VOL 2, NO 1 (2020)

IJAR

INDONESIAN JOURNAL OF ANESTHESIOLOGY AND REANIMATION

DEPARTEMENT OF ANESTHESIOLOGY AND REANIMATION
FACULTY OF MEDICINE UNIVERSITAS AIRLANGGA

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IJAR
INDONESIAN JOURNAL OF ANESTHESIOLOGY AND REANIMATION

EDITORIAL TEAM

p-ISSN 2722-4554 | e-ISSN 2686-021X | Volume 2 | Number 1 | January 2020

Website
https://e-journal.unair.ac.id/IJAR

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Gedung Anestesi, Second Floor, Dr Soetomo General Hospital
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INDEXED BY:

IJAR
INDONESIAN JOURNAL OF ANESTHESIOLOGY AND REANIMATION

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INDONESIAN JOURNAL OF ANESTHESIOLOGY AND REANIMATION
Volume 2 (1), January 2020 : 1-7

Original Article

ELECTROLYTES PROFILE OF CRITICALLY ILL PATIENTS ADMITTED TO PEDIATRIC INTENSIVE CARE UNIT (PICU) DR. SOETOMO GENERAL ACADEMIC HOSPITAL

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ABSTRACT

Introduction: Fluid and electrolyte disorders can be affected by various conditions or diseases. Electrolyte disorders are often found in pediatric patients with critically ill conditions and are associated with increased morbidity also mortality that requires extra care in the Pediatric Intensive Care Unit (PICU). **Objective:** To describe the electrolyte profile of critically ill patients with electrolyte disorders admitted to the Pediatric Intensive Care Unit (PICU) Dr. Soetomo General Hospital. **Materials and Methods:** The study was conducted prospectively with a descriptive method in patients with electrolyte disorders aged 1 month – 18 years old admitted to PICU Dr. Soetomo General Hospital, Surabaya in a period from August to November 2018. Data on patient age, gender, electrolyte profile (sodium, potassium, calcium, chloride), and origin before PICU admission were recorded. **Results and Discussion:** From 37 patients with electrolyte disorders showed that patients were dominated by the male in 56.8% (n=21), in the age group of infants or 1-12 months old in 45.9% (n=17). Common main diagnosis in most patients were digestive system disorders in 27% (n=10), followed by central nervous system, respiratory system, kidney and cardiovascular disorders, and the origin before PICU admission were from Emergency Room (ER) in 62.2% (n=23). There were found 97 incidences of electrolyte disorders. Most frequent electrolyte disorders were hypocalcemia in 59.5% (n=22), hypokalemia in 54.1% (n=20), hyponatremia in 40.5% (n=15) and the least was hypochloremia in 35.1% (n=13). Mean serum sodium level was 138.18 ± 12.071, serum potassium level was 3.608 ± 1.2247, serum calcium level was 8.057 ± 1.9473 and serum chloride level was 101.45 ± 13.266. **Conclusions:** Critically ill patients admitted in PICU tend to experience low electrolyte levels.

Keywords: Calcium; Chloride; Electrolyte Disorders; PICU; Potassium; Sodium; Profile

ABSTRAK

Pendahuluan: Gangguan cairan dan elektrolit dapat dipengaruhi oleh berbagai kondisi atau penyakit. Gangguan elektrolit sering ditemukan pada pasien anak dengan kondisi sakit kritis dan dikaitkan dengan peningkatan morbiditas serta mortalitas yang memerlukan perawatan ekstra di Pediatric Intensive Care Unit (PICU). **Tujuan:** Untuk menggambarkan profil elektrolit pada pasien sakit kritis yang dirawat di PICU RSUD Dr. Soetomo, Surabaya. **Metode dan Bahan:** Penelitian ini dilakukan secara prospektif dengan metode deskriptif pada pasien dengan gangguan elektrolit berusia 1 bulan - 18 tahun yang dirawat di PICU Rumah Sakit Umum Daerah (RSUD) Dr. Soetomo, Surabaya dalam periode dari bulan Agustus 2018 hingga November 2018. Data berupa usia, jenis kelamin, profil elektrolit serum (natrium, kalium, kalsium, klorida), dan asal pasien dicatat. **Hasil dan Pembahasan:** Dari 37 pasien, menunjukkan bahwa pasien didominasi oleh laki-laki sebesar 56,8% (n = 21), pada kelompok usia bayi atau usia 1-12 bulan sebesar 45,9% (n = 17). Diagnosis utama terbanyak pada pasien adalah gangguan sistem pencernaan sebesar 27% (n = 10), diikuti oleh gangguan sistem saraf, pernapasan, ginjal, dan sistem kardiovaskular. Asal pasien sebelum dirawat di PICU berasal dari Instalasi Rawat Darurat (IRD) sebesar 62,2% (n = 23). Ditemukan 97 kejadian gangguan elektrolit pada penelitian ini. Gangguan elektrolit yang paling sering adalah hipokalsemia sebesar 59,5% (n = 22), hipokalemia sebesar 54,1% (n = 20), hiponatremia sebesar 40,5% (n = 15) dan yang paling rendah adalah hipokloremia sebesar 35,1% (n = 13). Kadar natrium serum rata-rata adalah 138,18 ± 12,071, kalium serum adalah 3,608 ± 1,2247, kalsium serum adalah 8,057 ± 1,9473 dan klorida serum adalah 101,45 ± 13,266. **Kesimpulan:** Pasien sakit kritis yang dirawat di PICU cenderung mengalami kadar elektrolit yang rendah.

Kata kunci: Gangguan Elektrolit, Kalium, Kalsium, Klorida, Natrium, PICU, Profil.

Available at https://e-journal.unair.ac.id/IJAR | DOI: 10.20473/ijar.V2I12020.1-7

Article info: Received: September, 19th 2019; Revised: September, 23rd 2019; Accepted: November, 25th 2019; Published: January, 30th 2020

INTRODUCTION

Sixty percent of the total weight of the human body is water and dissolved components in the form of electrolytes and non-electrolytes. Where electrolytes consist of various kinds of cations and anions. The main cations in the body include Sodium (Na^+), Potassium (K^+), Calcium (Ca^{2+}) and Magnesium (Mg^{2+}). While the main anions in the body include Hydrogen bicarbonate (HCO^{3-}), Chloride (Cl^-) and Phosphate (PO_4^{3+}). Electrolytes in the body have a very important role in the continuity of physiological processes and the transport of fluids in the body. Electrolyte disorders can occur if electrolyte concentrations in the body are below or above normal levels.[1]

Fluid and electrolyte disorders can be affected by a variety of conditions or diseases. Those are common case in critically ill children, because they often accompany critical illness such as dehydration, severe vomiting, diarrhea, kidney failure, respiratory problems, sepsis, brain damage and heart failure.[2] For example, hyponatremia often occurs in critically ill children in the Pediatric Intensive Care Unit (PICU) and it is associated with increased morbidity and mortality.[3]

Electrolyte disorders that are often found in critically ill children, can result in changes of the body's physiological processes. The result is a circulatory failure due to an imbalanced volume reduction, muscle weakness, lethargy, acute respiratory failure to apnea, cardiac arrhythmia, heart murmur, tachycardia, hypotension, convulsions to coma.

Pediatric patients with critically ill conditions that experienced electrolyte disorders and almost all electrolyte disorders are sequelae, this requires extra care and supervision to optimize the condition of the body. In this study we evaluated the general characteristics of patients admitted to our PICU and diagnosed as having electrolyte disorders.

To our knowledge, there is still no specific data or research available in Indonesia, especially in Surabaya, which shows the profile of electrolyte disorders in critically ill patients, especially children. Therefore, this study is expected to bring benefits and can be used as a source of information about the electrolyte profile of critically ill patients admitted to Pediatric Intensive Care Unit (PICU) Dr. Soetomo General Hospital.

MATERIAL AND METHOD

This study was conducted in the PICU of Dr. Soetomo General Hospital, Surabaya and included 37 patients with electrolyte disorders out of 60 patients admitted to PICU from August 2018 to November 2018. With the inclusion criteria were critically ill patients who had just entered and received intensive care at PICU aged 1 month to 18 years old who experienced electrolyte disorders, meanwhile the exclusion criteria were critically ill patients who had just entered and received intensive care at PICU aged 1 month to 18 years who did not experience electrolyte disorders.

Demographic and clinical data were collected from the medical records, included gender, age, primary diagnosis, serum electrolyte levels (sodium, potassium, calcium, chloride), and origin before PICU admission.

The medical ethical committee of Dr. Soetomo General Hospital Surabaya approved this study. (0428/KEPK/VII/2018).

Available at https://e-journal.unair.ac.id/IJAR | **DOI:** 10.20473/ijar.V2I12020.1-7

For the statistical analysis, we used Statistical Program for Social Sciences (SPSS) v20.0 software for presenting frequencies, percentages and data distributions.

RESULT AND DISCUSSION

A total of 37 patients with electrolyte disorders out of 60 patients admitted to PICU aged from 1 month to 18 years old. The result of this study showed that the characteristics of the patients were dominated by the male in 56.8% (n=21). The Majority of the patients were in the age group of infants or 1-12 months old in 45.9% (n=17). The common main diagnoses in most patients were digestive system disorders in 27% (n=10) followed by the central nervous system, respiratory system, kidney, and cardiovascular disorders. These patients' origin before PICU admission was dominated from the Emergency Room (ER) in 62.2% (n=23). The Demographic profile of these patients is presented in Table 1.

Table 1. Demographic profile of Patients

Characteristics	n(%)
Gender	
Male	21 (56.8)
Female	16 (43.2)
Age	
Infants (1-12 months old)	17 (45.9)
Children (1-10 years old)	15 (40.5)
Adolescents (11-18 years old)	5 (13.5)
Main diagnosis	
Cardiovascular system disorders	1 (2.7)
Kidneys disorders	4 (20.8)
Digestive system disorders	10 (27.0)
Others	22 (59.5)
Origin before PICU admission	
Emergency Room (ER)	23 (62.2)
General ward	11 (29.7)
Referral from other hospital	3 (8.1)

Initial serum electrolyte levels of sodium, potassium, calcium, and chloride were observed when these patients first arrived at PICU. Out of 37 patients, there were found 97 incidences of electrolyte disorders. Most frequent electrolyte disorders were hypocalcemia in 59.5% (n=22), followed by hypokalemia in 54.1% (n=20), followed by hyponatremia in 40.5% (n=15), and the least was hypochloremia in 35.1% (n=13). The distribution of electrolyte disorders in our study population is presented in Table 2.

In this study, characteristics of critically ill patients with electrolyte disorders at PICU Dr. Soetomo General Hospital Surabaya based on gender was dominated by the male in 56.8% compared to female in 43.2%. Also, in another study conducted in PICU of Children's Hospital, Kanpur Medical College also obtained the same results, patients who experienced electrolyte disorders in PICU were also dominated by the male in 61% compared to female in only 38%.[4]

Table 2. Incidences of Electrolyte Disorders

Electrolyte Disorders*	N (%)
Hyponatremia	15 (40.5)
Hypernatremia	9 (24.3)
Hypokalemia	20 (54.1)
Hyperkalemia	3 (8.1)
Hypocalcemia	22 (59.5)
Hypercalcemia	3 (8.1)
Hypochloremia	13 (35.1)
Hyperchloremia	12 (32.4)

*each patient(s) could experience more than one electrolyte disorders

Patients were grouped into 3 age groups, namely infants (0 years), children (1-10 years) and adolescents (11-18 years). The results of this study showed that it was dominated by the age group of infants (0 years) with the highest percentage in 45.9%, this happened because infants are more susceptible to electrolyte

Available at https://e-journal.unair.ac.id/IJAR | DOI: 10.20473/ijar.V2I12020.1-7

disorders because physiologically, the total fluid in the body changes drastically before birth until the age of 1 year. At 24 weeks of pregnancy, total fluid in the baby's body is about 80% of total body mass. This amount continues to change until the age of the first year to 60% of total body mass.[5] Other studies have shown that pediatric patients suffering from electrolyte disorders were dominated by infants, especially under 6 months old.[6] However, other studies conducted in PICU of Children's Hospital, Kanpur Medical College showed a different result, the dominance was by toddlers in 34.4%.[4]

These patients' origin before entering PICU were varied. Mostly they were from the emergency room (ER), general ward, and referral from other hospitals. This showed that patients with critical illness with electrolyte disorders needed intensive care and treated immediately in PICU.

