ORIGINAL RESEARCH PAPER

Paediatrics

Prognostic Value Of Shock Index In Children With Sepsis/ Septic Shock

KEY WORDS:

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ABSTRACT

Objective- To investigate the association between PICU shock index and mortality in children with sepsis/septic shock and to explore cut off values for ICU mortality, how change in shock index over the first 6 hours of ICU admission is associated with outcome. **Methods-** 50 children who presented with sepsis/ septic shock were included in the study. Children were classified as per their age as < 1 year, > 1 year - < 6 years and > 6 years. They were also grouped as sepsis, severe sepsis and septic shock as per the International Sepsis Consensus Conference definition of sepsis in 2005. Clinical parameters like heart rate and systolic blood pressure was recorded, following which shock index was calculated over 0, 1, 2, 4 and 6 hours of PICU admission and trend was noticed. Patients were finally divided into 2 groups as per outcome, i.e. survival/ death. **Results :** Data analysis was done using GraphPad Prism 5. Cut-off values of shock index were analysed using Receiver Operator Curve and their relative risk of mortality was studied. Higher values of shock index and increasing trend of shock index was associated with increased mortality. **Conclusion :** SI can be a promising marker for risk of mortality in children with sepsis/ septic shock. It is simple, non-invasive and bedside clinical tool to identify high-risk children and help us keep vigilant. The obtained cut-off values indicate that higher the SI, higher is the risk of mortality.

INTRODUCTION

Sepsis in pSediatric age group is likely due to result of sequence of disorders that is due to infection by viruses, bacteria, parasite, fungi or toxins of organisms. Infection is defined as a suspected or proven (By positive culture, tissue stain or polymerase chain reaction test) infection caused by any pathogen or a clinical syndrome associated with a high probability of infection.[1]

There are various scores to predict the mortality and severity of illness when admitted in PICU[2-4.] In this study, the range in normal heart rate per minute for age was considered as per pediatric advance life support guidelines, 2015. Some of the common causes of tachycardia include increased body temperature, sympathetic stimulation of the heart and toxic conditions of the heart. Causes of sympathetic stimulation causing tachycardia includes blood loss resulting in shock causing sympathetic reflex stimulation of the heart and weakened myocardium causing pump failure causing sympathetic stimulation to increase the HR. Blood pressure is defined as the lateral pressure exerted by the column of blood on the walls of arteries. Normal blood pressure in children by age[5] as per pediatric advance life support guidelines, 2015. Hypotension in children is defined by the various thresholds of systolic blood pressure. For measuring BP, cuff sizes for various age groups were determined. With HR and SBP, Shock Index was calculated. SI= HR/ SBP. Repeated studies in children and adults have demonstrated that early recognition and aggressive resuscitation of shock is associated with better outcome. By determining the Shock index, it has the advantage of distinguishing from suppressed sympathetic state, use of anticholinergic drugs, sedation, which all can be confounding factors while assessing critically ill children, as heart rate and blood pressure individually cannot differentiate the above states. Thus, we sought to use a simple, non-invasive, metric tool that can serve as a predictive marker of high-risk children with sepsis/ septic shock. Though normal range of shock index has been suggested earlier, it is difficult to define the normal cut-off values for SI in children. Thus, this study was done to investigate the association between PICU shock index and mortality in children with sepsis/ septic shock and to explore cut-off values for ICU mortality, how change in shock index over the first 6 hours of ICU admission is associated with outcome.

OBJECTIVES

To find the association between PICU shock index and mortality in children with sepsis/ septic shock and to explore the cut-off values for shock index and to determine the change in shock index during the first 6 hours of PICU stay and its outcome.

METHODS

Study Design: Observational cohort study. Study Place: Paediatric Intensive Care Unit, Government General Hospital attached to Kurnool Medical College, Kurnool. Study Period: 6 months period from Jan to June 2021. 50 children who presented with sepsis/ septic shock were included in the study. Children were classified as per their age as < 1 year, > 1 year - < 6 years and > 6 years. They were also grouped as sepsis, severe sepsis and septic shock as per the International Sepsis Consensus Conference definition of sepsis in 2005. Clinical parameters like heart rate and systolic blood pressure was recorded, following which shock index was calculated over 0, 1, 2, 4 and 6 hours of PICU admission and trend was noticed. Patients were finally divided into 2 groups as per outcome, i.e. survival/ death.

RESULTS

Relationship Between The Si Index At Various Time In Various Age Groups With Outcome In The Study

S.No	Age group	Cut off value of SI index	Relative risk between survived and died groups	Confidence interval 95%
1	≤ 1 year (n=15)			
	SI index at 0 hr	2.16	2.01	0.67 to 5.91
	SI index at 6hr	1.77	2.85	0.78 to 10.37
2	>1 to ≤ 6 years			
	SI index at 0 hr	1.43	2.14	0.71 to 6.4
	SI index at 6hr	1.16	Odds ratio: (87)	2.95 to 2534
3	>6 to 12 years			
	SI index at 0 hr	2.03	7	0.67 to 72
	SI index at 6hr	1.56	15	2.25 to 99.7

Relationship Between The Trend In Si Index Change From 0 To 6 Hrs With Outcome In The Study Sample.

S. NO	Trend With Outcome	Number With Proportion N (%)	Relative Risk	95% Confidence Interval
1	Increase in SI index from 0 hour to 6th hour (n=16)		1.56	0.7 to 3.49

	Survived	9 (56.25)		
	Died	7 (43.75)		
2	Decrease in SI index from 0 hour to 6thhour (n=34)			
	Survived	23 (76.6)		
	Died	9 (23.7)		

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