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Evaluation of Liver Function in Diabetic Septicemias And Its Clinical Significance

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Abstract: *The objective of this study is to evaluate liver function abnormalities in patients with diabetic septicemias. There is substantial rize in gram negative sepsis in recent years and hepatic dysfunction forms a major part of multiple organ failure in diabetic patients. There is high incidence of infection in diabetic patients as compared to their counterparts. Approximately 1% of hospital admissions are complicated by gram negative sepsis and overall mortality from septic shock lies between 30-80%.*

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I. Introduction

Over the past twenty years there has been a tenfold increase in the incidence of Gram negative sepsis. Approximately 1% of hospital admissions are complicated by Gram negative sepsis, resulting in about 100,00 deaths annually. Overall mortality from septic shock has been estimated to be between 30 to 80%[1.2]. Hepatic dysfunction is believed to be an important component of this sepsis and forms a part of multiple organ failure syndrome (MOF). In patients with diabetes mellitus there is a high incidence of liver involvement in the form of fatty infiltration, glycogen accumulation; and cirrhosis[3]. Diabetic patients have a high incidence of infection as compared to their non-diabetic counterparts. Therefore, it was found desirable to document liver dysfunction in diabetic septicemias as blood born infection is usually a precursor to liver involvement. This was compared with patients not having diabetes mellitus.

II. Material And Methods

In this prospective, randomized, study conducted in the medical and surgical emergency as well as other units of Nalanda Medical College & Hospital, Patna. 146 consecutive patients admitted with a clinical diagnosis of septicemia were selected. 41 patients were excluded; and, 105 patients fulfilled the criteria for inclusion.

Inclusion criteria :

1. Clinical evidence of infection
2. Presence of fever or hypothermia
3. Any 3 of the following

i. Tachycardia - > 100 / minute
ii Tachypnoea - > 20 / minute
iii Altered mental status
iv Hypotension
v Leucocytosis

4. Positive or negative blood culture

Exclusion criteria :

i. Patients with clinical or laboratory evidence of pre-existing hepatobiliary disease such as cirrhosis of liver, alcoholic liver disease, chronic active hepatitis, HBV infection, cholecystitis, gall stone disease.
ii. Patients receiving hepatotoxic drugs such as anti tubercular drugs
iii. Patients with malaria.

Observation

105 patients were included in the study. Their sex and age distribution is shown in Table 1.

Table 1 Sex and age distribution of the subjects

Age group	Males	Females
15-29	13	12
30-44	20	15
45-59	16	10
60-74	09	03
75-89	06	00
>90	01	00

61 patients were blood culture positive, of these 20 grew Gram positive, 30 grew Gram negative and the rest both type of organisms. There were 23 (21.9%) diabetic patients in the study group; of these 12 were males. 21 out of 23 were in the above 45 years age group. In these diabetics, 26.1% presented with septic shock, comprising of a cascade of metabolic, hemodynamic and clinical changes resulting from the release of, and the host response to the presence of microbial toxins in the blood stream. 1 patient expired 21.7% presented with significant hypoxia and 4 patients in this category expired. 7 patients had a haemoglobin value less than 10.1 patient had significant leucopenia. 65.2% had leucocytosis in whom 6 expired. 19 patients (82.6%) had thrombocytopenia in whom 7 expired. Evidence of renal failure as revealed by a serum creatinine above 2.0 mg% was present in 39.1% of patients, of these 13 patients had concurrent hypertension. The primary source of infection in the diabetic group was urinary system (39.1%) followed by the respiratory system (26.1%). 66.7% of the patients with respiratory infection expired. It was most disturbing to note normal arterial blood gas in only 4 (15.1%) patients. Mixed defect of metabolic acidosis with respiratory alkalosis was seen in 7 patients (30.4%); metabolic acidosis, and respiratory alkalosis alone in 6 patients each (26.1%).

The liver function test performed in these diabetic septicemic patients following standard laboratory procedures[5] compared with the non diabetic patients is shown in Table 2.

Table 2 Laboratory Parameters

Parameter	Diabetics	Non diabetics	p value
Tot. Protein Mean Median	 6.18 ± 0.96 6.00	 5.35 ± 1.26 5.40	0.004
Albumin Mean Median	 3.01 ±0.65 3.00	 2.64 ± 0.85 2.50	0.05
Tot. Bilirubin Mean Median	 1.42 ±1.48 1.00	 3.33 ± 3.74	0.02
AST Mean Median	 82.96 ±76.53 47.00	 241.84 ±723.18 102.50	0.30
ALT Mean Median	 66.61 ±59.97 46.00	 378.23 ± 326.74 63.00	0.58
Alk. Phos. Mean Median	 370.09 ±296.58 241.00	 378.23 ± 326.74 281.00	0.91
GGT Mean Median	 63.06 ± 57.58 40.00	 69.27 ± 91.68 37.00	0.76

III. Discussion

Evaluation of M.O.F. of which liver dysfunction is an invariable accompaniment was critically assessed in patients with diabetic septicemias. Aim of this study being to find out the extent to which such patients have hepatic derangement in addition to other organ involvement. There was a significant number of diabetic patients in this study (21.9%). This compared favourably with the one reported by Rayner (23.5%)[6]. Previous studies on sepsis; and, liver functions have not brought out the incidence and outcome in diabetic subgroups[7.8] Rayner in his study has also highlighted the urinary system as the most common site of primary infection (39.1%) followed by the respiratory system (26.1%). In the diabetic group the mean value of protein was 6.183 ± 0.976 gm% compared with the non diabetic group's 5.352 ± 1.2639 ($p<0.05$). The albumin value also varied between the two groups studied: 3.017 ± 0.653 gm% in diabetics, and, 2.643 ± 0.848 gm% in non

diabetics ($p<0.05$). The bilirubin levels were lower in the diabetic patients as compared with non diabetics ($p<0.05$). The mean AST, ALT and GGT values were minimally altered in the diabetic patients (82.96, 66.61, 63.09) whereas in the non diabetics it was significantly elevated (241.84, 139.23 and 191.68). Through the mean alkaline phosphatase value in diabetic patients compared favourably with that seen in the non diabetics (370.09 vs. 378.23) it was significantly elevated (Table 2). However, in the diabetic patients who expired the alkaline phosphatase values were grossly increased when compared with those patients who survived (546.87 vs. 275.80) ($p<0.05$).

In our study there was no difference in the outcome of patients with diabetes when compared with the non diabetics, whereas in Rayner's study diabetics showed a slightly worse outcome.

IV. Conclusion

Thus, this study performed in patients with diabetes mellitus and with septicemia clearly highlights that liver dysfunction except an elevated alkaline phosphatase is not a major issue though they have other components of MOF consisting of gross metabolic derangements, hematologic complications; renal dysfunction. In the event of a gross liver dysfunction being present in diabetic septicemic patients one has to look for other common causes of liver disease such as HBV infection drug toxicity, chronic active hepatitis or underlying cirrhosis.

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