In this study, the main diagnosis of patients was categorized into 4 groups, namely cardiovascular system disorders, kidney disorders, digestive system disorders, and other system disorders (can be respiratory, nervous, endocrine and metabolic disorders, hematology, etc.). The results showed that the most common diagnosis of patients was digestive system disorders, central nervous system disorders, followed by kidney system disorders and cardiovascular system disorders. This showed different results with research conducted at the PICU of Children's Hospital, Kanpur Medical College found that the common main diagnosis was central nervous system then followed by respiratory system disorders and sepsis.[4]

Almost all electrolyte disorders are sequelae that follow disease and make these patients need intensive care at PICU.[5] So that, each patient must have a primary diagnosis/major illness besides the electrolyte disorders. Based on this research, we found 97 incidences of electrolyte disorders in critically ill patients admitted to PICU Dr. Soetomo General Hospital Surabaya. Serum electrolyte levels were observed, those were 4 main electrolytes that routinely examined in each patient. Namely sodium, potassium, calcium and chloride.

In sodium electrolyte, the normal standard value for sodium electrolyte level used at PICU Dr. Soetomo General Hospital, Surabaya was 136 - 144 mmol/L. In this study, it was found that the results were dominated by hyponatremia condition in 40.5% with an average serum sodium level of 138.18±12.071 mmol/L, and mostly in infants. In patients with hyponatremia, the most common primary diagnosis was central nervous system disorders (meningoencephalitis to seizures), respiratory system disorders (pneumonia), and others (leukemia, diabetic ketoacidosis due to type 1 diabetes mellitus, cholestasis to dengue shock syndrome). According to research conducted by Bhalla et al., hyponatremia is the most common cause of seizures in infants[7], and in research conducted by Perkin et al., hyponatremia is a common cause of seizures without fever in infants in PICU and related to drastically reduced body fluid.[8] Other research conducted at King George's Medical University Hospital, India showed that pediatric patients with type 1 diabetes mellitus who suffered from diabetic ketoacidosis, commonly suffered from hyponatremia.[9] However, in this study, hypernatremia patients were dominated by a diagnosis of acute diarrhea severe dehydration. These results are different from research conducted at M. Djamil Academic Hospital Padang, acute diarrhea with severe dehydration in pediatric patients showed that the most electrolyte disorders experienced was hyponatremia.[5,10] Hypernatremia conditions in patients in PICU

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Dr. Soetomo General Hospital Surabaya may be caused by the physiological mechanism of the patient's body which tends to maintain the discharge of electrolytes, resulting in sodium retention.[11]

In potassium electrolyte, the normal standard value for potassium electrolyte level used at PICU Dr. Soetomo General Hospital, Surabaya was 3.8 - 5.0 mmol/L. In this study, it was found that the results were dominated by hypokalemia in 54.1% with an average potassium level of 3.608±1.2247 mmol / L, and mostly in infants. In patients with hypokalemia, the most common primary diagnosis was respiratory system disorder, for example, pneumonia. According to other research conducted by Sankaran et al., hypokalemia is one of the signs of disease severity in patients suffered from bacterial pneumonia, beside hypophosphatemia and hypocalcemia.[12] On the other hand, the most common primary diagnosis of patients with hyperkalemia were endocrine and metabolic system disorders, especially diabetic ketoacidosis due to type 1 diabetes mellitus. The condition of diabetic ketoacidosis can cause hyperkalemia because of patients with type 1 diabetes mellitus experience absolute insulin deficiency due to defects in beta cells of the pancreas as their natural insulin producer. Without insulin, the blood glucose level in the patient's body will increase, and induced the activation of lipolysis (the breakdown of body fat cells). Along with the release of ketones into the blood, so that the blood becomes acidic.[13] Conditions of acidosis and high glucose levels in blood make fluid and potassium move out of cells, so hyperkalemia can occur. Hyperkalemia is also caused by a reduced ability of the kidneys to excrete out of the body through urine, according to the data obtained in this study, the most common cause was kidney disorders, for example, was acute kidney injury. The same thing was also obtained from other studies conducted at PICU Southern India, that one complication of pediatric patients with acute kidney injury is hyperkalemia, and others were metabolic acidosis and sodium electrolyte disorders.[14]

In calcium electrolyte, the normal standard value for calcium electrolyte level used at PICU Dr. Soetomo General Hospital, Surabaya was 8.5 - 10.1 mg/dL. In this study, it was found that the results were dominated by hypocalcemia in 59.5% with an average calcium level is 8.057±1.9473 mmol/L, and mostly in infants. In patients with hypocalcemia, the most common primary diagnosis was digestive system (acute diarrhea followed by severe dehydration) and central nervous system disorders. According to research conducted at Dr. Sardjito Teaching General Hospital in 2013-2016, pediatric patients under 5 years old, who had diarrhea with severe dehydration, showed that the most electrolyte disorder experienced was hypocalcemia too.[15] The most common form of central nervous system disorder experienced was a seizure. The Seizure happens due to irritability in the central nervous system and weak muscle contractility. Hypocalcemia results in decrease of nerve cell excitation threshold so that it results in repetitive movement response due to a single stimulus. According to Baines et al. it was stated in his journal that hypocalcemia was the most frequent case found in critically ill pediatric patients, whereas according to the study by Perkin et al., it was found that hyperkalemia was the rarest case in pediatric patients at PICU.[8] Pediatric patients with hypercalcemia were far fewer cases than the incidence rate in adult patients and one of the causes of hypercalcemia was impaired of parathyroid hormone production and kidney

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disorders.[16] And this applied also in this study because we only found three hypercalcemia patients.

Finally, in chloride electrolyte, the normal standard value for chloride electrolyte level used at PICU Dr. Soetomo General Hospital, Surabaya was 97 - 106 mmol/L. In this study, it was found that the results were dominated by hypochloremia in 35.1% with an average chloride level of 101.45 ± 13.266 mmol/L, and mostly in infants also children. In patients with hyperchloremia, the most common primary diagnosis was digestive system disorder, especially acute diarrhea followed by severe dehydration. Whereas in patients with hypochloremia, the most common primary diagnosis was respiratory system disorder. Hyperchloremia affects many adult patients with critical illness and tends to have a poor prognosis, and there are still no data showing the same thing in pediatric patients with critical illness.[6]

CONCLUSION

In conclusion, the present study showed that critically ill patients with electrolyte disorders admitted to the Pediatric Intensive Care Unit (PICU) were tend to experience low electrolyte levels. The most frequent were hypocalcemia, hypokalemia, hyponatremia, and hypochloremia.

ACKNOWLEDGEMENT

The authors would like to deliver gratitude to doctors, residents, and staff in the Faculty of Medicine, Universitas Airlangga and Dr. Soetomo General Hospital, Surabaya, Indonesia for their assistance and advice in running this research.

Conflict of Interest

There is no conflict of interest and funding in the writing of this article.

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Available at https://e-journal.unair.ac.id/IJAR | DOI: 10.20473/ijar.V2I12020.1-7

INDONESIAN JOURNAL OF ANESTHESIOLOGY AND REANIMATION
Volume 2 (1), January 2020 : 8-12

Original Article

THE EFFECT OF BASIC LIFE SUPPORT (BLS) TRAINING IN THE KNOWLEDGE AND SKILL LEVEL OF COMMUNITY IN SIDODADI VILLAGE, LAWANG, INDONESIA

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ABSTRACT

Introduction: About 300.000 – 350.000 Indonesian people suffer from cardiac arrest each year. Basic Life Support (BLS) is the first immediate response needed by cardiac arrest people, especially the out of hospital cardiac arrest (OHCA) patient. BLS that given from public to OHCA could increase the survival rate up to 2 – 3x higher. Unfortunately, the Indonesian still did not know what is cardiac arrest, how to recognize it, and how to do BLS. **Objective:** The objective of this study was to identify the effect of BLS training in the knowledge and skill level of community in Sidodadi Village, Lawang, Indonesia. **Method and Material:** This experiment used a quasi-experimental design with 102 of the random sampling of people age 20-40 in Sidodadi Village, Lawang, Indonesia. The sample was given pre-test and post-test knowledge questioner before and after joining BLS training. The sample's skill was scored by an assistant doctor using a skill checklist. The data then analysed with a t-paired sample test, Wilcoxon sum rank test, and Pearson correlation. **Result and Discussion:** The score of women is higher than men both in pre-test and post-test, with the significance of p=0,039 for pre-test and p=0,001. 99% who joined BLS training have a significant increase in knowledge with p=0,001. **Conclusion:** The increase in knowledge and skill is correlated for an excellent and good level of the score, but not correlated in a bad level. About 99% of people who have joined BLS training have a significant increase in knowledge and skill. These trained people have the willingness to be a bystander for cardiac arrest people near them.

Keywords: Basic Life Support Training; Skill; Knowledge; BLS; Bystander

ABSTRAK

Pendahuluan: Sekitar 300.000 – 350.000 masyarakat Indonesia mengalami henti jantung setiap tahunnya. Basic Life Support (BLS) adalah pertolongan pertama yang diperlukan oleh korban henti jantung, terutama henti jantung yang terjadi diluar rumah sakit (out of hospital cardiac arrest-OHCA). BLS yang diberikan oleh awam pada OHCA mampu meningkatkan survival rate sebanyak 2 hingga 3x lipat. Sayangnya, masyarakat Indonesia masih banyak yang belum mengetahui apa itu henti jantung, bagaimana cara mengenalinya, dan bagaimana cara melakukan BLS. **Tujuan:** Tujuan penelitian ini adalah untuk mengetahui pengaruh pelatihan BLS terhadap tingkat pengetahuan dan keterampilan masyarakat dalam memberikan pertolongan pertama henti jantung di Desa Sidodadi, Kecamatan Lawang, Indonesia. **Metode dan Bahan:** Penelitian ini menggunakan desain quasi eksperimental dengan 102 random sampling dari penduduk berusia 20-40 tahun di Desa Sidodadi, Kecamatan Lawang, Indonesia. Sampel diminta untuk mengisi pretest pengetahuan, mengikuti pelatihan BLS, dan mengisi posttest pengetahuan. Keterampilan sampel dinilai oleh dokter muda menggunakan ceklis keterampilan. Data dianalisis dengan uji t berpasangan, wilcoxon sum rank test, dan uji korelasi pearson. **Hasil dan Pembahasan:** Nilai pretest dan postest perempuan lebih tinggi daripada pria, dengan nilai signifikansi p=0,039 untuk pretest dan p=0,001. 99% peserta yang mengikuti pelatihan BLS mengalami peningkatan pengetahuan yang signifikan, dengan p=0,001. **Kesimpulan:** Peningkatan pengetahuan dan keterampilan memiliki korelasi, terutama pada kelompok dengan nilai pengetahuan yang baik dan sangat baik, namun tidak berkorelasi pada kelompok nilai yang buruk. 99% peserta yang mengikuti pelatihan BLS mengalami peningkatan pengetahuan dan keterampilan yang signifikan. Awan terlatih ini memiliki peningkatan kemauan untuk menjadi bystander dan memberikan BLS pada korban henti jantung di sekitar mereka.

Available at https://e-journal.unair.ac.id/IJAR | DOI: 10.20473/ijar.V2I12020.8-12

Kata Kunci : Pelatihan Basic Life Support; BLS; Pengetahuan; Keterampilan; Bystand

Article info: Received: October, 24th 2019; Revised: November, 5th 2019; Accepted; December, 13th 2019; Published: January, 30th 2020

INTRODUCTION

Cardiac arrest is one of the leading causes of death in the various Countries[6] 300,000 – 350,000 Indonesian communities suffer heart attacks every year.[8] Basic Life Support is an action that can be given by health workers or laypeople who can be trained for heart attacks, respiratory failure, or obstructive airway breath patients.[2] BLS provided by laypeople can increase 2 to 3 times of the survival rate. Anyone can do the BLS training. Teenagers between the ages of 13 to 14 years can even do chest compressions as well as adults.[9] Unfortunately there are still many Indonesians who don't know what a heart attack is, how to recognize it, and how to do BLS.

