

FUTURISTIC BIOTECHNOLOGY

<https://fbtjournal.com/index.php/fbt>

Volume 2, Issue 1 (Jan-Jun 2022)



Original Article

Assessment of Risk Factors of Septicemia

Ammarah Hasnain¹, Sidra Khalid² and Ahmad Alwazzan³

¹Department of Biotechnology, Lahore Medical and Dental College, Lahore, Pakistan

²University Institute of Dietetics and Nutritional Sciences, Faculty of Allied Health Sciences, The University of Lahore, Lahore, Pakistan

³Department of Obstetrics and Gynecology, King Abdul Aziz University, Jeddah, Saudi Arabia

ARTICLE INFO

Key Words:

Septicemia, Risk Factors, Hypertension, Diabetes, Smoking

How to Cite:

Hasnain, A., Khalid, S., & Alwazzan, A. (2022). Assessment of Risk Factors of Septicemia : Assessment of Risk Factors of Septicemia. *Futuristic Biotechnology*, 2(01). <https://doi.org/10.54393/fbt.v2i01.24>

*Corresponding Author:

Ammarah Hasnain
Department of Biotechnology, Lahore Medical and Dental College, Lahore, Pakistan
ammarahasnain3@gmail.com

Received Date: 20th April, 2022

Acceptance Date: 12th June, 2022

Published Date: 30th June, 2022

ABSTRACT

Septicemia, commonly referred to as blood poisoning, is a potentially life-threatening medical condition caused by the presence of harmful bacteria in the bloodstream. **Objective:** To assess risk factors of septicemia and observe correlation between them. **Methods:** This study is cross-sectional, descriptive, and observational. From the medical wards and Accident & Emergency Department of Mayo Hospital Lahore, 101 patients with septicemia were removed. Data was entered into a Performa created specifically for this use. **Results:** 15/32 patients of UTI, 11/18 patients of bed sores, 6/13 patients having chest infection, 4/8 patients having wound infection, 4/6 patients of hepatic encephalopathy and 3/6 patients of CVA were diabetic. Correlation at two levels was seen i.e., 0.05 which is an indicative of significant correlation and 0.01 which indicates highly significant correlation. **Conclusions:** Understanding the risk factors associated with septicemia is crucial for preventing and managing this condition. Age, male sex, diabetes, smoking, hypertension, and immunocompromised status have all been identified as significant risk factors for septicemia. Improving early life conditions, increasing vitamin D intake, and improving nutritional status may also play a role in reducing the risk of septicemia.

INTRODUCTION

Septicemia, commonly referred to as blood poisoning, is a potentially life-threatening medical condition caused by the presence of harmful bacteria in the bloodstream [1]. It is a major health risk that can result in sepsis, a disease when the immune system of the body overreacts to an infection, producing widespread inflammation and possibly even organ failure [2, 3]. People of all ages can develop septicemia, which can be brought on by a variety of different bacterial infections. The etiological factors of septicemia include alcohol [4], old age, socioeconomic status, lowered immunity, immunocompromising diseases (including AIDS and other hematological malignancies) [5, 6], diabetes mellitus (DM) [7, 8], HIV, hemodialysis [9], hospital acquired infections [10], cirrhosis [11], and comorbidity with several chronic and infectious diseases

[12]. One of the most prevalent chronic co-morbid medical diseases in the USA is diabetes mellitus (DM), which is usually present in sepsis patients [7, 8]. Granulocytopenia, which commonly coexists with severe bacterial infection in alcoholics and is negatively correlated with clinical prognosis. Alcohol reduces granulocyte production during septicemia and inhibits the stem cell antigen-1 response in granulocyte lineage-committed precursors, which may be an unique mechanism causing decreased host defense in alcoholics [4]. Patients receiving both hemodialysis (HD) and peritoneal dialysis (PD) commonly develop septicemia [13]. Age-related mortality from septicemia rises dramatically. Improved prenatal environments may facilitate better adaptive immunity development, hence boosting immunity against bacterial infections [6].

