DOI: https://doi.org/10.54393/pbmj.v6i02.850

PAKISTAN BIOMEDICAL JOURNAL
https://www.pakistanbmj.com/journal/index.php/pbmj/index
Volume 6, Issue 2 (February 2023)

Original Article

Variations in Biochemical Parameters in Diabetic and Non-Diabetic Patients of Septicemia

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ARTICLE INFO

Key Words:
Septicemia, Diabetic, Non-Diabetic, LFT, RFT, CBC

How to Cite:
Manzoor, Z. ., Aslam, M., Perveen, K. ., & Bashir, F. . (2023). Variations in Biochemical Parameters in Diabetic and Non-Diabetic Patients of Septicemia: Biochemical Parameters in Diabetic and Non-Diabetic Patients of Septicemia. Pakistan BioMedical Journal, 6(02). https://doi.org/10.54393/pbmj.v6i02.850

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Received Date: 16th January, 2023
Acceptance Date: 24th February, 2023
Published Date: 28th February, 2023

ABSTRACT

Septicemia is an infection caused by poisoning of blood by bacteria and is a prevalent disease in Pakistan. However, there is limited understanding of the pathogenesis of abnormal blood, liver and renal chemistry tests in septicemia. **Objective:** To determine variations in respective LFTs and RFTs and CBCs of diabetic and non-diabetic patients of septicemia. **Methods:** A descriptive, observational, cross-sectional research was directed, involving 101 participants diagnosed with septicemia. Study setting was Mayo Hospital Lahore. A specially designed Performa was used to record data, including liver function tests, renal function tests, and complete blood count for each patient. The data were analyzed using the latest version of SPSS. **Results:** In this study 45/101 patients of septicemia had diabetes. LFTs were also same for both non-diabetic and diabetic patients except Albumin which was low in diabetic patients but normal in non-diabetic patients. CBC were equally deranged in all diabetic and non-diabetic patients. **Conclusions:** This research provides important understandings into the variations of LFTs and RFTs and CBCs in diabetic and non-diabetic patients with septicemia. The findings suggest that while LFTs are similar between the two groups, there is a difference in albumin levels, highlighting the need for further investigation into the role of diabetes in septicemia.

INTRODUCTION

Septicemia, also known as sepsis, is a condition instigated by the regulation of toxicogenic microorganisms and their toxins in tissues or blood, leading to a systemic inflammatory response. It is commonly produced by infections caused by bacteria, such as Staphylococcus aureus, and sometimes occurs in combination with viral or fungal infections [1]. Septicemia has become increasingly common among hospitalized patients in recent decades and is a major cause of morbidity and mortality, particularly in infants with very low birth weight [2-4]. Symptoms of septicemia vary but commonly include fever, diarrhea, and vomiting. Low birth weight, prematurity, and complicated deliveries are among the risk factors associated with non-nosocomial infection sepsis [5, 6]. *Klebsiella* species and *Escherichia coli* are the most common organisms causing non-nosocomial infection sepsis, while *Klebsiella* is the most common cause of nosocomial sepsis [6, 7]. Contaminated intravenous lines are a common cause of septicemia and are normally located at the lungs and urinary tract [8]. Diabetes is listed as a comorbidity in many hospitalizations, and adult respiratory distress syndrome is associated with septicemia and worsens prognosis [7, 9].

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Septicemia can be diagnosed using blood culture to isolate the microbial causative agents [10-12]. Septicemia is a common clinical condition in hospitals worldwide, with reported rates varying by age, gender, and race. In the United States, septicemia causes over 34,000 deaths per year and is more common among elderly patients and the Black population [13]. In India, septicemia is encountered in most hospitals, and in Pakistan, it is a leading cause of hospital mortality [5, 14]. Hence, septicemia is a serious condition that can have severe consequences, particularly in vulnerable populations such as infants and the elderly. There is a less human health awareness related to septicemia and its relation to diabetes. This study is aimed to enhance health awareness and avoid common pitfalls in the evaluation of septicemia. It is important to identify and treat it promptly to improve patient outcomes.

METHODS

The research design of this study was observational, descriptive, cross-sectional study. Sample size was 101 participants diagnosed with septicemia. Study setting was accidental and medical wards of Mayo Hospital Lahore. The study included patients over the age of 30 years and excluded children, pregnant, and lactating women. The aim of the study was to observe the variations in RFTs, LFTs, and CBC of patients at the time of presentation by conducting careful examinations of the patients. Prior consent was obtained from the patients or their guardians, and all ethical considerations were taken into account during data collection. Ethical approval was taken by the Ethical Consideration board of KEMU. A specially designed Performa was used to record data, involving renal function tests, complete blood count and liver function tests for each patient. The data were analyzed using the latest version of SPSS.

RESULTS

Table 1 shows variations in RFTs in diabetic and non-diabetic patients of septicemia. Diabetes is a major risk factor of septicemia. In this study 45/101 patients of septicemia had diabetes (Table 1).

