

INDONESIAN JOURNAL OF  
**CLINICAL PATHOLOGY AND  
MEDICAL LABORATORY**

Majalah Patologi Klinik Indonesia dan Laboratorium Medik

---

**EDITORIAL TEAM**

**Editor-in-chief:**

Puspa Wardhani

**Editor-in-chief Emeritus:**

Prihatini

Krisnowati

**Editorial Boards:**

Jusak Nugraha, Ida Parwati, Adi Koesoema Aman, Edi Widjajanto, Rahayuningsih Dharma, Aryati, Kusworini Handono, Mansyur Arif, Budi Mulyono, Rismawati Yaswir, Yuyun Widaningsih, Purwanto AP, Osman Sianipar, Umi Solekhah Intansari, Banundari Rachmawati, Andaru Dahasihdewi, Agnes Rengga Indrati, Nyoman Suci Widyastuti, Hani Susianti, Efrida, Rikarni, Tenri Esa, Uleng Bahrn, July Kumalawati, Liong Boy Kurniawan, Ninik Sukartini, Maimun Zulhidah Arthamin, Tahono, Rachmawati Muhidin

**Editorial Assistant:**

Dian Wahyu Utami

**Language Editors:**

Yolanda Probohoesodo, Nurul Fitri Hapsari

**Layout Editor:**

Dian wahyu Utami

**Editorial Adress:**

d/a Laboratorium Patologi Klinik RSUD Dr. Soetomo, Gedung Diagnostik Center Lt. IV  
Jl. Mayjend. Prof. Dr Moestopo 6-8 Surabaya, Indonesia  
Telp/Fax. (031) 5042113, 085-733220600 E-mail: majalah.ijcp@yahoo.com, jurnal.ijcp@gmail.com  
Website: <http://www.indonesianjournalofclinicalpathology.or.id>

**Accredited No. 36a/E/KPT/2016, Tanggal 23 Mei 2016**

# INDONESIAN JOURNAL OF CLINICAL PATHOLOGY AND MEDICAL LABORATORY

Majalah Patologi Klinik Indonesia dan Laboratorium Medik

## CONTENTS

### RESEARCH

- Serum Zinc and C-Reactive Protein Levels as Risk Factors for Mortality in Systemic Inflammatory Response Syndrome  
*(Kadar Zinc dan C-Reactive Protein Serum Sebagai Faktor Kebahayaan Kematian di Pasien Systemic Inflammatory Response Syndrome)*  
**Dwi Retnoningrum, Banundari Rachmawati, Dian Widyaningrum** ..... 1-5
- Correlations between Mean Platelet Volume and Immature Platelet Fraction to Hemoglobin A1c in Patients with Type 2 Diabetes Mellitus  
*(Kenasaban antara Mean Platelet Volume dan Immature Platelet Fraction terhadap Hemoglobin A1c di Pasien Diabetes Melitus Tipe 2)*  
**Dian W Astuti, Sony Wibisono, Arifoel Hajat, Sidarti Soehita**..... 6-11
- Methicillin-Resistant Staphylococcus Aureus Colonization and Screening Method Effectiveness for Patients Admitted to the Intensive Care  
*(Kejadian dan Ketepatangunaan Penapisan Kolonisasi Methicillin-Resistant Staphylococcus aureus di Pasien Perawatan Intensif)*  
**Andaru Dahesihdewi, Budi Mulyono, Iwan Dwiprahasto, Supra Wimbarti** ..... 12-18
- Correlation between Visceral Adipose Tissue-Derived Serpin with Fasting Blood Glucose Level in Obesity  
*(Hubungan Kadar Visceral Adipose Tissue-Derived Serpin Dengan Kadar Glukosa Darah Puasa Pada Kegemukan)*  
**Novi Khila Firani, Agustin Iskandar, Anik Widijanti, Nonong Eriani** ..... 19-23
- Serum Glial Fibrillary Acidic Protein Levels Profile in Patients with Severe Traumatic Brain Injury  
*(Profil Kadar Glial Fibrillary Acidic Protein Serum di Pasien Cedera Otak Berat)*  
**Arief S. Hariyanto, Endang Retnowati, Agus Turchan** ..... 24-28
- Phylogenetic Profile of Escherichia coli Causing Bloodstream Infection and Its Clinical Aspect  
*(Profil Filogenetik Escherichia coli Penyebab Infeksi Aliran Darah dan Aspek Klinisnya)*  
**Osman Sianipar, Widya Asmara, Iwan Dwiprahasto, Budi Mulyono**..... 29-35
- Comparison of Glycemic State in Patients with and without Hyperuricemia  
*(Perbedaan Status Glikemia pada Pasien dengan dan tanpa Hiperurisemia)*  
**Corrie Abednego, Banundari Rachmawati, Muji Rahayu** ..... 36-41
- Analysis of Laboratory Parameters as Sepsis Markers in Neonatals with Hyperbilirubinemia  
*(Analisis Tolok Ukur Laboratorium Sebagai Petanda Sepsis di Neonatus dengan Hiperbilirubinemia)*  
**Bachtiar Syamsir, Rachmawati Muhiddin, Uleng Bahrn**..... 42-46
- Correlation Percentage of S and G2/M with Percentage of Lymphoblasts in Pediatric Acute Lymphoblastic Leukemia  
*(Kenasaban Persentase S dan G2/M dengan Persentase Limfoblas di Pasien Leukemia Limfoblastik Akut Anak)*  
**Erawati Armayani, Yetti Hernaningsih, Endang Retnowati, Suprpto Ma'at, I Dewa Gede Ugrasena** . 47-52