Systemic infections are rare and only occur in elderly people or those with severe underlying diseases, such as cirrhosis [11]. Assessing the risk factors for septicemia is critical in preventing and treating this condition. Understanding the factors that increase the likelihood of developing septicemia can help healthcare providers identify patients who are at risk and take appropriate measures to prevent or manage the condition [14, 15]. This article explored the various risk factors for septicemia, including underlying medical conditions, invasive medical procedures, and weakened immune systems. By examining these risk factors, we can gain a better understanding of how to prevent and manage septicemia, ultimately improving patient outcomes and reducing the incidence of this serious condition.

METHODS

This study is cross-sectional, descriptive, and observational. From the medical wards and Accident & Emergency Department of Mayo Hospital Lahore, 101 patients with septicemia were removed. Children, pregnant women, and women nursing infants were not allowed to participate in the study. Individuals above the age of 30 were enrolled. These individuals have had in-depth examinations to identify the origin and etiology of the disease at the time of presentation. The patients' or their guardians' permission was obtained. Throughout the data gathering procedure, every other ethical concern was taken into account. Also, the KEMU Ethical Consideration board gave their approval. Data was entered into a Performa created specifically for this use. Liver function tests, renal function tests, and full blood counts were performed for each patient. SPSS latest version was used for statistical analysis of data.

RESULTS

15/32 patients of UTI, 11/18 patients of bed sores, 6/13 patients having chest infection, 4/8 patients having wound infection, 4/6 patients of hepatic encephalopathy and 3/6 patients of CVA were diabetic (Table 1).

Causes	Diabetics	Non-diabetic	Total
Urinary Tract Infection	15	17	32
Bed Sores	11	07	18
Chest Infection	06	07	13
Wound Infection	04	04	08
Diabetic Foot	04	00	04
Brain Injury	00	05	05
Hepatic Encephalopathy	04	02	06
Gastroenteritis	03	01	04
Aspiration Pneumonia	01	05	06
Old CVA	03	03	06

Table 1: Major causes of Septicemia with respect to Diabetes status

Correlation was seen between different variables (Table 2). Pearson's correlation was applied which shows correlation at two levels i.e., 0.05 which is an indicative of significant correlation and 0.01 which indicates highly significant correlation. Negative sign (-) before a numeric value shows that two variables are inversely/negatively correlated. ALP and HTN are negatively whereas Glucose is positively correlated with age of patients.

Correlating Variables		Pearson's Correlation		Sig. (2tailed)
		at 0.05 level	at 0.01 level	
Age of Patients	ALP	-.215		.031
	B. Glucose	.248		.012
	Hypertension		-.295	.003
Smoking	B. Urea	.224		.024
Upper GI Bleeding	Bilirubin		-.269	.007
Septic Shock	B. Urea		-.263	.008
Chest Infection	Albumin	.203		.042
Urinary Tract Infection	WBC	.217		.030
Platelets Count	B. Glucose	-.205		.040
Chronic Renal Failure	Na+		.334	.001
Chronic Renal Failure	K+		-.290	.003
Respiratory Failure	ALT		-.759	.000
Respiratory Failure	AST		-.684	.000
End Stage Renal Disease	B. Urea		-.310	.002

Table 2: Correlation between Biochemical and Hematological parameters, Risk factors, Complications and Causes of Septicemia

Table 3 shows major risk factors of septicemia observed in this study. Diabetes was observed in 45 participants in which 24 were male and 21 were female. Hypertension was observed in 23 participants in which 13 were male and 10 were female. Smoking was observed in 18 participants all of which were males.

