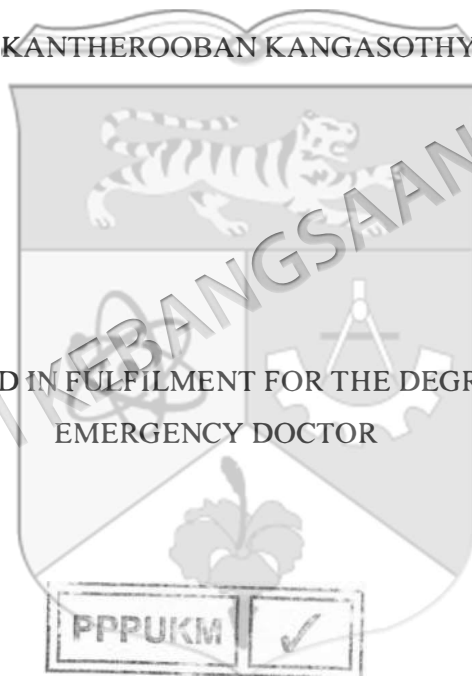


THE ASSOCIATION BETWEEN LACTATE GLUCOSE RATIO AND 28-DAY ALL-CAUSE
MORTALITY, SHOCK INDEX, AND LENGTH OF HOSPITAL STAY IN SEPSIS PATIENT
PRESENTED TO EMERGENCY DEPARTMENT HOSPITAL CANSELOR TUANKU
MUHRIZ: A PROSPECTIVE OBSERVATIONAL STUDY

DR KANTHEROOBAN KANGASOTHY

DISSERTATION SUBMITTED IN FULFILMENT FOR THE DEGREE OF THE DOCTOR OF
EMERGENCY DOCTOR



FACULTY OF MEDICINE

UNIVERSITI KEBANGSAAN MALAYSIA

KUALA LUMPUR

2023



DR. FAIZAL AMRI HAMZAH
(MPM 45425), MBBCh. BAO (Dublin),
M.Med, Emergency Medicine (USM), FADUSM
Ketua Jabatan Perubatan Kecemasan
Pakar Perunding Perubatan Kecemasan
Hospital Canselor Tuanku Muhriz

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TESIS YANG DIKEMUKAKAN UNTUK MEMPEROLEH IJAZAH DOKTOR PAKAR
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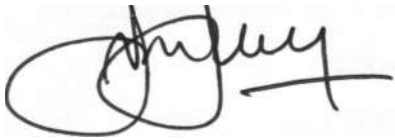


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KUALA LUMPUR

2023

DECLARATION

This is to certify that this work by Dr Kantherooban Kangasothy has been reviewed and I, the undersigned am satisfied and have accepted it as a dissertation for the Doctor of Emergency Medicine, 2023.



Assoc Prof Dr Tan Toh Leong

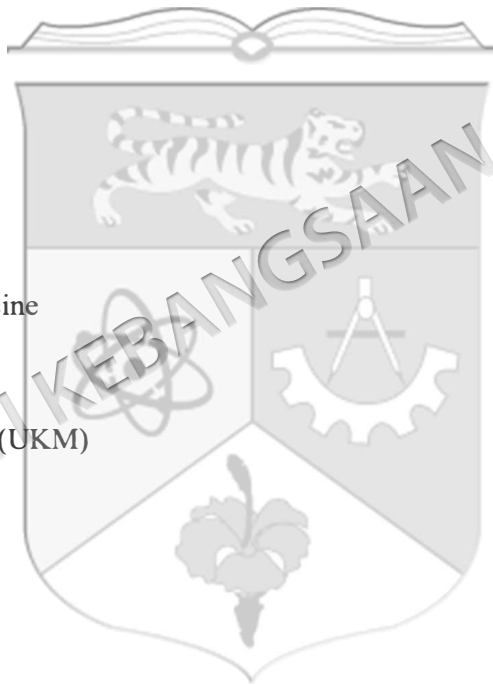
Emergency Physician

Department of Emergency Medicine

Faculty of Medicine

Universiti Kebangsaan Malaysia (UKM)

Date:



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ABSTRACT

INTRODUCTION: Sepsis can be associated with high morbidity and mortality if not managed promptly. Both levels of lactate and glucose are found to be deranged in the critically ill with sepsis. Classifying patients according to lactate glucose ratios may aid in the identification of patients with increased mortality in sepsis. This study was done to evaluate the outcome between the lactate glucose ratio (LG ratio) and the 28-days all-cause mortality rate, shock index (SI) and length of hospitalization among patients with sepsis in Malaysia. **METHODS:** A Single Centre Prospective Observation Study in Emergency Department Universiti Kebangsaan Malaysia was performed. The review included patients aged 18 years and above, who fulfil the definition of sepsis according to Sepsis-3 criteria from May 2021 till April 2023. The outcome included 28-day and in hospital mortality, SI and length of stay in hospital, which was traced via electronics health care system and BHT. Glucose and lactate measurement was obtained from venous blood gas result, which was analyzed using the ABL 800 Basic blood gas analyzer. LG ratio was later calculated and documented. **RESULTS:** A total of 150 patients were included in this study [60 females (n=40%) and 90 males (n=60%)], with the mean age of 64 years old. LG ratio shows significant values when compared to mortality ($p=0.011$) and Shock Index ($p=0.001$). LG ratio has an odds ratio of 2.84 (95% CI 1.27 to 6.37) when compared to mortality, and an odds ratio of 3.47 (95% CI 1.63 to 7.42) when compared to SI. LG ratio is correlated with shock index has a AUROC value, which is 0.66 (95% CI, 0.57–0.75). The LG ratio able to predict 28-days mortality (AUROC value of 0.65; 95% CI, 0.55–0.75). The LG Ratio has a Sp of 84% (95% CI, 74%-90%) with a cut-off point of 0.364 in predicting shock, and a Sp of 79% (95% CI, 71%-86%) with a cut-off point of 0.375 in predicting 28-days mortality. There was no significance between LG Ratio and length of hospitalization with a p value of 0.438. **CONCLUSION:** This study shows patients with lactate glucose ratio ≥ 0.37 may predict mortality and SI.