Correlation of Blast Percentage to CD34 of Bone Marrow in All Pediatric Patients <i>(Kenasaban Persentase Blas Dengan CD34 di Sumsum Tulang pada Pasien LLA Anak)</i> <b>Rahmi Rusanti, Yeti Hernaningsih, Endang Retnowati, Mia Ratwita Andarsini, Andy Cahyadi .....</b>	53–58
Analysis of Decreased Glucose Level in Stored Samples Correlated to Serum Separation and Temperature Storage <i>(Analisis Penurunan Glukosa Dari Sampel Yang Disimpan Dalam Kaitannya Dengan Pemisahan Serum dan Suhu Penyimpanan)</i> <b>Gustamin, Liong Boy Kurniawan, Ruland DN Pakasi .....</b>	59–63
Diagnostic Concordance between Next Generation and High Sensitive Troponin-I in Angina Pectoris Patients <i>(Kesesuaian Diagnostik Troponin-I Next generation dan High sensitive di Pasien Angina Pectoris)</i> <b>Erna R Tobing, Jusak Nugraha, Muhammad Amminuddin .....</b>	64–69
Elevated Serum S100B Protein Level as a Parameter for Bad Outcome in Severe Traumatic Brain Injury Patients <i>(Peningkatan Kadar Serum Protein S100B Sebagai Tolok Ukur Keluaran Buruk di Pasien Cedera Kepala Berat)</i> <b>Ridha Dharmajaya, Dina Keumala Sari, Ratna Akbari Ganie .....</b>	70–75
Analysis of Mean Platelet Volume As A Marker For Myocardial Infarction and Non-Myocardial Infarction in Acute Coronary Syndrome <i>(Analisis Mean Platelet Volume sebagai Pembeda Infark Miokard dan Non-Infark Miokard di Sindrom Koroner Akut)</i> <b>Wandani Syahrir, Liong Boy Kurniawan, Darmawaty Rauf .....</b>	76–80
Anti-Dengue IgG/IgM Ratio for Secondary Adult Dengue Infection in Surabaya <i>(Rasio IgG/IgM Anti Dengue untuk Infeksi Dengue Sekunder Dewasa di Surabaya)</i> <b>Aryati, Puspa Wardhani, Ade Rochaeni, Jeine Stela Akualing, Usman Hadi .....</b>	81–85
Analysis of Blood Urea Nitrogen/Creatinin Ratio to Predict the Gastrointestinal Bleeding Tract Site <i>(Analisis Rasio Blood Urea Nitrogen/Kreatinin Untuk Meramalkan Lokasi Perdarahan pada Saluran Cerna)</i> <b>Arfandhy Sanda, Mutmainnah, Ibrahim Abdul Samad .....</b>	86–90
The Differences of Sodium, Potassium and Chloride Levels in STEMI and NSTEMI Patients <i>(Perbedaan Kadar Natrium, Kalium dan Klorida di Pasien STEMI dan NSTEMI)</i> <b>Freddy Ciptono, Muji Rahayu .....</b>	91–94

