment is of utmost significance. Pathophysiology of sepsis is needed for better understanding of host response to various infections and for diagnosis and treatment. Infection causes a change in cholesterol composition. High density lipoproteins(HDL) possess several biological functions. During infections, HDL level decreases very rapidly. HDL influences humoral and innate immunity by activation of complement system and neutralisation of toxins, hence

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playing a critical role in sepsis. Studies have shown low levels of HDL in sepsis and its level improves with the recovery. So, HDL level can help in the assessment of prognosis in patients with sepsis. Several severities of illness scoring systems were developed and validated over years. Such scores help in stratifying the patients and help in prediction of disease outcome depending on certain clinical and laboratory parameters. These scoring systems aid in objective evaluation, improving triage, therapeutic decision making, medical administration and medical auditing. Sequential organ failure assessment (SOFA) score is one such scoring system used for sepsis related organ dysfunction severity and prognosis. Acute physiology and chronic health evaluation (APACHE) II score is widely used in critically ill patients for prognostication and mortality prediction. In this study, HDL levels were measured in patients having sepsis. SOFA score and APACHE II score were calculated for each patient included in the study. HDL levels are correlated for patients having sepsis. Then the calculated SOFA and APACHE II scores were correlated in study sample.

Aims and Objectives

To study the serum level of HDL in patients with sepsis admitted in the medical wards.
To study the correlation of HDL levels with SOFA score.
To study the correlation of HDL levels with APACHE II score.

Methodology

This was a hospital based Descriptive study conducted among 100 patients who presented with sepsis to the Institute of Internal Medicine, Madras Medical College and Rajiv Gandhi Government General Hospital, Chennai, over a period of 6 months, after obtaining clearance from Institutional Ethics Committee and written informed consent from the study participants.

Inclusion Criteria

- Patients of age greater than 18 years with sepsis

Exclusion Criteria

- Patients on statins
- Chronic liver disease
- Chronic kidney disease
- Thyroid dysfunction
- Diabetes mellitus
- Malignancy
- Chronic inflammatory conditions like Human immunodeficiency virus infection(HIV), systemic lupus erythematosus (SLE), rheumatoid arthritis(RA)
- Patients with malabsorption
- Pregnancy

Data Collection Methods

- Patients were subjected to history taking, clinical examination and biochemical investigations.

Procedure / Investigation Details

- Serum HDL estimation was done by enzymatic method using fully automated analyser

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Statistical Methods

Data was entered in MS Excel and analysed using Statistical Package for Social Sciences (SPSS) software. Results were presented as tables.

RESULTS

Table 1: VENTILATORY SUPPORT

		Frequency	**Percent**
Normal		20	20.0
Hyperthermia		54	54.0
Hypothermia		26	26.0
Total		100	100.0
Temperature			
		Frequency	Percent
	More than 100	47	47.0
	Less than 100	53	53.0
	Total	100	100.0
Systolic_BP			
		Frequency	Percent
	<22	69	69.0
	>22	31	31.0
	Total	100	100.0
Respiratory_Rate			
		Frequency	Percent
	YES	42	42.0
	NO	58	58.0
	Total	100	100.0

Table 2: HDL Groups

Group Statistics FOR 80 ABNORMAL CASES							
	HDL_15	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**	**T Value**	**P Value**
APACHE_II_SCORE	Less than 15	43	33.7674	2.63527	.40187		
	More than 15	37	12.9189	4.68673	.77049	24.96*	P<0.001
SOFA_Score	Less than 15	43	17.7442	1.81388	.27661	21.123*	P<0.001
	More than 15	37	8.1622	2.24244	.36865		

Correlation of SOFA & Apache II score among low HDL groups			
		Frequency	Percent
	NORMAL (35-80)	20	20.0
	ABNORMAL <35	80	80.0
	Total	100	100.0

Hyperthermia was observed to be of 54% of study sample. Systolic BP less than 100 mmHg was observed in 53% of samples. Respiratory rate less than 22 was observed in 69% of samples. Patients without ventilatory support were found to be 58%.