Major Risk Factors	Male	Female	Total
Diabetes	24	21	45
Hypertension	13	10	23
Smoking	18	00	18

Table 3: Major Risk Factors of Septicemia

DISCUSSION

Age, male sex, a history of diabetes, smoking one pack or more cigarettes per day, and difficulty performing daily tasks are risk factors that significantly and independently raise the fatality rate in septicemia [16]. Diabetes makes a person more vulnerable to septicemia and infection [17]. One of the most prevalent etiological variables is diabetes, which is usually present in sepsis patients [7]. The most prevalent risk factor in our analysis was diabetes, which was present in 44.55% of patients. Diabetics made up 42% of women and 47.05% of men. Smoking has damaging effects on the skin, soft tissues, respiratory system, and immunological system, and it raises the risk of septicemia

[18]. After smoking, hypertension was the second often observed risk factor in our study. Men and women experienced somewhat different rates of septicemia [8]. In our study, septicemia afflicted males and females equally (50.50% males, 49.0% females). The tests performed for this study exhibited identical findings for both genders, with the exception of ALT, which was normal in the majority of males (64.70%) but increased in the females (62%). Patients with weakened immune systems are more likely to acquire bloodstream infections such as septicemia [19]. The development of adaptive immunity is improved by better early life settings, which may increase immunity (resistance) against bacterial infections [6]. Vitamin D and sun UVB are essential factors in lowering the incidence of septicemia, according to a US based research [12]. The risk of septicemia can be reduced by improving nutritional status [20]. A patient should also maintain good personal hygiene. Cuts, pricks, and surgical wounds need to be managed properly. In addition to preventative antibiotics and routine checkups, proper medical care is also required.

CONCLUSIONS

In conclusion, septicemia is a serious and potentially life-threatening condition that can affect people of all ages. Understanding the risk factors associated with septicemia is crucial for preventing and managing this condition. Age, male sex, diabetes, smoking, hypertension, and immunocompromised status have all been identified as significant risk factors for septicemia. Improving early life conditions, increasing vitamin D intake, and improving nutritional status may also play a role in reducing the risk of septicemia. It is important for patients to take care of their personal hygiene and for healthcare providers to manage surgical wounds and cuts properly. Regular medical checkups and prophylactic antibiotics can also help prevent septicemia. By identifying and addressing these risk factors, we can work towards reducing the incidence of septicemia and improving patient outcomes.

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.