#### LITERATURE REVIEW

Macrophage Autophagy in Immune Response <i>(Otofagi Makrofag dalam Respons Imun)</i> <b>Jusak Nugraha .....</b>	95–101
---	--------

#### CASE REPORT

Very Severe Hypertriglyceridemia in Suspected Familial Chylomicronemia Infant <i>(Hipertriglisideridemia Sangat Berat di Bayi Terduga Kausa Familial Chylomicronemia)</i> <b>Fitry Hamka, Liong Boy Kurniawan, Suci Aprianti .....</b>	102–107
--	---------

**Thanks to editors in duty of IJCP & ML Vol 24 No. 1 November 2017**

Rismawati Yaswir, Purwanto AP, Sidarti Soehita, July Kumalawati, Aryati,  
Rahayuningsih Dharma, Adi Koesoema Aman, Yolanda Probohoesodo, Puspa Wardhani

---

RESEARCH

---

## **ANALYSIS OF BLOOD UREA NITROGEN/CREATININ RATIO TO PREDICT THE GASTROINTESTINAL BLEEDING TRACT SITE**

*(Analisis Rasio Blood Urea Nitrogen/Kreatinin Untuk Meramalkan Lokasi Perdarahan Pada Saluran Cerna)*

**Arfandhy Sanda, Mutmainnah, Ibrahim Abdul Samad**

### **ABSTRAK**

Perdarahan saluran cerna merupakan keluhan pasien yang sering dijumpai dalam keseharian dan untuk penatalaksananya dilakukan dengan menentukan lokasi perdarahan dan gejalanya. Berdasarkan lokasi perdarahan saluran cerna dibagi menjadi dua yaitu perdarahan saluran cerna atas (SCBA) dan perdarahan saluran cerna bawah (SCBB), sedangkan gejala perdarahan dibagi menjadi 3 yaitu hematemesis (muntah darah segar), melena (feses kehitaman) dan hematokezia (perdarahan lewat anus berwarna merah terang). Data penggunaan rasio BUN/kreatinin untuk menentukan lokasi perdarahan saluran cerna di Indonesia masih kurang sehingga peneliti tertarik untuk meneliti analisis rasio BUN/kreatinin untuk meramalkan lokasi perdarahan pada saluran cerna dengan tujuan untuk diagnosis dan penatalaksanaan yang lebih cepat. Penelitian ini dilakukan untuk meramalkan letak perdarahan saluran cerna yaitu SCBA atau SCBB pada pasien rawat inap di RSUP Wahidin Sudirohusodo masa waktu Januari-Desember 2014. Penelitian dilakukan secara potong silang dengan menggunakan uji t-tidak berpasangan untuk menentukan kenasaban rasio BUN/Kreatinin dengan lokasi perdarahan saluran cerna. Selama masa waktu Januari-Desember 2014 diperoleh data sebanyak 144 pasien perdarahan saluran cerna dengan perdarahan SCBA sebanyak 64 pasien (44%), serta perdarahan SCBB 80 pasien (56%). Pada perdarahan SCBA, nilai rerata BUN 33,2 mg/dL, nilai rerata kreatinin 1,06 mg/dL, dan rerata rasio BUN/Kreatinin 32. Terdapat kenasaban yang bermakna antara lokasi perdarahan saluran cerna dan nilai rasio BUN/kreatinin ( $t=6,394$ ;  $p=0,001$ ). Pasien dengan perdarahan saluran cerna bagian atas memiliki rasio BUN/kreatinin lebih tinggi dibandingkan dengan pasien dengan perdarahan saluran cerna bagian bawah.