The purpose of this study was to determine the effect of BLS training on the level of community knowledge and skills providing first-aid cardiac arrest in the village of Sidodadi, Lawang, Indonesia.

MATERIAL AND METHOD

The design of this study was Quasi-experimental involving the villagers of Sidodadi, Lawang, East Java, Indonesia. About 102 samples were taken randomly using simple random samples from people aged 20-40 years in the village. The exclusion criteria for the sample are residents who work in the health sector or have not attended training from the beginning to the end.

Samples were asked to fill in a pre-test knowledge level questionnaire, then they would get Basic Life Support (BLS) training for one hour, and then return to fill in the post-test knowledge level questionnaire. The value of pre-test and post-test knowledge will be compared. Samples skills were assessed by young doctors using the BLS skills checklist. The level of knowledge was taken with a BLS layman questionnaire and a BLS assessment skills sheet from the Department of Anaesthesiology and Reanimation of Dr. Soetomo General Hospital. Data knowledge was tested by paired-sample t test and Wilcoxon rank-sum test. Meanwhile, skills data are related to knowledge and tested with the Pearson Correlation test.

RESULT AND DISCUSSION

A total of 102 participants consisted of 47 male participants and 55 female participants in two groups. The level of knowledge of each participant's questionnaire was evaluated and then the average of each group was calculated to compare the group's average results before and after receiving BLS training. The results of the second group pre-test were compared and tested with the Wilcoxon Range Sum Test and obtained the following results:

Table 1. The Comparison Between Male and Female's Knowledge Pretest Score

Gender	N	The Average of Ranking	The Sum Of Ranking	Sig.
Male	47	21.44	536.00	0.039
Female	47	17.43	244.00	

Table 1 shows that the value of knowledge pre-test participants is better men than pre-test knowledge participants are women. This comparison is significant with p = 0.039.

Table 2. The Comparison Between Male and Female's Knowledge Posttest Score

Gender	N	The Average of Ranking	The Sum Of Ranking	Sig

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Male	47	23.50	1081.00	0.001
Female	47	47.00	47.00	

Table 2 shows that the value of men's post-test knowledge is better than the pre-test knowledge of women. This comparison is significant with p = 0.0001.

The researchers also made a comparison between the level of knowledge before and after getting BLS training with paired-sample t-test and obtained the following results:

Table 3. The Value of Male Knowledge Level's T-Test

Age	Pre-test/ Post-test	N	Mean±SD	Difference	T Value	P
20-25	Pre-test	29	6.93 ±1.981	-5.76	-14.004	0.001
	Post-test		12.69±1.147			
26-30	Pre-test	12	6.33±2.498	-5.50	-3.482	0.001
	Post-test		11.83±3.271			
31-35	Pre-test	6	6.5±2.168	-5.83	-2.622	0.001
	Post-test		12.33±1.366			
Total	Pre-test	47	6.72±2.113	-5.71	-2.990	0.001
	Post-test		12.43±2.030			

Table 4. The Value of Female Knowledge Level's T-Test

Age	Pre-test/ Post-test	N	Mean±SD	Difference	T Value	P
20-25	Pre-test	2	7.41±2.806	-4.04	-7.973	0.001
	Post-test	2	11.45±1.471			
26-30	Pre-test	1	6.06±2.53	-4.99	-7.813	0.001
	Post-test	7	11,.59±1.805			
31-35	Pre-test	7	5.71±3.039	-5.58	-4.324	0.002
	Post-test		11.29±1.254			
36-40	Pre-test	9	6.67±2.449	-4.33	-4.596	0.001
	Post-test		12.43±2.030			
Total	Pre-test	5	6.65±2.710	-4.75	-3.995	0.001
	Post-test	5	11.40±1.706			

The test results on the level of knowledge difference above indicate that the level of knowledge difference was obtained by participants before and after receiving BLS training. The average level of difference in men's knowledge before and after getting training is -5.71. The average level of difference in women's knowledge before and after getting training is -4.75. The average level of difference in knowledge of all participants before and after getting training was -5.18. The degree of difference in knowledge is significant with p = 0.0001.

Then the researchers tested the correlation between the level of knowledge and skills with the Pearson Correlation Test and obtained the following results:

Table 5. The Pearson Correlation Test of Knowledge and Skill Level of All Participants

Category	Correlation
Knowledge	0.170
Skill	0.088

The results of the correlation test between the level of knowledge and skills in table 5

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show that increasing knowledge does not correlate with increasing levels of skills. That is indicated by the correlation test value which is more than 0.01 on the whole correlation test results.

When the researcher tried to repeat the correlation test based on the level of knowledge and skills, the following results were obtained:

Table 6. The Crosstabs between Knowledge and Skill Level's Correlation Test

Skill	Knowledge		
	Good	Sufficient	Less
Good	0,002**	0,050*	a
Sufficient	0,045*	a	a
Less	a	a	a

*correlate if p<0.05 (2-tailed)
**correlate if p<0.01 (2-tailed)
[a]did not analyze cause there was no posttest knowledge score in sufficient and less level

Table 6 shows that the level of knowledge does not correlate with the level of skills. However, when researchers conducted more correlation tests by separating samples based on ranges of the level of knowledge and skills were well correlated.

Increased knowledge before and after getting training did not only occur in this study. Mayanlambam and Dewi's (2016) research also showed an increase with an average value of knowledge from 24.65 to 35.5, which means that BLS training is effectively effective. The Owojuyigbe et al (2015) study states that 75% of respondents obtained sufficient BLS knowledge after attending the training.[7] However, there are a number of studies that have not significantly decreased the value of knowledge after receiving the BLS training, namely the Bhatnagar et al (2017). It happened because of various factors that require further research.

If observed from gender differences, this study gets the value that the knowledge of pre-test and post-test in women has better value than men. In a study conducted by Sopka et al (2015) in the first week, no significant difference was found in the level of knowledge of both sexes, but at the 8th week, the female group looked superior to the group of male.[10]

In the study of Adrian et al (2017) different results were obtained in the comparison to the value of BLS knowledge of women and men. Adrian et al's research state that women's group are only able to do BLS in less time than the men's group. Also the time needed to start BLS, the women's groups takes longer than the men's groups. The female group also showed a lack of leadership performance in a number of cases included in the CPR case compared to the male group.[1]

Supporting Adrian et al (2017) research, the research conducted by Mario Krammel et al (2018) states that women and elderly participants have low awareness and willingness to conduct BLS training and use Automated External Defibrillators (AEDs) in case of unconsciousness.[5] Research conducted by Enrico Baldi et al (2015) states that young participants have a good ability to remember BLS, even though the training is only given for a short time. Thus, training provided to young participants is a good provision for training BLS in conducting first aid.[3]

Discussion the correlation between BLS knowledge and skills training, the researchers found a lack of correlation between overall knowledge and skills. Increased knowledge and skills only have a correlation on the value of good knowledge and the value of skills that are quite good. This contradicts research conducted by Seham A. Abd El-Hay et al (2014) which states that there is significant progress on average scores between knowledge and skills in Basic Life Support (BLS) training.[4]

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CONCLUSION

There was an increase in knowledge and skills before and after the provision of BLS (Basic Life Support) training on the Krajan community, Sidodadi Village, Lawang, Malang Indonesia.

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INDONESIAN JOURNAL OF ANESTHESIOLOGY AND REANIMATION
Volume 2 (1), January 2020 : 13-19

Original Article

TRIAGE KNOWLEDGE OF EMERGENCY ROOMS NURSES AT DR SOETOMO REGIONAL GENERAL HOSPITAL

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ABSTRACT

Introduction: Triage is a system to sort patients based on their urgency for care during an emergency. In addition, to determine patient's severity, triage reduces time wasted and overcrowding in the emergency room.[1] Triage errors such as over-triage or under-triage must not exceed 35% and 5% of the total numbers of patients respectively. Dr. Soetomo General Hospital of Surabaya with its status as one of type "A" hospital in Indonesia that has good amenities, facilities, and infrastructures which is also the main referral hospital from Primary or Secondary Health Care, is prone to patients overcrowding. The high number of patients and the demands for high-quality service as the main referral hospital require higher qualification from health care professionals in term of cognitive, skills, and attitude. **Objective:** This study conducted to evaluate the level of knowledge of the ER (Emergency Room) nurses at Dr. Soetomo General Hospital in 2019 towards triage. **Methods and Materials:** This study is a quantitative descriptive study using a validated questionnaire with 32 nurses as the samples. **Results and Discussion:** Demographic profile showed that majority of nurses are: female (52%), age 26 – 35 years old (46 %), graduated from D3 (61%), have been working in this field for >15 years (46%), attended Basic Life Support Training (33%), and have moderate knowledge in triage (61%). **Conclusion:** Emergency room nurses of Dr. Soetomo General Hospital had adequate knowledge in triage. The researcher considers there might be some factors influencing nurse's knowledge in triage.

Keywords: Emergency; Emergency Department; Emergency Nursing; Triage Nurse; Triage

ABSTRAK

Pendahuluan: Triase adalah sistem pemilahan kondisi Korban/Pasien Gawat Darurat. Selain untuk mendeteksi tingkat kegawatan pasien, triase juga memiliki peranan penting dalam mengurangi waktu yang terbuang dan kepadatan pasien di IGD .Kesalahan dalam triase seperti over-triage prosentasenya tidak boleh lebih dari 35% dari total pasien yang ditriase dan kesalahan under-triage prosentasenya tidak boleh lebih dari 5% dari total pasien yang ditriase. Rumah Sakit Umum Daerah Dr. Soetomo dengan predikatnya sebagai salah satu rumah sakit tipe "A" yang memiliki fasilitas, sarana, dan prasarana paling lengkap dan juga merupakan rumah sakit rujukan utama dari faskes tingkat satu maupun dua, membuatnya rentan terjadi kepadatan pasien. Banyaknya pasien dan tingginya tuntutan mutu sebagai rumah sakit rujukan tersier menuntut kualifikasi tenaga medis yang lebih tinggi baik dari aspek pengetahuan, keterampilan dan sikap. **Tujuan:** Penelitian ini dilakukan untuk mengetahui gambaran tingkat pengetahuan perawat IGD RSUD Dr Soetomo Surabaya Tahun 2019 terhadap triase. **Metode dan Bahan:** Penelitian ini merupakan penelitian deskriptif kuantitatif menggunakan instrumen kuisioner tervalidasi dengan 32 perawat sebagai sampel. **Hasil dan Pembahasan:** Profil demografis perawat IGD RSUD dr Soetomo tahun 2019 menunjukkan bahwa mayoritas perawat adalah: berjenis kelamin perempuan (52%), berusia 26-35 tahun (46%), lulusan D3 (61%), lama kerja >15 tahun (46%), pernah mendapatkan pelatihan PPGD (33%), dan memiliki pengetahuan yang cukup terhadap triase (61%). **Kesimpulan:** Tingkat pengetahuan perawat IGD (Instalasi Gawat Darurat) RSUD Dr Soetomo rata rata masuk kedalam kategori cukup adekuat untuk melakukan triase dengan benar. Peneliti mempertimbangkan adanya faktor lain yang mempengaruhi pengetahuan perawat terhadap triase.

Kata Kunci: Kegawatdaruratan; IGD (Instalasi Gawat Darurat); Keperawatan Gawat Darurat; Perawat Triase; Triase

Available at https://e-journal.unair.ac.id/IJAR | DOI: 10.20473/ijar.V2I12020.13-19

INDONESIAN JOURNAL OF ANESTHESIOLOGY AND REANIMATION
Volume 2 (1), January 2020 : 13-19

Article info: Received: November, 1st 2019; Revised: November, 5th 2019; Accepted: January, 20th 2020; Published: January, 30th 2020

INTRODUCTION

Triage was first used by a French military doctor to assess the soldier's condition and their priority to get treatment.[2] Indonesian Ministry of Health defined triage as a system used to sort patients based on their conditions in an emergency.[3]

Triage has become a mandatory section in every hospital's emergency department. Triage help clinician determining priority not only by looking at the clinical condition of the patient but also the survival rate after receiving treatment. Triage can also be done by nurses or doctors at hospital wards.

