

Impact of Hypertonic Lactated Saline Resuscitation on Serum Interleukin-6 (IL-6) Level in Pediatric Severe Sepsis/Septic Shock in Developing Country

Herdiana Elizabeth Situmorang*, Dadang Hudaya Somasetia, Heda Melinda Nataprawira

Department of Child Health, Hasan Sadikin General Hospital-Universitas Padjadjaran, Bandung, Indonesia

*Corresponding author: herdiana1983@gmail.com

Received January 09, 2015; March 02, 2015; Accepted March 05, 2015

Abstract Background: Fluid resuscitation with normal saline (NS) could aggravate IL-6 production. Our objective was to compare impact of small volume resuscitation hypertonic lactated saline (HLS) versus NS in pediatric severe sepsis/septic shock in developing country hospital setting. The primary endpoint was the decrease of serum IL-6 level after 6 and 12 hours fluid resuscitation. The secondary endpoint was fluid overload. **Methodology and principal findings:** A pre- and post-design, repeated measure study including 30 severe sepsis/septic shock children was conducted in Hasan Sadikin Hospital Bandung, Indonesia. Newly diagnosed severe sepsis/septic shock children (>12–168 months old) were eligible. Patients were resuscitated with either HLS (bolus of 5 mL/kgBW, repeated if no response and followed with 1 mL/kgBW/hour for 12 hours), or NS (bolus of 20 mL/kgBW, repeated if no response and followed with maintenance fluid requirement). If shock persisted inotropes and/or catecholamine were commenced. There were no significant difference of serum IL-6 levels between groups over time ($p=0.183$). HLS group had significant lower fluid balance than NS group ($p<0.001$). **Conclusions:** There was no impact of HLS on serum IL-6 levels after 6 and 12 hours fluid resuscitation. As lower fluid overload observed in HLS group, HLS solution may likely to be a promising fluid for resuscitation in severe sepsis/septic shock children.

Keywords: children, hypertonic lactated saline, interleukin-6, normal saline, septic shock, severe sepsis

Cite This Article: Herdiana Elizabeth Situmorang, Dadang Hudaya Somasetia, and Heda Melinda Nataprawira, "Impact of Hypertonic Lactated Saline Resuscitation on Serum Interleukin-6 (IL-6) Level in Pediatric Severe Sepsis/Septic Shock in Developing Country." *American Journal of Epidemiology and Infectious Disease*, vol. 3, no. 1 (2015): 10-14. doi: 10.12691/ajeid-3-1-2.

1. Introduction

Sepsis is the main cause of mortality among infants and children worldwide, particularly in developing countries. Shock is an important risk factor and main predictor of mortality in septic children [1]. Imbalance of pro-inflammatory and anti-inflammatory response, dominated by pro-inflammatory response occurs in sepsis. [2] Important cytokines in early phase of sepsis are TNF- α , IL-1 β , and IL-6 [3]. Production of IL-6 is associated with vascular leakage, hypoperfusion, and organ dysfunction [4]. In experimental sepsis, IL-6 at 6 hours predicted mortality over 3 days [5]. Studies of [6] and [4] found high IL-6 on adult sepsis at day 1 admission. High serum IL-6 is correlated with severity of pediatric septic shock [7,8].

Fluid resuscitation is the main management of severe sepsis/septic shock. Severe sepsis/septic shock management was in accordance with Surviving Sepsis Campaign 2012 guidelines which used normal saline (NS) as resuscitation fluid could aggravate IL-6 production and risk children in fluid overload. Other fluid resuscitation choice i.e. hypertonic lactated saline (HLS) has been used in pediatric shock due to dengue shock syndrome [9] and

severely burn [10]. Small volume resuscitation using HLS, may avoid risk of fluid overload [9].

Hypertonic lactated saline has hemodynamic [9] and immunomodulation impact [11]. Its hemodynamic impact had been studied in children [9], while to our knowledge, no available study of knowing its immunomodulation impact in septic shock children. We hypothesize that there are significant decrease of serum IL-6 levels on 6 and 12 hours after fluid resuscitation between severe sepsis/septic shock children treated with HLS compared with NS. The primary endpoint was decrease of serum IL-6 level after 6 and 12 hours fluid resuscitation. The second endpoint was fluid overload between groups.

Developing countries with inadequate health facilities and infrastructures limitation may cause delay in medical treatment, irrational antibiotics prescriptions, and finally lead to poor outcome in pediatric severe sepsis/septic shock [12]. Until now, there were limited studies related to severe sepsis/septic shock management in developing countries.

2. Methods

2.1. Patients Population