**Kata kunci:** Rasio BUN/kreatinin, lokasi perdarahan saluran cerna

### **ABSTRACT**

Gastrointestinal bleeding is a symptom frequently complained by patients encountered at the hospital and for this treatment is usually done by determine the bleeding manifestation and the bleeding site. Based on gastrointestinal bleeding it is divided into two parts, upper gastrointestinal bleeding and lower gastrointestinal bleeding. Symptoms of bleeding are divided into three kinds, hematemesis (fresh blood vomiting), melena (black feces) and hematochezia (feces with fresh blood). Data usage ratio of BUN/creatinine to determine the location of GI bleeding in Indonesia is still low so that researchers were interested in studying the analysis of the ratio of BUN/creatinine to predict the site of bleeding in the gastrointestinal tract for purpose of faster diagnosis and management. This study was conducted to predict the location of gastrointestinal bleeding whether upper or lower gastrointestinal bleeding in patients treated at the Dr. Wahidin Sudirohusodo Hospital, period January-December 2014. A cross-sectional study was conducted using the unpaired t-test to determine the correlation ratio of BUN/creatinine with the gastrointestinal bleeding tract site. During this period January-December 2014 the data of 144 patients with gastrointestinal bleeding were obtained, the upper 64 patients (44%) gastrointestinal bleeding and 80 patients (56%) lower gastrointestinal bleeding. In upper bleeding, the mean BUN was 33.2 mg/dL, the mean creatinine 1.06 mg/dL and the mean ratio of BUN/creatinine, 32. There was a significance comparing analysis between the site of gastrointestinal bleeding tract and the value of the ratio of BUN/creatinine ( $t = 6.394$ ;  $p = 0.001$ ). Patients with upper gastrointestinal bleeding had a ratio of BUN/creatinine were higher compared to patients with lower gastrointestinal tract bleeding.

**Key words:** BUN/creatinine ratio, gastrointestinal bleeding tract site

---

## INTRODUCTION

Gastrointestinal bleeding is a frequent complaint of patients encountered in everyday life. The management of patients with gastrointestinal bleeding is to determine the severity of bleeding and the bleeding site. According to the site of bleeding it is divided into two, upper gastrointestinal and lower gastrointestinal bleeding tract site.<sup>1,2</sup>

Symptoms of bleeding in the gastrointestinal tract are divided into three kinds which are hematemesis, melena and hematochezia. Hematemesis is an upper gastrointestinal bleeding or proximal to the Trietz ligament which is characterized by vomiting fresh blood or dark brown. Melena is blackish stool indicating bleeding in upper gastrointestinal tract and lasted about 14 hours. Hematochezia is a bleeding via the anus which is characterized by bright red or maroon stool, primarily from lower gastrointestinal tract bleeding. Another characteristic of the upper gastrointestinal bleeding, which is Hyperperistaltic intestinal sounds and increased levels of Blood Urea Nitrogen (BUN) because of blood due to lysis in the stomach caused by stomach acid mixture which will emit a blood protein that will flow into the duodenum and the blood protein is subsequently absorbed in the ileum.<sup>1,3,4</sup>

The etiology of upper gastrointestinal bleeding includes rupture of esophageal varices (common in Indonesia, about 70–75%), bleeding peptic ulcers, erosive gastritis (especially because of NSAIDs), portal hypertension gastropathy, esophagitis, tumors and angiodysplasia. While the etiology of lower gastrointestinal tract bleeding is hemorrhoids, colitis (infection, radiation, ischemia), colorectal carcinoma, diverticulosis and Inflammatory Bowel Disease.<sup>1,3,5</sup>

According to the data obtained, of 1673 cases of upper gastrointestinal bleeding site in the Department of Internal Diseases Dr. Soetomo Hospital Surabaya, the causes included rupture of esophageal varices (76.9%), erosive gastritis (19.2%), peptic ulcer (1.0%), stomach cancer (0.6%) and other causes (2.6%). Reports from the Government Hospitals in Jakarta, Bandung and Yogyakarta stated that the third most common cause of upper gastrointestinal bleeding is the same as in the Dr. Soetomo Regional Hospital Surabaya. Meanwhile, reports from government hospitals in Makassar mentioned peptic ulcer bleeding ranking first as the cause of upper gastrointestinal bleeding. Similarly, in western countries, peptic ulcer was also the first rank as the cause of the upper gastrointestinal bleeding with a frequency of approximately 50%.<sup>1,5,6</sup>

Meanwhile, according to a report obtained from the Dr. Cipto Mangunkusumo Hospital Jakarta in 2000 and 2001, of 442 patients suffering from bleeding in upper gastrointestinal site, hemorrhoid was the most common cause with a percentage of 38.2%. The same was found in a study conducted at the San Carlos Clinico Hospital in Madrid, Spain in 2008 showing 177 patients with lower gastrointestinal tract bleeding, the most common cause of hemorrhoids was the presentation of 35% cases.<sup>1,7</sup>