Triage has different mechanisms based on the condition it is performed. Triage performed in hospital differs from field triage by the default that the hospital has sufficient resources to manage a huge amount of patients. However, field triage performed in the disaster has a smaller amount of resources. Therefore, triage has to be very selective and detail on assessing patient's condition and prognosis patient's outcome. In hospital triage, all patients will eventually get the treatment needed, but in field triage patients with better condition and survival rate will get higher priority than patient with the worse condition and lower survival rate.

Triage tag uses colors to differentiate the patient's conditions. Colors frequently used as triage tag are blue, red, yellow, green, white, and black. Dr Soetomo General Academic Hospital uses CTAS (Canadian Triage and Acuity Scale) with modification since 2018.

Triage errors can be classified as under-triage and over-triage. Under-triage is an inadequate triage placement (below the level of emergency that should be), thereby increasing the risk of worsening the patient's condition while waiting.[4] Over-triage is a triage error where patients who are supposed to have a low emergency level are considered high emergencies.[5] Over-triage should not be more than 35%, and under-triage errors should not exceed 5% of total patients.[5] Errors in triage will certainly be very closely related to the prognosis and length of patient treatment. The lack of data documenting these errors results in underestimation and unsolved problems. A study conducted at a general hospital in Yogyakarta portraits at least 20% errors in triage.[6]

The aim of this study is to evaluate the level of knowledge of nurses in the Emergency Department of Dr Soetomo General Hospital against triage.

MATERIAL AND METHOD

This study was descriptive qualitative research. The sample in this study has taken from all ED nurses at Dr Soetomo Regional General Hospital Surabaya that fulfilled the inclusion criteria and selected by total sampling method. The inclusion criteria were all ER (Emergency Room) nurses who worked on the first floor at Dr Soetomo Regional General Hospital according to the employee's data taken on January 2019, and all subject have given informed consent. The exclusion criteria were ER (Emergency Room) nurses who fulfilled the inclusion criteria but resigned during the period of research.

This study was located on the first floor of Emergency Department at Dr Soetomo General Hospital and done during nurse's work hours from November 2018 until July 2019. This study retrieved data needed using a validated questionnaire that contains demographic data including gender, age, last education degree, followed by other variables such as length of service and training. The

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questionnaire contained eight questions to assess the triage knowledge of study subject. Data were analysed using IBM SPSS Statistic 24 software.

RESULT AND DISCUSSION

Table 1. Research Subject Distribution Based on Their Demographic Profile

No	Variables	Frequency	Percentage
	Gender		
1	Female	17	52%
	Male	16	48%
	Age		
2	<26 years old	1	3%
	26-35 years old	15	46%
	36-40 years old	9	27%
	>41 years old	8	24%
	Last Education Degree		
3	D4	1	9%
	D3	15	61%
	S1	9	30%
	S2	0	0%

Subjects at Dr Soetomo General Hospital mostly were female (52%), and the rest were male. This study is in line with study at Tangerang District General Hospital, wherein the study found most nurses were female (76.1%), compared with men (23.9 %).[7] This result is also comparable to a study at Prof. Mental Hospital Dr. V. L. Ratumbuysang of North Sulawesi Province in September - October 2016 where most nurses were also female (85%).[8] A study about Canadian and American nurses had similar nurse's gender distribution where most active nurses were female (95%).[9]

Many factors affected the difference between the number of male and female nurses, such as heavy and menial work done frequently by male nurses[10]. Isolations and unpleasant experience such as hostility were commonly done by female nurses against male nurses.[11]

Most subjects were in the range of 26-35 years old (46%). The results of this study are similar to a study in Manado where most nurses were 26-35 years old (56.8%), followed by under 26 years old (34.1%), and lastly more aged than 35 years old (9.1%).[12] Similar results were also found in the study at a primary care facility in Malang, where 47% of nurses were 21-30 years old. Followed by 31-40 years old nurses (23%), 41-50 years old nurses (22%) and the remaining 8% in the range of 51-60 years old.[13] However, there are differences found in the study conducted in Premiere Hospital of Surabaya where most nurses were under 26 years old(44%).[14]

The age range of 25-45 years is a stage of development of generativity compared to stagnation, where one pays attention to ideas, desires to share knowledge, and enhances creativity.[15] This might be considered as productive period. In the mid-40s, physiologically, there is a decrease in sensory ability which usually begins with a decrease in visual acuity, which can also be followed by a decrease in hearing function.[16] Overworking in old age is also very closely related to chronic pain such as neck pain, back pain, and pain related to inflammatory processes such as arthritis and other musculoskeletal disorders.[17] Nurses on their unproductive period with hard work were prone to chronic pain condition.[18]

ER (Emergency Room) nurses in Dr Soetomo General Hospital mostly graduated from D3 degree (61%). A study at the general hospital in Semarang where most nurses last education was D-3 (68.9%).[19] A study at the general hospital in Tangerang also showed most nurses educated from D3 (82.1%) .[7] Study in Manado also found most nurses were D3 graduate (77.3%) followed by S1 graduate

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(15.9%).[12] A similar thing was found in Sinjai General Hospital, South Celebes, where the majority of respondents graduate from D3 (61%).[18]

Nursing staff with higher education will perform better because they already have broader knowledge and insight. Diploma education prioritizes work practice rather than theory when compared to the level of undergraduate education.[19] This is relevant with the work of nurses who need a lot of work practices in providing excellent service and forming good, caring behaviour for patients. The higher level of formal education results in increased expectations in terms of career and job acquisition and income. However, the available employment does not always match the level and type of knowledge and skills possessed by those job seekers.[20] Nurses who graduate from diploma education are also proven to have work efficiency and better job performance than nurses with SPK education.[21]

Table 2. Subject's Distribution Based on Their Length of Service, Training Types and Training Frequency

No	Variables	Frequency	Percentage
1	**Length of Service**		
	<5 years	2	6%
	6-10 years	9	27%
	11-15 years	7	21%
	>15 years	15	46%
2	**Training Types**		
	BLS	25	35%
	ATLS	6	8%
	EKG	4	6%
	ACLS	3	4%
	PPGD	24	33%
	Code Blue	7	10%
	BTCLS	3	4%
3	**Training Frequency**	13	40%
	Once	11	33%
	Twice	5	15%
	Three times	0	0%
	Four times	2	6%
	Five times	2	65
	Six times	0	0%
	Seven times	0	0%
	More than seven times		

The most extended length of a nurse's service in the ER (Emergency Room) of Dr Soetomo General Hospital was over 15 years. The results of this study are similar to the study in Datoe Binangkang General Hospital with most nurses worked over five years (78.8%).[22] This is contrary to a study at the general hospital in Tangerang where the largest proportion were most nurses only worked under five years (37%).[7] Nurses who have a working period of < 7 years are said to perform worse (55.6%) than those of 7-12 years (45.3%).[23] The length of service is also linked to more experience the nurse has in providing nursing care in accordance with applicable standards or fixed procedures.[24]

Most nurses have served for more than 15 years at ER (Emergency Room), majority of nurses have attended at least one training, and the most attended training by ER (Emergency Room) nurses is BLS (Basic Life Support) training. The results of this study are similar from a study in Karanganyar General Hospital where most nurses also received PPGD training (66,7%).[25] However, it has been proven statistically that there is no correlation between the training of nurses on nurse performance.[26,29] On the contrary, a study with a different subject (high school students) on the effect of basic life support theory training on pulmonary resuscitation knowledge, stating that there is a correlation between training and knowledge.[30]

Table 3. Study Subject's Distribution Based on Their Knowledge on Triage.

No	Triage Knowledge	Frequency	Percentage

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1	Good	20	27%
2	Average	45	61%
3	Bad	9	12%

Results from the study questionnaire reveal that most ER (Emergency Room) nurses at Dr Soetomo General Hospital have adequate knowledge of triage.

Table 4. Frequency Distribution of Triage Error Based on The Study Subject's Questionnaire Results.

No	Triage Error	Frequency	Percentage
1	Under-triage	13	5%
2	Over-triage	68	26%
3	Accurate	183	69%

Results from the study questionnaire reveal that most common mistakes are over-triage.

CONCLUSION

Subject's knowledge is generally in the category of adequate to do the triage correctly. Triage knowledge is a complex multifactorial matter that depends on other variables such as gender, age, last education degree, length of service, training, and individual factors of nurses. All of which,–frequency of nurse's training is the only variable that correlates with the level of nurse knowledge on triage.

Many factors are contributing to this study results regarding nurse's knowledge on triage such as sample size, subject's condition when filling the questionnaire, work hours, or nurse's tasks at the moment. Researchers suggest the results of this study to be taken seriously as a consideration to do an overall competency test or training for the ER (Emergency Room) nurses.

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INDONESIAN JOURNAL OF ANESTHESIOLOGY AND REANIMATION
Volume 2 (1), January 2020 : 20-26

Original Article

EFFECTIVENESS OF KETOPROFEN SUPPOSITORIA AS PREEMPTIVE ANALGESIA FOR POSTOPERATIVE PAIN IN PATIENTS UNDERGOING ELECTIVE SURGERY WITH GENERAL ANESTHESIA

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ABSTRACT

Introduction: Effective postoperative pain management provides improved patient comfort and satisfaction, earlier mobilization, fewer pulmonary and cardiac complications, reduced risk deep vein thrombosis, fast recovery, and reduced cost of care. Preemptive analgesia, initiated before the surgical procedure to prevent pain in the early postoperative period, has the potential to be more effective than a similar analgesic treatment initiated after surgery. As a part of multimodal analgesia, the use of NSAIDs should always be considered for acute postoperative pain management. NSAIDs can be used preoperatively as a part of the preemptive regimen and for postoperative pain control to increase the efficacy of opioids and reduce its side effects. **Material and Method:** This research was experimental research with a case-control design of the study. The samples separated into two groups, the first group got ketoprofen suppository before the induction, and the second group didn't get the ketoprofen suppository The intensity of pain measured with the Numeric Rating Scale (NRS) or Wong-Baker Faces Pain Scale was the variable studied at different postoperative times (30 min, 60 min, 120 min, 2-6 hours, 6-12 hours). The total amount of rescue analgesics (fentanyl) and side effects were other variables of this study. **Result and Discussion:** The result is ketoprofen suppository as preemptive analgesia administrations can reduce postoperative pain. Numeric Rating Scale was significantly lower in the ketoprofen group compared to the control group ($p < 0,05$) at 30 min, 60 min, 230 min, 2-6 hours, 6-12 hours. The number of postoperative analgesics needed in the recovery room was significant differences among both groups ($p < 0,05$). **Conclusion:** Preemptive analgesia in patients who underwent an operation with general anesthesia with ketoprofen suppository was effectively in blocking noxious stimuli and central sensitization, with subsequent prevention of acute postoperative pain.