REFERENCES

- [1] Fanaroff AA, Korones SB, Wright LL, Verter J, Poland RL, Bauer CR, *et al.* Incidence, presenting features, risk factors and significance of late onset septicemia in very low birth weight infants. *The Pediatric Infectious Disease Journal*. 1998 Jul; 17(7): 593-8. doi: 10.1097/00006454-199807000-00004.
- [2] Vinod Kumar CS and Neelagund YF. Incidence and antifungal susceptibility of *Candida* species in neonatal septicemia. *The Journal of Communicable Diseases*. 2004 Sep; 36(3): 182-6.
- [3] Alam MS, Pillai PK, Kapur P, Pillai KK. Antimicrobial therapy and outcome of septicemia patients admitted to a University Hospital in Delhi. *Arzneimittelforschung*. 2012 Mar; 62(03): 117-22. doi: 10.1055/s-0031-1298005.
- [4] Melvan JN, Siggins RW, Bagby GJ, Stanford WL, Welsh DA, Nelson S, *et al.* Suppression of the stem cell antigen-1 response and granulocyte lineage expansion by alcohol during septicemia. *Critical Care Medicine*. 2011 Sep; 39(9): 2121-30. doi: 10.1097/CCM.0b013e31821e89dc.
- [5] Behrendt G, Schneider S, Brodt HR, Just-Nübling G, Shah PM. Influence of antimicrobial treatment on mortality in septicemia. *Journal of Chemotherapy*. 1999 Jan; 11(3): 179-86. doi: 10.1179/joc.1999.11.3.179.
- [6] Wong IO, Cowling BJ, Leung GM, Schooling CM. Trends in mortality from septicaemia and pneumonia with economic development: an age-period-cohort analysis. *PLoS One*. 2012 Jun; 7(6): e38988. doi: 10.1371/journal.pone.0038988.
- [7] Esper AM, Moss M, Martin GS. The effect of diabetes mellitus on organ dysfunction with sepsis: an epidemiological study. *Critical Care*. 2009 Feb; 13: 1-6. doi: 10.1186/cc7717.
- [8] McBean M and Rajamani S. Increasing rates of hospitalization due to septicemia in the US elderly population, 1986-1997. *The Journal of Infectious Diseases*. 2001 Feb; 183(4): 596-603. doi: 10.1086/318526.
- [9] Abbott KC and Agodoa LY. Etiology of bacterial septicemia in chronic dialysis patients in the United States. *Clinical Nephrology*. 2001 Aug; 56(2): 124-31.
- [10] Wang FD, Wang LS, Liu CY, Cheng DL, Duh RW, Tsai IK. Septicemia in adults: II. Factors in prognosis. *Chinese Medical Journal; Free China ed*. 1989 Aug; 44(2): 89-94.
- [11] Ashley BD, Noone M, Dwarakanath AD, Malnick H. Fatal *Pasteurella dagmatis* peritonitis and septicaemia in a patient with cirrhosis: a case report and review of the literature. *Journal of Clinical Pathology*. 2004 Feb; 57(2): 210-2. doi: 10.1136/jcp.2003.7419.
- [12] Grant WB. Solar ultraviolet-B irradiance and vitamin D may reduce the risk of septicemia. *Dermato-Endocrinology*. 2009 Jan; 1(1): 37-42. doi: 10.4161/derm.1.1.7250.
- [13] Powe NR, Jaar B, Furth SL, Hermann J, Briggs W. Septicemia in dialysis patients: incidence, risk factors, and prognosis. *Kidney International*. 1999

- Mar; 55(3): 1081-90. doi: 10.1046/j.1523-1755.1999.0550031081.x.
- [14] Struelens MJ, Patte D, Kabir I, Salam A, Nath SK, Butler T. Shigella septicemia: prevalence, presentation, risk factors, and outcome. *Journal of Infectious Diseases*. 1985 Oct; 152(4): 784-90. doi: 10.1093/infdis/152.4.784.
- [15] Motte S, Deviere J, Dumonceau JM, Serruys E, Thys JP, Cremer M. Risk factors for septicemia following endoscopic biliary stenting. *Gastroenterology*. 1991 Nov; 101(5): 1374-81. doi: 10.1016/0016-5085(91)90091-X.
- [16] Salive ME, Wallace RB, Ostfeld AM, Satterfield SU, Havlik RJ. Risk factors for septicemia-associated mortality in older adults. *Public Health Reports*. 1993 Jul; 108(4): 447.
- [17] Koh GC, Peacock SJ, Van Der Poll T, Wiersinga WJ. The impact of diabetes on the pathogenesis of sepsis. *European Journal of Clinical Microbiology & Infectious Diseases*. 2012 Apr; 31: 379-88. doi: 10.1007/s10096-011-1337-4.
- [18] Huttunen R, Heikkinen T, Syrjänen J. Smoking and the outcome of infection. *Journal of Internal Medicine*. 2011 Mar; 269(3): 258-69. doi: 10.1111/j.1365-2796.2010.02332.x.
- [19] Papageorghe R. Bloodstream infections in immunocompromised hosts. *Romanian Archives of Microbiology and Immunology*. 2012 Apr; 71(2): 87-94.
- [20] Jaar BG, Hermann JA, Furth SL, Briggs W, Powe NR. Septicemia in diabetic hemodialysis patients: comparison of incidence, risk factors, and mortality with nondiabetic hemodialysis patients. *American Journal of Kidney Diseases*. 2000 Feb; 35(2): 282-92. doi: 10.1016/S0272-6386(00)70338-6.