The patient's history as a history of significant liver cirrhosis, alcohol consumption, smoking and abdominal pain are all factors that support the gastrointestinal bleeding, but these factors are not strong enough to estimate the site of gastrointestinal bleeding. Some of the ways that can be used to determine the location of gastrointestinal bleeding is to see the manifestation of bleeding, endoscopic examination, or by determining the ratio of Blood Urea Nitrogen (BUN)/creatinine.<sup>2,4,5</sup>

Urea is the major metabolic product containing more than 75% of non-protein nitrogen from protein catabolism in humans and has a very small molecular weight (60 kD). Urea more than 90% is excreted through the kidneys and a small portion is absorbed and excreted through the gastrointestinal tract and skin. Whereas creatinine is the end product of the metabolism of creatine which is synthesized and stored in the muscles.<sup>3,6,7</sup>

The ratio of BUN/creatinine, serum can also be used to estimate the origin of bleeding from the gastrointestinal tract. According to clinical studies conducted by Sittchanbuncha et al<sup>9</sup> in Bangkok Thailand Ramathibodi Hospital showed that patients with hemorrhagic manifestations of upper gastrointestinal tract (hematemesis and melena) had a ratio of BUN/creatinine of more than 30 while the ratio below 30 tended to the lower gastrointestinal bleeding tract. Similar results were also obtained by Ernst et al<sup>10</sup> in his research at the Davis Medical Centre.<sup>1,8,9</sup>

Endoscopy is the investigation to detect the location of abnormalities in the body organs including the gastrointestinal tract, urinary tract, oral cavity, abdominal cavity and others. The advantages of this examination is to be able to detect quickly the lesion of the gastrointestinal tract, but its drawbacks include the cost of the examination that are quite expensive, preparation for colonic cleansing which takes several hours, and very contraindicated in some conditions such as shock, severe heart failure, acute coronary occlusion, coma and uncooperative patients. Endoscopic examination is performed in many type A

and B hospitals, while in type C and D the hospitals are rarely found, this is because the cost of endoscopy equipment is very expensive and maintenance of endoscopy equipment kept totally safe.<sup>6-8</sup>

Research of the ratio of BUN/creatinine in gastrointestinal bleeding in Indonesia is still lacking, so researchers were interested in examining it to predict the location of bleeding in the gastrointestinal tract. Hopefully this research can help clinicians for faster diagnosis and management.

## METHODS

This study used a cross-sectional study, the data were obtained from the medical records of the Dr. Wahidin Sudirohusodo Hospital with research samples inpatients starting from January to December 2014. During this period the number of patients acquired was 144 people who fit the study criteria. The data analyzed were as many as 144 patients with gastrointestinal bleeding, comprising 64 patients suffering from upper gastrointestinal bleeding site and 80 patients suffering from lower gastrointestinal bleeding site. Data used in the study included age, sex, results of endoscopy and urea-creatinine examination

when they first entered the hospital and the diagnosis of gastrointestinal disorders. Data analysis used unpaired t-test (independent t-test).

## RESULTS AND DISCUSSION

During the period of January to December 2014 as much as 144 patients were obtained who met the inclusion criteria with a lifespan of 15-85 years with symptoms of upper gastrointestinal tract bleeding as hematemesis and melena while those that were within the lower gastrointestinal tract bleeding was hematochezia.

Based on the above table, which was obtained during January-December 2014 the number of patients who experienced lower gastrointestinal bleeding was more than upper gastrointestinal bleeding with a number of 80 patients, both males and females with the details of males and females who experienced lower gastrointestinal bleeding were 45 patients and 35 patients. In addition, most gastrointestinal bleeding in patients aged older, adults 51-70 years as many as 66 patients, comprising 32 patients with upper gastrointestinal bleeding and 34 patients with lower gastrointestinal bleeding. The number of

**Table 1.** Characteristics of the samples of hospitalized patients with symptoms of gastrointestinal bleeding in the Dr. Wahidin Sudirohusodo Hospital Makassar period of January-December 2014