Keywords: Postoperative Analgesia; General Anesthesia; Ketoprofen Suppository; Preemptive Analgesia

ABSTRAK

Pendahuluan: Manajemen nyeri postoperatif yang efektif akan dapat meningkatkan kepuasan dan kenyamanan pasien, mobilisasi dini, komplikasi pulmoner dan kardiovaskuler yang rendah, menurunkan resiko deep vein thrombosits, pemulihan lebih cepat dan menurunkan biaya perawatan. Preemptive analgesia yang diberikan sebelum prosedur pembedahan untuk mencegah nyeri diawal periode postoperatif lebih efektif dibandingkan dengan terapi analgesik yang sama diberikan di akhir pembedahan. Konsep multimodal analgesia diajukan dan direkomendasikan bila memungkinkan. Sebagai bagian dari multimodal analgesia, penggunaan NSAID dapat dipertimbangkan sebagai bagian dari manajemen nyeri akut postoperatif. NSAID sapat digunakan sebagai regimen preemptive dan mengendalikan nyeri postoperatif untuk menurunkan penggunaan opioid dan mengurangi resiko. **Bahan dan Metode:** Penelitian ini merupakan penelitian eksperimental dengan desain studi case control. Sample dibedakan menjadi dua kelompok, kelompok pertama mendapat ketoprofen suppositoria sebelum induksi dan kelompok kedua tidak mendapatkan ketoprofen suppositoria. Intensitas nyeri postoperatif diukur dengan skala Numeric Rating Scale (NRS) atau Wong Baker Faces Pain Scale (pada menit ke 30, 60, 120, dan jam ke 2-6, 6-12). Pemberian rescues analgetics dan efek samping juga diteliti. **Hasil dan**

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Pembahasan: Hasil penelitian yakni pemberian ketoprofen suppositoria sebagai preemptive analgesia dapat menurunkan intensitas nyeri postoperatif. NRS postoperatif pada kelompok ketoprofen suppositoria lebih rendah dibandingkan kelompok kontrol ($p < 0,05$) dimana pada 30 menit ($p= 0,005$), 60 menit ($p= 0,002$), 120 menit ($p= 0,001$) dan 2-6 jam ($p=0,005$). Jumlah penggunaan analgetik durante dan postoperatif di ruang pulih sadar berbeda secara signifikan diantara dua kelompok ($p<0,05$)**.** Ketoprofen suppositoria sebagai preemptive analgesia efektif dalam memblok stimulus noksius dan sensitisasi sentral pada pasien yang menjalani operasi dengan pembiusan secara general anestesi untuk menurunkan nyeri akut postoperatif.

Kata Kunci: Analgesia Postoperatif; General Anestesi; Ketoprofen Suppositoria; Preemptive Analgesia

Article info: Received: October, 23rd 2019; Revised: October, 24th 2019; Accepted: January, 13th 2020; Published: January, 30th 2020

INTRODUCTION

Pain is an unpleasant experience, both sensory and emotional, due to the damage of tissue, which is described in the form of its destruction.[1] The great challenge for the anesthesiologist is the pain management of postoperative. The postoperative pain is a part of acute pain which is predictively occurring. If it is not done well, it will cause physiological changes, causing negative impacts in the organ system, producing adverse outcomes in the postoperative period, even it can develop into chronic pain syndrome in the individuals both adult and children. [2,3]

Tissue trauma caused by the surgery can cause afferent sensitization, which will stimulate the Central Nervous System, but it can be prevented by giving antinociceptive (preemptive analgesia) that will reduce the acute pain of post-operative.[2,3] Preemptive analgesia is an action to mitigate or avert mediator production, which is responsible for nerve stimulation and aims to block pain receptors and release inhibitory effect toward pain neurotransmitters so that it can avoid hyperalgesia and allodynia. Several preemptive analgesia drugs used until now including ibuprofen, celecoxib, ketorolac, gabapentin orally. All are given a single dose of pre-operative.[4,5]

Ketoprofen is a propionic acid group of NSAID (Nonsteroidal Anti-Inflammatory Drugs) It is very beneficial for pain management of post-operative because it gives analgesic effect, anti-inflammatory, and antipyretic by blocking cyclo-oxygenase (COX) activity and reduces prostaglandin and thromboxane.[1,6,7] Besides, NSAID will not cause side effects such as opioids, causing breath depression, sedatives and nausea, and vomiting.

In September up to October 2015, the number of patients who did elective surgery with general anesthesia was 1124 in Dr. Soetomo Hospital → 731 patients (65.03%) aged 18-65 years old and 375 patients (50%-61%) were given ketorolac (intravenous) at the end of surgery as anti-pain of post-operative. In the research done by Ismar Lima C, et al., rescue analgesics such as opioid analgesic like paracetamol, dipyrone, tenoxicam or ketoprofen were used to handle post-operative pain with the level of moderate pain up to severe in the oncology patients undergoing surgery in the head and neck areas who used oxycodone as an anti-pain.[8]

MATERIAL AND METHOD

This research was an experimental research with a case-control study design.

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The number of samples was as many as 60 adult patients aged 18-65 years old who underwent elective surgery with the estimation of moderate up to severe post-operative pain. From all the samples, the samples were divided into two groups covered the first (case) group as many as 30 patients were given ketoprofen suppository after induction and the second (control) group as many as 30 patients were not given ketoprofen suppository.

Both groups were given the same treatment during induction, anesthesia maintenance, and in the postoperative period during the surgery. In the recovery room, both groups were measured toward the level of pain by using Numeric Rating Scale (NRS), Wong-Baker Faces Pain Scale, and vital parameter signs in the recovery room at the 30, 60, 90, 120 and 180 minutes if NRS ≥ 4 then post-rescue analgesia (fentanyl 1-2 mcg/kg) post-operative.

This research was done at the Integrated Central Surgery of RSUD Dr. Soetomo, Surabaya, in December 2016 up to January 2016.

RESULT AND DISCUSSION

Demographic Characteristics of Research Samples

The demographic characteristics of the patients in this research included gender, age, weight, height, BMI, surgery duration, surgery type, number of bleeding, and PS ASA. After data of demographic characteristics of the patient were collected, then different test in the case and control groups were conducted.

Table 1. Demographic Characteristics of Age, Gender, PS ASA, Weight, Height, BMI, Surgery Duration, Hemorrhage

Variable	Group		P-Value
	Case (Ketoprofen Suppositoria)	Control	
Gender			
Male	12 (40.0)	4 (13.3)	0.041
Female	18 (60.0)	26 (86.7)	
Age (year)	41.1 ± 13,1	45.2 ± 11.2	0.202
PS ASA 1	5 (16.7%)	5 (16.7%)	1.000
PS ASA 2	25(83.3%)	25(83.3%)	
Weight (kg)	60.7 ± 11.3	57.1 ± 9.0	0.2
Height (cm)	157.8 ± 9.2	155.1 ± 7.4	0.5
BMI	24.2 ± 2.7	23.8 ± 2.8	0.567
Duration of surgery (minute)	197.7 ± 91.9	209.2 ± 84.5	0.622
Hemorrhage (ml)	223.3 ± 189.3	263.3 ± 154.2	1.47

Based on Table 1, there was a significant difference in the gender of the patients between ketoprofen suppository and control groups. Based on the results of the different test, it obtained the result of the P-value is 0.41 or <0.05 so that it could be said to be significant, or there was a significant difference between the two groups. It possibly to happen because of the randomization system so that the difference of gender between men and women among the treatment and control groups were different.

The characteristics of the patients were also examined based on the surgery types done. The different test Results of both groups as in the following table:

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Table 2. Demographic Characteristics of Surgery Types of Each Research Group

Surgery	Case (Ketoprofen Suppositoria)	Control	P-Value
Oncological Surgery	8 (26.7%)	7 (23.3%)	0.922
Head-neck Surgery	15 (50%)	16 (53.3%)	
General Surgery	1 (3.3%)	1 (3.33%)	
Oral Surgery	3 (10.0%)	3 (10.0%)	
Otolaryngology	2 (6.7 %)	0 (0%)	
Obstetric and Gynecology	1 (3.3%)	3 (10.0%)	

On Table 2, it was known that the types of surgery of two research groups. In the research of ketoprofen suppository and control groups obtained, most of the patients were from head-neck surgery while the least patients found was otolaryngology surgery. The statistics analysis result showed there was no significant difference between those two groups in which the P-value > 0.05 (p = 0.922).

The Influence of Ketoprofen Suppository Giving on the Value of NRS/Wong-Baker Faces Pain Scale in Post-Operative

The measurement of The NRS/Wong-Baker Faces Scale aimed to know the response of postoperative pain in adult patients who had elective surgery under general anaesthesia. The data collected in this research included the NRS pain scale, or Wong-Baker Faces Pain Scale in pre-operative, in the conscious recovery room at 30, 60, 60, 90, 120 minutes, 2-6 hours, 6-12 hours in the room.

Table 3. The Average of NRS/Wong-Baker Faces Pain Scale Value in each group

Variable	NRS≥4 Control	NRS<4 Control	NRS≥4 Ketoprofen	NRS<4 Ketoprofen
Pre Anesthesia	0	30	0	30
30th minute	8	22	0	30
60th minute	0	21	0	30
120th minute	10	20	0	30
2-6th hour	12	18	2	28
6-12th hour	13	17	2	28

Based on Table 3, it was known that the NRS value of the control and the ketoprofen suppository (case) groups had significant difference at 30, 60, 120 minutes, 2-6 hours and 2-12 hours, while at pre-anesthesia did not show a significant difference of NRS value. The results of statistics test to show p-value in the differences of NRS values of each time, at the 30 minutes with P-Value of 0.005 ($p<0.05$), at the 60 minutes with P-value of 0.002 ($p<0.05$), at the 120 minutes with P-value of 0.001 ($p<0.05$), at the 2-6 hours with P-value of 0.005 ($p<0.05$) and at the 6-12 hours with P-value of 0.002 ($p<0.05$).

This research analyzed the effectivity of ketoprofen suppository (*Non-Steroid AntiInflammatory Drug*/ NSAID type), which was a very beneficial analgesic in the pain management of post-operative because it was able to reduce the pain and inflammation. NSAID was effective in the pain management of mild and moderate postoperative. In severe pain which needed opioid giving, the giving of NSAID added analgesia and opioid-sparing effect. For optimal outcome, the time given was very important because NSAID required time to block prostaglandin synthesis and inhibit the

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pain way. The giving of pre-operative as preemptive analgesia became essential to get a good postoperative effect. [9-12]

It could be concluded from this research that the effectivity of ketoprofen suppository as preemptive analgesia seen in the ketoprofen suppository group compared with the control group and it obtained the significant difference with P-value < 0.05, in which the score of postoperative pain measured by the value of NRS or Wong-Baker Faces Pain Scale in the ketoprofen group was lower than the control group.

Theoretically, due to "protective" effect toward the system of nociceptive, preemptive analgesia was potentially more effective than the similar analgesic therapy given after surgery because the giving of preemptive analgesia was able to prevent central sensitization which was triggered by the incision and inflammatory trauma happened during the surgery and at the beginning of postoperative period.

The Influence of Ketoprofen Suppository on the Need of Rescue Analgesic (Fentanyl)

Table 4. The Needs of Rescue Analgesic (Fentanyl) during the Induction, Durante Operation and Post-Operative in the Recovery-Room

Fentanyl Use	Ketoprofen	Control	P-Value
Induction Fentanyl	73.3 ± 19.6	70.0 ± 23.1	0.541
Durante Operation Fentanyl	40.0 ± 44.3	62.5 ± 50.7	0.048
Post Operation Fentanyl	0.00 ± 0.00	14.2 ±26.8	0.003

According to table 4, it showed that the differences in the use of fentanyl in the ketoprofen and control groups could be seen through the use of fentanyl during Durante operation with P-value of 0.048 (P<0.05) and post-operative in the recovery room with P-value of 0.003 (P<0.05). The use of fentanyl during the induction did not show any significant differences in the ketoprofen and control groups with P-value of 0.541 (p> 0.05).

The needs of opioid fentanyl suppository during Durante operation and post-operative was much lower compared to control group, and this is in line with the theory stating that preemptive analgesia (in this case was ketoprofen suppository) reduced the amount of intravenous sedation and general anesthetic agents during the surgery due to the loss of patients' central nervous system reaction to the pain stimuli. The ability to recover from anesthesia was faster with lower analgesic side effects if it was given before onset stimulus noxious and pre-operative, it gave the reaction of blocking the pain receptors and released inhibitory effects on pain with the mechanism on neurotransmitters in which it affected the central nervous system and peripheral nervous system by processing noxious stimuli and significantly reduced hyperalgesia and allodynia before it even occurred. However, on analgesia pharmacological perspective, the needs of analgesia also relied on the patients' pain response, while pain referred to a very complex cause coming from family factor, culture, environment, previous pain experience greatly determined the patients' needs for analgesia.