KEYWORDS

Lactate Glucose Ratio, LG Ratio, Lactate, Glucose, Sepsis, Mortality, Shock Index, Length of hospitalization.

ABSTRAK

PENGENALAN: Sepsis boleh dikaitkan dengan morbiditi dan kematian yang tinggi jika tidak dikendalikan dengan segera. Kedua-dua paras laktat dan glukosa didapati terganggu dalam pesakit kritikal dengan sepsis. Mengelaskan pesakit mengikut nisbah laktat glukosa boleh membantu dalam mengenal pasti pesakit dengan peningkatan kematian dalam sepsis. Kajian ini dilakukan untuk menilai hasil antara nisbah laktat glukosa (nisbah LG) dan kadar kematian 28 hari atas semua sebab, Shock Index (SI) dan tempoh kemasukan ke hospital dalam kalangan pesakit sepsis di Malaysia. **KAEDAH:** Kajian Pemerhatian Pusat Tunggal di Jabatan Kecemasan Universiti Kebangsaan Malaysia telah dilakukan. Kajian ini termasuk pesakit berumur 18 tahun dan ke atas, yang memenuhi definisi sepsis mengikut kriteria Sepsis-3 dari Mei 2021 hingga April 2023. Kematian di hospital dalam tempoh 28 hari, SI dan tempoh tinggal di hospital telah dikesan melalui sistem penjagaan kesihatan elektronik dan BHT. Pengukuran glukosa dan laktat diperoleh daripada keputusan gas darah vena. Nisbah LG kemudiannya dikira dan didokumenkan. **KEPUTUSAN:** Seramai 150 pesakit telah dimasukkan dalam kajian ini [60 perempuan (n=40%) dan 90 lelaki (n=60%)], dengan purata umur 64 tahun. Nisbah LG menunjukkan nilai yang signifikan jika dibandingkan dengan kadar kematian ($p=0.011$) dan Shock Index ($p=0.001$). Nisbah LG mempunyai nisbah odds 2.84 (95% CI 1.27 hingga 6.37) jika dibandingkan dengan kematian, dan nisbah odds 3.47 (95% CI 1.63 hingga 7.42) jika dibandingkan dengan SI. Nisbah LG yang dikaitkan dengan SI mempunyai nilai AUROC, iaitu 0.66 (95% CI, 0.57–0.75). Nisbah LG mampu meramalkan kematian 28 hari (nilai AUROC 0.65; 95% CI, 0.55–0.75). Nisbah LG mempunyai Sp sebanyak 84% (95% CI, 74%-90%) dengan titik potong 0.364 dalam meramalkan kejutan, dan Sp sebanyak 79% (95% CI, 71%-86%) dengan titik potong 0.375 dalam meramalkan kematian 28 hari. Tiada signifikan antara LG Ratio lama semut kemasukan ke hospital dengan nilai p 0.438. **KESIMPULAN:** Kajian ini menunjukkan pesakit dengan nisbah glukosa laktat ≥ 0.37 boleh meramalkan indeks kematian dan SI.

KATA KUNCI

Nisbah Glukosa Laktat, Nisbah LG, Laktat, Glukosa, Sepsis, Kematian, Shock Index, Tempoh Masuk Hospital.

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CHAPTER I

INTRODUCTION

Sepsis can be associated with high morbidity and mortality if not managed promptly. There is dysregulation of the host due to infection, which can lead to life-threatening organ dysfunction. According to the World Health Organization, there are 1 in 5 deaths worldwide associated with sepsis (WHO 2020). Sepsis cases presented in the Emergency Department of University Kebangsaan Malaysia Medical Centre (UKMMC) was estimated to around 14 000 cases annually which is 25-35% cases from the year 2013 to 2014 (Tan et al. 2016). To improve the risk stratification among patients who were suspected to be infected, a consensus was formed via Sepsis-3 definition (Singer et al. 2016). Classifying patients according to lactate glucose ratios may aid in the identification of patients with increased mortality in sepsis (Nugent et al. 2016). Both levels of lactate and glucose are found to be deranged in the critically ill. The body generates an adaptive mechanism with sufficient reservoir which can be indicated via hyperlactatemia with hyperglycaemia during stress response. Early lactate and glucose monitoring may provide an idea on the current status of a patient, and thus support tailored nutritional support with enteral feeding or glucose infusion (Jorge et al. 2017). High and low glucose groups combined with lactate levels was associated with high in-hospital mortality rate (Chen et al. 2019). This study will be done to evaluate the outcome between the lactate glucose ratio and the 28-days all-cause mortality rate, Shock Index and length of hospitalization among patients with sepsis in Malaysia.

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