Variable	Gastrointestinal bleeding site		Total
	Upper gastrointestinal site	Lower gastrointestinal site	
<b>Amount of patients</b>			144
<b>Gender</b>			
Males	35	45	
Females	29	35	
Total	64	80	144
<b>Age</b>			
15-40 year	9	24	33
41-70 year	42	51	93
71-85 year	13	5	18
Total	64	80	144
<b>Symptoms</b>			
<b>Hematemesis</b>			
Gastritis	7		
Peptic ulcer	12		
Esophagus ulcer	5		24
<b>Melena</b>			
Gastritis	21		
Peptic ulcer	13		
Esophagus ulcer	4		40
Drug-induced Gastropathy	2		
<b>Hematochezia</b>			
Hemorrhoid		40	
Colon carcinoma		40	80
Total			144

**Table 2.** Results of the average value of the ratio of BUN and creatinine and BUN/creatinine in patients with gastrointestinal bleeding treated in the Dr. Wahidin Sudirohusodo Regional Hospital Makassar December-January, 2014

Gastrointestinal bleeding symptoms		Average of BUN (mg/dL)	Average of creatinine (mg/dL)	Average of BUN/creatinine ratio
Upper gastrointestinal bleeding	Hematemesis	33.2	1.06	32.21
	Melena			
Lower gastrointestinal bleeding	Hematochezia	11.4	0.75	15.96

**Table 3.** Correlation between the location of gastrointestinal bleeding with a ratio value of BUN/creatinine

Gastrointestinal bleeding site	Amount of patients	BUN/creatinin ratio			t-value	P-value
		Min	Max	Mean ( $\pm$ SD)		
Upper gastrointestinal bleeding	64	7.8	113.4	32.2 $\pm$ 19.8	6.394*	0.001*
Lower gastrointestinal bleeding	80	5.8	62.8	15.9 $\pm$ 9.9		

patients experiencing more hematochezia (80 patients) compared to other patients who had hematemesis and melena.

Based on the above table it was shown that the average (mean) of the upper gastrointestinal bleeding was BUN 33.2 mg/dL and lower gastrointestinal bleeding 11.4 mg/dL. The mean creatinine 1.06 mg/dL and SCBB 0.75 mg/dL. The mean ratio of BUN/creatinine of upper and lower gastrointestinal bleeding tract was 32.21 and 15.96.

The results were then tested using the unpaired t-test to determine the presence of a significant correlation between the location of gastrointestinal bleeding and the value of the BUN/creatinine ratio.

From the test results it can be concluded that the upper gastrointestinal bleeding correlated significantly with the value of BUN/creatinine ratio, the value of t 6.394 and p value of 0.001.

This study showed that the greater the value of the ratio of BUN/creatinine, the greater the GI bleeding, so it can be predicted site of bleeding occurred in the upper gastrointestinal tract, the gastrointestinal tract starting from the mouth, esophagus, stomach up in the intestinal tract which is an attachment for Treitz ligament as a barrier between the upper gastrointestinal tract and lower gastrointestinal tract. Results of a research conducted by Ernst et al<sup>10</sup>, in the Davis Medical Center Hospital-University of California said that of the 124 patients with gastrointestinal bleeding, an average ratio of BUN/creatinine 24 was obtained. The results were almost the same with the study by Sittichanbuncha et al<sup>9</sup> at Ramathibodi Hospital Bangkok Thailand, stating that patients with

hemorrhagic manifestations SCBA (hematemesis and melena) had a ratio of BUN/creatinine of more than 30 while the ratio below 30 tended to lower gastrointestinal bleeding.<sup>1,9,10</sup>

There are two mechanisms which have been proposed to explain the increased BUN associated with gastrointestinal bleeding, especially in patients with upper gastrointestinal bleeding. The first is the bleeding manifestation from lesions in the upper gastrointestinal site is being hemolyzed by gastric acid (HCl) impacting ureum extracted and separated from lysed erythrocytes, the ureum will flow through duodenum till it is absorbed in high amounts by the ileum so that the ureum plasma will be increased. Second mechanism related to hypovolemia and reduced renal perfusion is associated with significant blood loss in the gastrointestinal. Hypovolemia triggered the adaptive response of renal with increasing renal reabsorption of ureum and consequent reduced ureum excretion with increased plasma ureum concentration. Unlike the lower gastrointestinal tract bleeding that has a lower ratio of BUN/creatinine, this is because the process of bleeding in the lower gastrointestinal tract is not through lysis of blood urea is not absorbed in the colon and eventually disposed through the anus in the form of fresh blood.<sup>10-12</sup> However, this study has several limitations, there are many factors that influence the BUN/creatinin increased ratio besides gastrointestinal bleeding, among others is dehydration, heart failure, high protein diet, reduced muscle mass and hypercatabolic condition caused by trauma, severe infection, starvation and use of corticosteroid.