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The Effect of Ketoprofen Suppository on Post-Operative Side Effects

Table 5. The Effect of Ketoprofen Suppository on Post-Operative Side Effects

Side Effect		Ketoprofen	Control	P Value
Dizziness	**Yes**	3 (10%)	14 (46.7%)	0.004
	No	27 (90.0%)	16 (53.3%)	
Nausea	**Yes**	0 (0%)	7 (23.3%)	0.011
	No	30 (100%)	23 (76.7%)	
Gag	**Yes**	0 (0%)	4(13.3%)	0.112
	No	30 (100%)	26 (86.7 %)	

The table 5 showed that the difference of the side effects of fentanyl usage in both groups could be seen in the forms of dizziness with p-value of 0.004 ($p<0.05$) and nausea with p-value of 0.011 ($p<0.05$). The side effects of fentanyl usage in the form of nausea did not give the difference to the ketoprofen and control groups with p-value of 0.112 ($p>0.05$).

Some literatures state that the use of inhalation and opioid drugs stimulate the center of nausea indirectly through this Chemoreceptor Trigger Zone/ CTZ, similarly sore is a factor that influences the occurrence of postoperative nausea and vomiting because those give effects indirectly through higher cerebral cortex towards the center of chemotactic (Chemoreceptor Trigger Zone/ CTZ located on the area of Postrema that is the base of ventricle IV) and triggers the release of katekolamin.[12] As it was known, the center of nausea could be activated directly as a result of irritant or indirectly as a result of the input from the main Four areas: gastrointestinal tract, cerebral cortex and thalamus, vestibular region and chemoreceptor trigger zone (CTZ). CTZ located between the medulla and the base of the fourth ventricle.

The Effect of the Total Amount of Opioid toward the Emersion of Side Effects

Table 6. The Total usage of Opioid (Morphine and Fentanyl) toward the Emersion of Side Effects.

Variables	The Side Effects		
	B	P-value	OR (CI 95%)
Ketoprofen suppository	-2, 744	<0,0001	0,064 (0,02- 0,26)
Fentanyl	-0,003	0,568	0,997 (0,989- 1,006)
Morphine	0,189	0,629	1,208 (0,562-2,597)

Based on the results of Table 6 of statistical analysis to the side effects of dizziness, nausea, and vomiting in post-operative, in the Ketoprofen suppository group was lower than in the control group (B= -2.744), however the amount of morphine and fentanyl usage gave no effect toward the emersion of the side effects with the value of $p>0.05$ ($p= 0.629$ and $p= 0.568$).

Some literature showed that the use of opioid as monomodal caused complications and side effects such as inhalation depression, drowsiness, pruritus, skin rash, urine retention, inhibited gastrointestinal motility and postoperative vomiting and nausea. The vomiting and nausea induced by opioids were caused by direct stimulation from chemoreceptor trigger zone in the base of the fourth ventricle. This reflected the agonist role of opioid as partial dopamine agonist to dopamine receptor in the

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chemoreceptor trigger zone; moreover, morphine also caused nausea and vomiting with the incline of gastrointestinal secretion and the deceleration of gastrointestinal flow. However, if it was used together with NSAID, then the group of non-opioid added analgesia, supported opioid efficacy with opioid sparing-effect and decreased the side effect of opioids.

CONCLUSION

Ketoprofen suppository was more effective as preemptive analgesia in handling post-operative sore. The giving of rescue analgesia (fentanyl) in the Durante operation and post-operative in the ketoprofen suppository group was lower than in the control group. The side effects of dizziness and nausea in the ketoprofen group were lower than in the control group.

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Available at https://e-journal.unair.ac.id/IJAR | DOI: 10.20473/ijar.V2I12020.20-26

INDONESIAN JOURNAL OF ANESTHESIOLOGY AND REANIMATION
Volume 2 (1), January 2020 : 27-33

Original Article

PROFILE HEMODYNAMICS (BLOOD PRESSURE AND HEART RATE) CHANGES IN THE USE OF ADRENALINE IN CESAREAN SECTION WITH SPINAL ANESTHESIA AT DR SOETOMO SURABAYA HOSPITAL

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ABSTRACT

Introduction: spinal anesthesia block is one of anesthesia technique that aims to block motor nerves resulting in paresis or anesthesia and paralysis or loss of muscle function in myotomes that are the same level as blocked dermatomes. Caesarean section is one of the surgical actions that are often performed mainly in birth cases. Besides that, the mechanism of the effects of giving birth to the operation of type B autonomic caesarean section autonomic nerve pronglion nerve which results in a decrease in the resistance of peripheral veins and peripheral vasodilatation which results in an imbalance in hemodynamics especially in blood pressure and heart rate and cause of hypotension. Vasopressor, fluid therapy, vasoconstrictor are given to reduce the toxicity of local anesthesia and to overcome hypotension. **Objective:** To determine hemodynamic changes (blood pressure and pulse) in spinal anesthesia block surgery patients with caesarean section at Dr Soetomo Hospital. **Material and Method:** This research is descriptive with a retrospective from January - March 2018, the sample taken with total sampling from secondary data from the central medical record at RSUD Dr. Soetomo. **Results and Discussion:** 68 samples were obtained from inclusion and exclusion criteria there was a change in blood pressure and pulse in patients with caesarean section with spinal anesthesia block with the addition of vasoconstrictors. There was a decrease in average systolic pressure 13.25, diastole 18.25 and pulse 4.5 and in no increase. There was a decrease in average systolic pressure 11.9286, diastole 13.8929 and pulse 5.6429 and no addition of p> 0.05 the two are not significantly different. **Conclusion:** addition of adrenaline to spinal anesthesia in caesarean section patients was not cause significant hemodynamic (blood pressure and heart rate) changes.

Keywords: Adrenaline; Spinal Anesthesia; Heart Rate; Caesarean Section; Blood Pressure

ABSTRAK

Pendahuluan:. Spinal anestesia salah satu teknik anestesi bertujuan untuk memblok saraf motorik yang mengakibatkan paresis atau mati rasa serta paralisis atau kelumpuhan otot pada miotom pada bagian tubuh yang selevel dengan dermatom yang telah di blok. Oprasi seksio sesaria merupakan salah satu tindakan oprasi yang sering dilakukan utamanya pada kasus kelahiran. Mekanisme efek yang ditimbulkan pada ibu melahirkan daengan oprasi seetio caesaria saraf pre ganglion otonom sabut saraf tipe B yang mengakibatkan penurunan tahanan pembulu perifer serta vasodilatsi pembulu perifer yang mengakibatkan imbalance pada hemodinamik khususnya pada tekanan darah dan nadi yang menyebabkan hipotensi. Untuk mengatasi hipotensi diberikan vasopressor, terapi cairan serta vasokonstriktor untuk mengurangi toksisitas dari anestesi lokal yang diberikan. **Tujuan:** Mengetahui perubahan hemodinamik (tekanan darah dan nadi) pada anestesi spinal blok dengan penambahan vasokonstriktor untuk prolonge duration operasi pasien operasi secio caesaria RSUD Dr Soetomo. **Bahan dan Metode:** Penelitian ini bersifat deskriptif dengan sample retrospective yang diambil dengan total sampling dari secondary data rekam medis pusat RSUD Dr. Soetomo Januari – Maret 2018. **Hasil dan Pembahasan:** 68 sample yang di dapat dari kriteria inklusi dan eksklusi terdapat perubahan tekanan darah dan nadi pasein pasien sectio caesaria dengan spinal anestesi blok dengan penambahan vasokonstriktor penurunan rata – rata tekanan sistole 13,25, diastole 18,25 dan nadi 4,5 serta pada tidak ada penambahan didapatkan penurunan rata – rata tekanan sistole 11,9286, diastole 13,8929 dan nadi 5,6429 dan keduanya di uji dengan Independent T Test didapatkan p>0,05 keduanya tidak berbeda bermakna **Kesimpulan:** penambahan adrenalin pada spinal anestesi pasien seksio sesaria tidak menyebabkan adanya perubahan hemodinamik (tekanan darah dan nadi) yang signifikan

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Kata Kunci: Adrenalin; Anestesi Spinal; Nadi; Seksio Sesaria; Tekanan darah

Article info: Received:November, 18th 2019; Revised: November, 25th 2019; Accepted: January, 14th 2020; Published: January, 30th 2020

INTRODUCTION

One type of anesthesia that is often used in surgery, especially caesarean section is a spinal anesthesia block or SAB, which is one type of regional anesthesia. According to WHO, in 2015 recorded prevalence in Indonesia, caesarean section reached 10% - 15%. *Hypotension* or decrease in blood pressure is one of the most common acute complications of spinal anesthesia.[1] The incidence of hypotension under spinal anesthesia is significant. In several studies mentioning the incidence reached 8% -33% case surgery related to hypotension, highest found in the obstetric portion with 11.8% if compared to general surgery 9.6% and hypotension due to trauma 4.8%, incident maternal hypotension in cesarean section due to spinal anesthesia reached 83.6%.[2,3,4]

Neuraxial anaesthesia is the commonest, safest, and most logical choice of anaesthesia for caesarean section. Various options include spinal anaesthesia, and epidural anaesthesia, or combined spinal-epidural (CSE) anaesthesia.[5,9] Hypotension in spinal anesthesia caused by the blockade of sympathetic nerves that function to regulate vascular smooth muscle tone. Blockade of preganglionic sympathetic nerve fibers that causes venous vasodilation, resulting in a shift in blood volume especially to the splanchnic and lower extremities so that it will reduce blood flow back to the heart.[6,7]

The mechanism of effect on the mother giving birth with caesarean section is in the autonomic pre ganglion nerve type B nerve that causes a decrease in peripheral resistance and peripheral vascular vasodilatation resulting in an imbalance in hemodynamics especially in temperature and blood pressure or hypotension.[6,7]

Factors that influence the degree and incidence of hypotension in spinal anesthesia include the type of local anesthetic drug, the level of sensory inhibition, age, sex, body weight, patient's physical condition, patient's position, surgical manipulation.[6,7]

The addition of a vasoconstrictor to a local anesthetic solution such as in spinal anesthesia block has several potentially beneficial effects. It may decrease the peak plasma concentration of the local anesthetic agent, increase the duration of anesthesia and improve its quality, decrease the minimum concentration of local anesthetic agent needed for nerve block and reduce blood loss during surgical procedures [8,9]

Based on the description above, the researcher wants to find out more about Profile Hemodynamic changes in the use of lidodex and adrenaline in cesarean section with spinal anesthesia at Dr Soetomo General Hospital.

MATERIAL AND METHODS

This research was conducted at Dr Soetomo General Hospital in a manner retrospectively with a descriptive method involving 68 patients that included in the inclusion criteria of caesarean section patients with spinal anesthesia block from January - March 2018 in total sampling.

Demographic and clinical data from patients were collected from medical record status in the form of anthropometry,

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pregnancy status, and history of anesthesia when the patient was under caesarean section. Health research ethics committee Dr Soetomo Surabaya approved this research. (0675/KEPK/IX/2018) Data processing uses the Statistical Program for Social Sciences (SPSS) v20.0 to present data.

RESULT AND DISCUSSION

The subjects of this study were 68 patients who included in the inclusion criteria of about 198 patients with caesarean section at RSUD Dr Soetomo.

The data obtained included 68 samples in 3 months January – March 2018 from 196 total sampling it was excluded because of general anesthesia, incomplete data and comorbid with cardiovascular disease, so 68 samples were obtained in this study with spinal anesthesia and using lidodex, vasopressor with a minimum age of 18 years pregnant women and a maximum age of 45 years, with an average age of 33.015 years and a standard deviation of 6.9400. Anthropometric distribution of body weight of pregnant women patients from 68 samples. With the lightest weight of 42.8 kg and the heaviest weight of 102 kg, which has an average of 68.435 kg and a standard deviation of 12.8628. For the height of pregnant women patients, there is the lowest height of 139 cm and the highest of 166.5 cm, which has an average of 153,592 and a standard deviation of 6,1472. From demographic data, there were 15 BMI before birth, 15 people with BMI 19.8-26.0, 23 people with a BMI 26.0-29.0, and 30 people with BMI more than 30.