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APACHE II and SOFA scores were having significant correlation with low HDL groups. 80% of samples were found to have low HDL levels.

Table 3: SOFA Score

	HDL_Group	N	Mean	Std. Deviation	Std. Error Mean	T Value	P Value
GCS	Normal (35-80)	20	14.90	0.31	0.07	6.524*	P<0.0001
	Abnormal <35	80	10.59	2.94	0.33		
TOTAL_ COUNT	Normal (35-80)	20	7160.00	4701.11	1051.20	2.26*	0.026
	Abnormal <35	80	11628.75	8501.50	950.50		
PLATELET_COUNT	Normal (35-80)	20	35690.00	20971.43	4689.35	4.123*	P<0.0001
	Abnormal <35	80	21175.00	11840.58	1323.82		
BILIRUBIN	Normal (35-80)	20	0.95	0.27	0.06	11.202*	P<0.0001
	Abnormal <35	80	4.14	2.49	0.28		
CREATININE	Normal (35-80)	20	0.98	0.24	0.05	12.191*	P<0.0001
	Abnormal <35	80	3.48	1.77	0.20		
APACHE _II_SCORE	Normal (35-80)	20	4.15	0.67	0.15	15.985*	P<0.0001
	Abnormal <35	80	24.13	11.10	1.24		
SOFA_SCORE	Normal (35-80)	20	3.50	0.76	0.17	8.368*	P<0.0001
	Abnormal <35	80	13.31	5.21	0.58		

GCS, total count, platelet count, serum bilirubin, serum creatinine, APACHE II and SOFA scores were found to have significant correlation with HDL levels.

DISCUSSION

This study is adescription study done on patients admitted with sepsis. According to the inclusion and exclusion criteria, patients in medical wards were selected. After obtaining proper written consent, they were subjected to detailed history taking and physical examination. Biochemical analysis of collected blood samples was done.[1]

SOFA and APACHE II scores were calculated on the day of admission. HDL levels were estimated and correlated with SOFA and APACHE II scores. In developing countries like India, sepsis remains to be the major cause of mortality and morbidity. Early recognition and prompt treatment will prevent the adverse outcome. SOFA and APACHE II scores help in prognostication of the disease. Serum HDL is one of the widely used investigation in general

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and is available in most of the centres. The concept of decrease in HDL level in sepsis was used in this study and it has been evaluated. Some of the studies are mentioned below. A study of serum HDL levels in severe sepsis patients done by NareshMonigari et al. showed significant association of low HDL value on day 1 with mortality.[2] In a study done by Sunil B Kumarasamy et al. showed plasma concentrations of HDL were low in severe sepsis patients and reflecting the severity of the disease.[3] A study published by Chien et al. showed that low HDL level on day 1of severe sepsis is significantly associated with an increase in mortality and adverse clinical outcome.[4] In this study, serum level of HDL was decreased in 80% of patients. There was a significant correlation between sepsis and HDL level. In our sample, proportion of males got admitted was higher than females. Hyperthermia, systolic BP < 100 mm Hg, respiratory rate < 22/ minute and patients without ventilatory support were in higher proportion. SOFA and APACHE II scores were inversely proportional with HDL levels. In patients having low HDL levels, these scores were very high and showing poor prognosis. Significant correlation was found between sepsis and HDL and also between HDL and these two scores.[5-7]

CONCLUSION

Significant correlation was present between the patients with sepsis and serum HDL level. Low HDL values were observed in patients with severe sepsis and in those having severe organ dysfunction. Higher values of SOFA and APACHE II scores were associated with low HDL levels. HDL level has significant correlation with SOFA and APACHE II scores. In this study, HDL level less than 15 mg/dl have higher SOFA and APACHE II scores, indicating poor prognosis in such patients. Hence, a simple investigation like HDL can be used as a prognostic marker in sepsis. Serial monitoring of patients with SOFA score, APACHE II score and HDL values are essential than a single value, for better prognostication and best clinical outcome in patients with sepsis.

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