## CONCLUSIONS AND SUGGESTION

Patients with upper gastrointestinal bleeding had a ratio of BUN/creatinine which was higher compared to patients with lower gastrointestinal tract bleeding. It is advisable for patients who come to the hospital with gastrointestinal bleeding complaints to check blood urea and creatinine levels and then calculate the ratio of BUN/creatinine as alternative biomarkers in predicting and determining the location of gastrointestinal bleeding in addition to endoscopic examination.

## REFERENCE

1. Djojodiningrat D, Pangestu A, Abdullah M. Pendekatan Klinis Penyakit Gastrointestinal, Pengelolaan Perdarahan Saluran Cerna Atas, Perdarahan Saluran Cerna Bagian Bawah (Hematokezia) dan Perdarahan Samar (Occult) dalam Buku Ajar Ilmu Penyakit Dalam Jilid 1. Ed kelima., Jakarta, Penerbit PB-PAPDI. 2010; 441–59.
2. Longo DL, Fauci AS. Gastrointestinal Bleeding in Harrison's Gastroenterology and Hepatology. 17<sup>th</sup> Ed., United States, the Mc-Graw Hill Companies. 2010; 62–67.
3. Kasper DL, Fauci AS, Longo DL. Harrison Manual Kedokteran. Jilid 1. Karisma Tangerang, Publishing Group. 2009; 339–43.
4. Friedman SL, McQuaid KR, Grendell JH. Acute Upper Gastrointestinal Bleeding and Acute Lower Gastrointestinal Bleeding in Current Diagnosis & Treatment in Gastroenterology. 2<sup>nd</sup> Ed., United States, the Mc-Graw Hill Companies. 2002; 53–96.
5. Thuluvath P, Fox C, Maheshwari A. Hematemesis and Melena in Crash Course Gastroenterology. 1<sup>st</sup> Ed., Philadelphia, Mosby Elsevier Inc. 2006; 37–40.
6. Butcher PG. Chronic Gastrointestinal Bleeding in Gastroenterology: An Illustrated Colour Text. Philadelphia, Churchill Livingstone. 2003; 68–75.
7. Sibernagl S, Lang F. Stomach, Intestine, Liver in Color Atlas of Pathophysiology. 1<sup>st</sup> Ed., New York, Thieme Flexibook. 2000; 134–75.
8. Kolopaking MS. Pemeriksaan Endoskopi Saluran Cerna dalam Buku Ajar Ilmu Penyakit Dalam. Jilid 2. Ed Ketiga., Jakarta, Penerbit PB-PAPDI. 2001; 239–45.
9. Sittichanbuncha Y, Senasu S, Thongkrao T, Keeratikasikorn C, Sawanyawisuth K. Clinical Study: How to Differentiate Sites of Gastrointestinal Bleeding in Patients with Hematochezia by Using Clinical Factors? Hindawi Publishing Corporation Gastroenterology Research and Practice. 2013; 2013: 1–6. Available in: <http://dx.doi.org/10.1155/2013/265076>
10. Haynes ML, Nick TG, Weiss SJ, Ernst AA. Usefulness of the Blood Urea Nitrogen/Creatinine Ratio in Gastrointestinal Bleeding. Pubmed Medical Journal. United States. 1999; 17(1): 70–2.
11. Felber S, Rosenthal P, Henton D. The BUN/Creatinine Ratio in Localizing Gastrointestinal Bleeding in Pediatric Patients. Pubmed Medical Journal. United States 1988; 7(5): 685–687.
12. Kikai Y, Matsuoka K. The Blood Urea Nitrogen/Creatinine in localizing the bleeding site in pediatric patients with gastrointestinal hemorrhage. Pubmed Medical Journal. United States. 1990; 57(4): 297–307.