Diabetes status	Bilirubin			B. Glucose			B. Urea			Creatinine			Na+			K+			TOTAL
	L	N	h	L	N	h	L	N	h	L	N	h	L	N	h	L	N	h	
Diabetic	0	36	9	0	5	40	0	9	36	4	14	27	17	25	3	5	40	0	45
Non-Diabetic	0	47	9	7	33		0	20	36	15	16	25	25	29	2	7	47	2	56
TOTAL	0	83	18	7	38	56	0	29	72	19	30	52	42	54	5	12	87	2	101

Table 1: Variations in RFTs in patients of septicemia with and without diabetes

Table 2 shows variations in LFTs in patients of septicemia with and without diabetes. LFTs were also same for both type of patients except Albumin which was low in diabetic patients but normal in non-diabetic patients (Table 2).

Diabetes status	ALT			AST			ALP			Albumin			T. Protein			TOTAL
	L	N	h	L	N	h	L	N	h	L	N	h	L	N	h	
Diabetic	0	31	14	0	27	18	0	0	45	27	18	0	2	43	0	45
Non-Diabetic	0	32	24	0	23	33	0	1	55	18	38	0	1	55	0	56
TOTAL	0	63	38	0	50	51	0	1	100	45	56	0	3	98	0	101

Table 2: Variations in LFTs in patients of septicemia with and without diabetes

Table 3 shows variations in CBC in patients of septicemia with and without diabetes. RFTs and CBC were equally deranged in all diabetic and non-diabetic patients (Table 1, 3).

Diabetes status	WBC			Platelets			TOTAL	Hemoglobin Male			TOTAL	Hemoglobin Male			TOTAL
	L	N	h	L	N	h		L	N	h		L	N	h	
Diabetic	0	5	40	18	27	0	45	21	3	0	24	15	3	3	21
Non-Diabetic	0	11	45	19	32	5	56	22	5	0	27	21	8	0	29
TOTAL	0	16	85	37	59	5	101	43	8	0	51	36	11	3	50

Table 3: Variations in CBC in Diabetic and Non-Diabetic patients of septicemia

DISCUSSION

Septicemia is a serious and life-threatening condition that requires prompt diagnosis and treatment. In this study, the researchers aimed to determine the cause and etiology of septicemia in patients presenting to the medical wards and Accident & Emergency Department of Mayo Hospital Lahore. The study found that diabetes is a major risk factor for septicemia, as 45 out of 101 patients in the study had diabetes. The study also found that renal and liver function tests were similarly deranged in both diabetic and non-diabetic patients, while albumin was low in diabetic patients but normal in non-diabetic patients. These findings are consistent with previous studies that have shown a high prevalence of diabetes in

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patients with sepsis. A systematic review and meta-analysis of 26 studies by Liu *et al.*, (2020) found that diabetes was associated with an increased risk of sepsis and septic shock [15]. Another study by Umpierrez *et al.*, (2002) found that patients with diabetes had a higher risk of developing severe sepsis and septic shock and were more likely to require ICU admission and mechanical ventilation [16]. The finding that liver and renal function tests were similarly deranged in both diabetic and non-diabetic patients is also consistent with previous studies. A study by Martin *et al.*, (2003) found that patients with diabetes had higher rates of acute kidney injury and liver dysfunction compared to non-diabetic patients, but there was no significant difference in the severity of these complications between the two groups [17]. The finding of low albumin levels in diabetic patients with septicemia is also supported by previous studies. A study by Jaar *et al.*, found that low serum albumin levels were associated with increased mortality in patients with sepsis, and that this association was stronger in patients with diabetes [18]. The study has some limitations, including its small sample size and the fact that it was conducted at a single center. Future studies with larger sample sizes and conducted at multiple centers are needed to confirm these findings and provide a more comprehensive understanding of the relationship between diabetes and septicemia. In conclusion, this study found that diabetes is a major risk factor for septicemia, and that renal and liver function tests are similarly deranged in both diabetic and non-diabetic patients. However, albumin levels were lower in diabetic patients compared to non-diabetic patients. These findings are consistent with previous studies and highlight the need for early recognition and aggressive management of septicemia in patients with diabetes [19, 20].

CONCLUSIONS

Septicemia is a serious condition that can have severe consequences, particularly in vulnerable populations such as infants and the elderly. Diabetes is a significant risk factor for septicemia. This research offers important information about variations of LFTs and RFTs and CBCs in diabetic and non-diabetic patients with septicemia. The findings suggest that while LFTs are similar between the two groups, there is a difference in albumin levels, highlighting the need for further investigation into the role of diabetes in septicemia.

Conflicts of Interest

The authors declare no conflict of interest.

Source of Funding

The authors received no financial support for the research, authorship and/or publication of this article.

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