There were 68 patients, 60 patients, spinal anesthesia with lidodex and 12 patients with lidocaine only and both given by vasopressor in spinal anesthesia. In the results of the data obtained in this study, there was a change in blood pressure and heart rate in the administration of anesthetic drugs with spinal anesthesia block in caesarean section through the normality of Saphiro-Wilk data having significance p>0.05 so that the data distribution is normal. And obtained 56 samples without the addition of vasoconstrictors and 12 samples with the addition of vasoconstrictors In the results of the data obtained in this study there was a change in blood pressure and heart rate in the administration of anesthetic drugs with spinal anesthesia block or SAB with lidodex or lidocaine and dextrose in section caesarean through the normality of Saphiro-Wilk data having significance p>0.05, the data distribution is normal.

Table 1. Demographic profile of patients

Characteristics	N (%)
Age	
<35 years	38 (55.8)
≥35 years	30 (44.2)
BMI (Kg)	
< 19.8	0 (0)
19.8 - 26.0	15 (22.0)
26 – 29	23 (33.8)
>29	30 (44.2)
Lidodex (Lidocaine and Dextrose)	
With vasoconstrictor	12 (17.64)
Without Vasoconstrictor	56 (82.36)

*All sample is usinglidodex for anesthesia drug and addition by vasopressor in caesarean section with spinal anesthesia

In this study, the inclusion of caesarean section patients with Lidodex and given by vasopressor with vasoconstrictor and Lidodex have given by vasopressor without vasoconstrictor was, and homogeneous

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data distribution was obtained. Then the sample was examined in the use of vasoconstrictors in spinal anesthesia and not using vasoconstrictors through secondary data recording of medical records and observed hemodynamic changes mainly in blood pressure and heart rate.

Spinal Anesthesia is frequently accompanied by hypotension, which may be defined in absolute terms as a systolic blood pressure (SBP) of 90 or 100 mmHg or relative terms as a percentage it is about 20% fall from baseline.[6] Hypotension in spinal anesthesia is mainly a result of the blockade of sympathetic nerves that function to regulate vascular smooth muscle. Preganglionic sympathetic nerve fiber blockade which causes venous vasodilation, resulting in a shift in blood volume especially to the splanchnic and lower extremities so that it will reduce blood flow back to the heart and it can make hemodynamic changes after spinal anesthesia block anesthesia using lidocaine anesthesia, local anesthesia lidocaine works by blocking transmission by obstruction in the sodium channel. Binding of lidocaine with intracellular sodium channels will inhibit sodium ions from entering the cell and prevent the comparison of premedication of nerve membrane potential. The mechanism provides anesthetic and analgesic effects by inhibiting the transmission of pain sensations in nerve fibers.[7,10] There are several ways to reduce the effects of massive hypotension, and several studies have been conducted for approximately three decades with varied results.[2,8] one of them using vasoconstrictors to prolong the duration of anethesia and to minimalize hypotension mechanism caused by vasodilation.[2] Solutions containing vasoconstrictors spread in the same way as those without, although block duration may be prolonged. It makes this drug is usually using in spinal anesthesia [9,10] Vasopressor drugs act the first line to the management of hypotension using on α1-, β1- and β2-adrenoreceptors in the heart and vascular system. The physiological response of these adreno-receptor agonists depends on the type and location of the receptors. Vasoconstriction is mainly mediated by α1-receptors. Vasopressors are usually using in obstetrics primarily include directly acting selective α_1 receptors agonists, phenylephrine, and methoxamine, and both, directly and indirectly, acting such as mephentermine, metaraminol and ephedrine. However, some vasopressors can also stimulate β1- and or β2-receptors directly or indirectly, leading to a positive inotropic effect. Adrenaline is a synthetic alkaloid that is almost similar to the secretion of the natural adrenaline medulla, having the effect of reducing local blood flow, decreasing the rate of absorption of local anesthetics, and extending its local effect. One effect of administering local anesthetics that contain adrenaline is a change in blood pressure between before and after the administration of local anesthetics due to hypotension due to the vasodilation of the blood vessels.[3,13]

In table 2 the mean change in systole from the Pre-post-delivery of vasoconstrictor sample shows a decrease systole of 13.25 mmHg with the difference in post and pre systole difference in anesthesia the largest sample difference and the smallest difference of 16,24318 mmHg.

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Table 2. Hemodynamics Changes Lidodex Without Vasoconstrictor

Pre-post of Without vasoconstrictor	
Systole (N)	56
Mean	-11,9286
Standard deviation	17,80690
Signifcance	0,814
Diastole (N)	
Mean	-13,8929
Standartd deviation	14,98081
Signifcance	0,378
Heart Rate (N)	56
Mean	-5,6429
Standard deviation	12,66409
Signifcance	0,786

*This sample has through the normality of Saphiro-Wilk data distribution is normal. And tested by independent T-test.
*p > 0.05 not significant
* Lidodex without vasoconstrictor more stable in hemodynamics changes than Lidodex given by vasoconstrictor to prolonged duration.

Table 3. Hemodynamics Changes Lidodex With Vasoconstrictor

Pre-post delivery of vasoconstrictor	
Systole (N)	12
Mean	-13,2500
Standard deviation	16,24318
Signifcance	0,814
Diastole (N)	
Mean	-18,2500
Standar deviation	17,52466
Signifcance	0,378
Heart Rate (N)	
Mean	-4,5000
Standard deviation	15,53588
Signifcance	0,786

*This sample has through the normality of Saphiro-Wilk data distribution is normal. And tested by independent T-test.
*p > 0.05 not significant
* Lidodex without vasoconstrictor more stable in hemodynamics changes than Lidodex given by vasoconstrictor to prolonged duration.

In contrast, in the table 2, Pre-post of hemodynamics without vasoconstrictor, the mean change in systole decreased by 11,9286 mmHg with the difference in pre and post systole difference in anesthesia the largest sample difference and the smallest difference is 17,80690 mmHg. Both samples tested by the independent T-test, obtained significance of 0.814, P>0.05, which means there was no significant difference between the two groups. And diastole from the Pre post-delivery of vasoconstrictor sample shows a decrease systole of 18.25 mmHg with the difference in post and pre diastole difference in anesthesia the largest sample difference and the smallest difference of 17.52466 mmHg. In contrast, in the Pre-post of hemodynamics table without vasoconstrictor, the mean change in diastole decreased by 13.8929 mmHg with the difference in pre and post diastole difference in anesthesia the largest sample difference, and the smallest difference is 14.98081mmHg. Both samples tested by the independent T-test, obtained significance of 0.378, P>0.05, which means there was no significant difference between the two groups. And heart rate from the Pre post-delivery of vasoconstrictor sample shows a decrease heart rate of 4.5 mmHg with the difference in post and pre systole difference in anesthesia the largest sample difference and the smallest difference of 15.53588 mmHg. In contrast, in the Pre-post of hemodynamics table without vasoconstrictor, the mean change in heart rate decreased by 5.6429 mmHg with the difference in pre and post heart rate difference in anesthesia the largest sample difference, and the smallest difference is 12.66409 mmHg. Both samples tested by T independent test, obtained significance of 0.786, p>0.05, which means there was no significant difference between the two groups.

In this study, there was a change in pulse with a decrease of 4.5 in the addition

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of vasoconstrictors and a decrease in 5.6436 without the addition of vasoconstrictors. And for a comparison of the two obtained in this study, there were hemodynamic changes in post blood pressure and pre-induction of anesthetic drugs with additional vasoconstrictors in cesarean section using spinal anesthesia block techniques. Then both of them were compared to changes through independent sample T-test and obtained P-value>0.05 which means that there was no significant change and there were no significant differences in this matter different from the research conducted by Pindet, et al, because there were other factors not yet examined. The number of samples dependent and independent is quite different for the sample. [7.8]

CONCLUSIONS

In conclusion, the present study showed there were an addition of adrenaline to spinal anesthesia in cesarean section patients was not caused significant hemodynamic (blood pressure and heart rate) changes.

ACKNOWLEDGMENT

The authors would like to deliver gratitude to doctors, residents, and staff in the Faculty of Medicine, Universitas Airlangga, and Dr. Soetomo General Hospital, Surabaya, Indonesia, for their assistance and advice in running this research.

Conflict of Interest

There is no conflict of interest and funding in the writing of this article.

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Available at https://e-journal.unair.ac.id/IJAR | DOI: 10.20473/ijar.V2I12020.27-32

INDONESIAN JOURNAL OF ANESTHESIOLOGY AND REANIMATION
Volume 2 (1), January 2020 : 33-37

Original Article

EFFECTIVITY OF 5% DEXTROSE-DILUTED AND RINGER LACTATE-DILUTED PROPOFOL TO REDUCE INTRAVENOUS INJECTION PAIN IN PEDIATRIC PATIENT

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ABSTRACT

Introduction: Propofol has been known as one out of many inductive drugs which, can cause pain during intravenous injection. There has been a high prevalence of injection pain in pediatric patients. The mechanism of injection pain has not been known. Some therapeutic methods have been tested to reduce the pain, with several success rates. **Objective:** To compare the effectivity of 5% dextrose-diluted propofol and ringer lactate-diluted propofol, with dilution comparison of 1:1, in their role to reduce intravenous injection pain in pediatric patients, from age 2-15 years old during elective surgery in the Integrated Surgical Building Center of Dr. Soetomo General Hospital Surabaya. **Method and Material:** Forty-five patients PS ASA I-II, which fulfill inclusion criteria, were induced with general anesthesia. Patients had been selected randomly into three groups. Group I (control group) were injected with propofol without dilution. Group II was injected with propofol with a dilution of 5% dextrose, into 5 mg/ml liquid. Group III was injected with propofol with a dilution of ringer lactate, into 5 mg/ml liquid. **Result and Discussion:** The level of pain was evaluated afterward, with responding to the four-point scale and spontaneous expression. Patients' blood pressure, mean arterial pressure, heart rate, and oxygen saturation were also examined after injection. Compared to the control group, those in groups with 5% dextrose-diluted and ringer lactate-diluted propofol are not effective in reducing intravenous injection pain, with analytical statistics $p=0.503$ ($p > 0.05$). Also, the dilution of propofol has no significant difference to the hemodynamic measurement of patients. Systolic and diastolic blood pressure, and mean arterial pressure were declined after the induction, but statistically insignificant. The heart rate of patients was inclined but also not significant. **Conclusion:** 5% dextrose-diluted and ringer lactate-diluted propofol with a comparison of 1:1 were not significantly effective in reducing intravenous injection pain in pediatric patients.

Keywords: 5% Dextrose; Ringer Lactate; Propofol Dilution; Injection Pain; Pediatric Pain.

ABSTRAK

Pendahuluan: Propofol telah diketahui sebagai salah satu obat induksi yang sering menimbulkan nyeri saat penyuntikan. Insiden nyeri karena penyuntikan propofol secara intravena pada pasien anak sangat tinggi. Mekanisme nyeri pada saat penyuntikan propofol ini belum diketahui hingga saat ini. Berbagai teknik telah diupayakan untuk mengurangi kejadian nyeri tersebut, dengan angka keberhasilan yang berbeda-beda. **Tujuan:** Untuk membandingkan efektivitas dari propofol yang diencerkan dengan dextrose 5% dan ringer laktat dengan perbandingan pengenceran 1:1, dalam mengurangi nyeri injeksi intravena pada pasien pediatri, usia 2-15 tahun selama operasi elektif, di Gedung Pusat Bedah Terpadu, RSUD Dr. Soetomo Surabaya. **Metode dan Bahan:** Empat puluh lima pasien PS ASA I-II yang memenuhi kriteria inklusi, diinduksi dengan anestesi umum. Pasien yang telah dipilih secara acak dikelompokkan ke dalam tiga grup. Grup I adalah grup kontrol, yang diinjeksi intravena menggunakan induksi propofol. Grup II adalah grup yang diinjeksi intravena dengan propofol yang diencerkan dalam dextrose 5% menjadi cairan dengan konsentrasi 5mg/ml. Grup III adalah grup yang diinjeksi intravena dengan propofol yang diencerkan dengan ringer laktat menjadi cairan dengan konsentrasi 5mg/ml. **Hasil dan Pembahasan:** Nyeri pada pasien setelah injeksi akan dievaluasi dengan skala empat titik dan ekspresi spontan dari pasien. Tekanan darah, MAP, denyut jantung, dan saturasi oksigen pada pasien akan dievaluasi

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setelah injeksi. Propofol yang diencerkan dengan dextrose 5% dan ringer laktat tidak efektif dalam mengurangi nyeri injeksi dibandingkan dengan kontrol, dengan p = 0,503 (p>0,05). Hemodinamik pasien juga tidak mengalami perubahan secara signifikan. Rerata tekanan darah sistolik dan diastolik, dan MAP pasien menurun setelah injeksi, sedangkan denyut jantung dan saturasi oksigen pasien meningkat setelah injeksi. **Kesimpulan:** Propofol yang diencerkan dengan dextrose 5% dan ringer laktat dengan perbandingan 1:1 tidak menurunkan nyeri injeksi intravena secara signifikan pada pasien pediatri.

Kata kunci: Dextrose 5%; Ringer Laktat; Pengenceran Propofol; Nyeri.

Article info: Received: December, 11th 2019; Revised: Jananuary, 13th 2020; Accepted: January, 23th 2020; Published: January, 30th 2020

INTRODUCTION

Propofol (or 2,6 diisopropyl phenol) first used in 1977, was diluted in chromofor, because of its hydrophobicity.[1] Propofol was known as one of many induction drugs in anesthesiology. There are at least 15,506 patients using propofol for induction or sedation during elective operation in Dr. Soetomo General Hospital, Surabaya.[2] Propofol often used because it has a quick onset, short duration of action, and low occurrence of adverse.[1,3,4]

However, propofol may induce pain during intravenous injection[3], such as sharp pain, burnt-like pain, or excruciating pain.[4] The incidence of pain during propofol intravenous injection is very high, from 28% to 90%.[5] This made propofol injection pain is classified to seven highest clinical problems of modern anesthesiology.[6] Yet, the mechanism of propofol injection pain has been unknown.

According to systematic review and meta-analysis in 2011, there are more than 60 methods used to reduce propofol-induced pain in adult patients, such as cooling, warming, injecting great veins, and using lidocaine, ketamine, opioid, metoclopramide, or thiopental before injections.[7] In pediatric patients, there are at least 18 publications are made to reduce pain because of propofol injection.[7] A research in Germany said propofol-induced pain can be reduced by diluting propofol from 0.5% to 10% for pediatric patients (age 2-6).[8]

Based on that early literature, this research about the effectivity of 5%-dextrose diluted propofol and ringer lactate diluted propofol to reduce intravenous injection pain in elective surgery in Dr. Soetomo General Hospital, Surabaya, was made.

MATERIAL AND METHOD

This research is an experimental study, a double-blind randomized-control-trial clinical research, to compare the effectivity of 5%-dextrose diluted and ringer lactate diluted propofol to reduce intravenous injection pain during induction in elective surgery.

The population of this research is pediatric patients undergoing elective surgery in the Center of Integrated Surgery Building, Dr. Soetomo General Hospital.

$$n = \left[\frac{Z_{1/2\alpha}\sqrt{2.\bar{p}.\bar{q}} + Z_{\beta}\sqrt{p_1.q_1 + p_2.q_2}}{p_1 - p_2}\right]^2$$

$$n = \left[\frac{1{,}96.\sqrt{2.0{,}78.0{,}22} + 0{,}84\sqrt{0{,}89.0{,}11 + 0{,}67.0{,}33}}{0{,}89 - 0{,}67}\right]^2$$

$$n = 41{,}47 \approx 42$$

Figure 1. The Formula of Sampling Calculation

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The inclusion criteria are pediatric patients with age of 2-15 undergoing elective surgery with general anesthesia, categorized into *American Society of Anesthesiologist (ASA)* classification stage I-II according to the clinical status of patients, were under venous infusion at the dorsal part of the hand, and not having any phlebitis.

From these criteria, there are 45 patients included being the subject of this research, classified into three groups: one control group (with non-diluted propofol), one with 5%-dextrose diluted propofol, and one with ringer lactate diluted propofol. The intravenous injection pain was using a 4-point extremities movement scale and spontaneous expression scale. Vital signs of patients was also examined.

The data of this study were analyzed with *Statistical Product and Service (SPSS) version 10 for Windows.* The data with normal distribution were statistically analyzed with ANOVA test, and Multiple Comparisons LSD and others were analyzed Kruskal Walls non-parametric statistic test. It is stated to be significant if $p<0.05$.

RESULT AND DISCUSSION

The minimum sample needed for each group of this study is 14.2 and concluded into 15 patients. The total sample would be 45 patients and categorized into three groups, group I, II, and III. The group I will be injected with propofol without dilution, group II will be injected with D5% diluted propofol, and group III will be injected with ringer lactate diluted propofol.

Table 1 shows the demographic distribution of patients, including sex, age, body weight, and PS ASA. The value of homogeneity test was the data were homogenous and normal in distribution.

Table 1. Demographic characteristics of patients

Variables	Propofol Without Dilution (n=15)	D5% Diluted (n=15)	Ringer Lactate Diluted (n=15)	P-Value
Sex				
Male	8 (53.3%)	9 (60%)	12 (80%)	0.283**
Female	7 (46.7%)	6 (40%)	3 (20%)	
Age	10.5±4.0	8.3±4.9	9.4±4.3	0.409**
Body Weight	36.9±18.1	25.3±14.4	29.8±14.5	0.143**
PS ASA				
1	6 (40%)	2 (13.3%)	5 (33.3%)	0.245**
2	9 (60%)	13 (86.7%)	10 (66.7%)	0.283**

**P > 0.05, homogenous and normal distribution data

The group I as the control group, those who were injected by propofol without dilution. This group consists of 8 males and 7 females, aged 4-15 with mean 10.5, (SD = 4.0), mean body weight 36.9 (SD = 18.1) kg, and PS ASA 1 is 6, and PS ASA 2 is 9. Group II was injected with D5% diluted propofol, consists of nine males and five females, age 2-15 with mean of 8.3 (SD = 4.9), mean body weight 25.3 (SD = 14.4) kg, and PS ASA 1 is two, and PS ASA 2 is thirteen. Group III was injected with ringer lactate diluted propofol, consists of 12 male and three female, age 2-15 with mean of 9.4 (SD = 4.3), mean body weight 29.8 (SD = 14.5) kg, and PS ASA 1 is five, and PS ASA 2 is ten. Three groups are compared because there is no significant difference of the data in sex, age, body weight, and PS ASA. The data was homogenous so that

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variables are not continued to another statistical analysis.

A recent study stated that propofol dilution with D5% in 100 patients shows 32% of patients in the control group have severe pain, whether only 10% of patients in D5% group have severe pain. [9]

Table 2. Normality Test of Research Variables (N=15)

Variables	Propofol without dilution (P-Value)	D5% diluted propofol (P-Value)	Ringer lactate diluted propofol (P-Value)
Age	10.5±4.0 (0.561)	8.3±4.9 (0.368)	9.4±4.3 (0.990)
Bodyweight	36.9±18.1 (0.604)	25.3±14.4 (0.654)	29.8±14.5 (0.584)
Pain scale	4.7±1.3 (0.700)	4.9±1.1 (0.499)	4.3±1.9 (0.855)
Hemodynamic before treatment			
Systolic BP	110.6±12.4 (0.677)	106.7±17.6 (0.699)	105.3±11.4 (0.971)
Diastolic BP	70.1±11.3 (0.515)	63.1±12.9 (0.718)	62.1±11.1 (0.960)
MAP	83.6±10.9 (0.897)	77.7±14.0 (0.694)	76.5±10.5 (0.987)
Heart rate	97,8±17,5 (0,771)	110±21,5 (0,976)	97.7±14.6 (0.532)
SpO2	99.1±0.6 (0.057)	98.8±0.4 (0.002*)	99.1±0.4 (0.001*)
Hemodynamic after treatment			
Systolic BP	102.5±14.8 (0.803)	103.7±13.2 (0.978)	101.5±16.4 (0.862)
Diastolic BP	61.9±11.2 (0.919)	63.1±11.5 (0.935)	62.7±16.7 (0.977)
MAP	75.4±11.5 (0.978)	76.6±10.6 (0,688)	75.7±15.7 (0.976)
Heart rate	107.4±19.1 (0.457)	112,5±23,8 (0,920)	104.7±19.9 (0.727)
SpO2	99.2±0.4 (0.002*)	98,8±0,414 (0.002*)	99.1±0.3 (0.0000*)

Numeric normality test is conducted to test the data. P-value from the variable is taken and tested using one-sample Kolmogorov-Smirnov. Data is normally distributed if the value of P > 0.05. Oxygen saturation of these samples, on the other hand, shows a significant difference.

Table 3 showed that without data analysis using a statistical method, it is found that group III responses show slight differences to other groups, in no pain and mild pain. Still, for severe pain, group III also shows more patients than other groups. According to the t-test between three groups, it is found that the p-value is 0,503 (p>0.05), which means there is no significant difference between groups.

Table 3. Pain Response to Propofol Injection

Pain score (The FLACC pain score)	Group I Propofol without dilution	Group II D5% diluted-propofol	Group III Ringer lactate diluted propofol	P-Value
No pain (2)	1 (6.7%)	0	3 (20%)	0.503*
Mild pain (3-4)	5 (33.3%)	5 (33.3%)	6 (40.0%)	
Moderate pain (5-6)	8 (53.3%)	9 (60%)	4 (26.7%)	
Severe pain (7-8)	1 (6.7%)	1 (6.7%)	2 (13.3%)	

*P > 0.05, there is no significant difference between groups.

The statistic analysis stated that the whole of the research samples was not effectively significant to reduce the propofol pain. Many things can affect the final result of this research. The sample of pediatric patients were difficult to evaluate. When the children was far from the parent would make the children feel anxious, the solution was they would give midazolam intravenous medicine to reduce their anxiety.

Patients' age also affects the result of this study. Since age 2-15 is classified into pediatrics group age, the immaturity of the

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psychological aspect, response to a new environment, and adaptional ability have a great role in their responses to pain. Separation anxiety in pediatric patients may also affect pain reactions in pediatric patients. [8,10]

Table 4. Hemodynamic Changes between Groups

Group		Pre	Post	Delta	P-value
SBP	I	110.0±12.4	102±14.8	-8.1±12.1	0.021**
	II	106.7±17.6	103.7±13.2	-3.1±12.1	0.342
	III	105.3±11.4	101.5±16.4	-3.8±16.2	0.379
DBP	I	70.1±11.3	61.9±11.2	-8.2±10	0.007**
	II	63.1±12.9	63.1±11.5	-0.07±10.5	0.981
	III	62.1±11.1	62.7±16.7	0.6±15	0.879
MAP	I	83.6±10.9	75.4±11.5	-8.2±9.7	0.006**
	II	77.7±14.0	76.6±10.6	-1.0±9.7	0.677
	III	76.5±10.5	75.6±15.7	-0.9±14.5	0.820
HR	I	97.8±17.5	107.4±19.1	9.6±12.4	0.009**
	II	110±21.5	112.5±23.8	2.5±16.5	0.572
	III	97.7±14.7	104.7±20	7.1±22.8	0.251
SpO2	I	99.0±0.6	99.2±0.4	0.13±0.4	0.157
	II	98.8±0.4	98.8±0.4	0	1
	III	99.1±0.4	99.1±0.3	-0.07±0.3	0.317

**p<0.05, t-test statistical test shows significant difference

Table 4 showed that in Group I, the hemodynamic change is shown in group I (Blood pressure declines). This can be caused by the drastic change of peripheral resistance in systemic blood vessels by inhibition of sympathetic vasoconstriction, heart contractility, and preload. However, in group II and III, the change is insignificant. This phenomenon can be explained by the steady concentration of propofol in blood takes longer time than in the control group, since the propofol is diluted in another solution.[11]

CONCLUSION

The use of 5%-dextrose diluted propofol and ringer lactate diluted propofol with the comparison of 1:1 are not effective to reduce intravenous injection pain in pediatric patients and are not significant to affect patients' hemodynamic.

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