

The Comparison Between Hemodynamic Status on 15⁰ and 30⁰ Head Up Elevation Patient With Risk For Increased Intracranial Pressure in Intensive Care Unit

Eirene E.M.Gaghauna¹, Bagus Rahmat Santoso²
{ eirenegaghauna@gmail.com^{1*}, ners_b4gs@yahoo.com² }

^{1,2}Emergency & Critical Department, Nursing Program, Faculty of Health Sari Mulia University, Banjarmasin, Indonesia

*eirenegaghauna@gmail.com

Abstract. Intracranial Pressure is the pressure inside the cavity of the cranial and it is usually use as measuring instrument of the lateral ventricle of the brain pressure. According to the World Health Organization in 2016 on axles for about 16,000 people were dead the caused by the Increased intracranial pressure in case of brain injury. Nursing Intervention to Overcome this problem are an adequate oxygenation, cerebrospinal liquor drainage, diuretiknd hyperosmolar therapy and nutrition. This study has purpose to find the comparison between hemodynamic status using bed elevation 150 and 300 in patient with risk for Increased intracranial pressure, this study is the use quasy experiment with design approach non equivalent control group models, with 12 samples in the Intensive Care Unit. The Result of this study based on the value of MAP T test p value = 0.003, Blood Pressure p value = 0.017, p value = 0174 heart rate it is mean that there is difference value of hemodynamic status on head up elevation 15 and 300. it means that on 150 and 300 head-up elevation are effective in patient with hemodynamic status on risk for Increased intracranial pressure.

keyword: Hemodynamic status, Intracranial Pressure, Head Up Elevation

1. Introduction

The Definition of Intracranial pressure (ICP) is the pressure inside the cranial cavity and is usually measured as the pressure in the lateral ventricle of the brain. Normal intracranial pressure is 0-15 mmHg. Values above 15 mmHg is considered as intracranial hypertension, or increased intracranial pressure. Intracranial pressure is influenced by three factors, the brain (approximately 80% of total volume), cerebrospinal fluid (approximately 10%) and blood (approximately 10%) [1]. Patients with increased ICP should be monitored especially patient with an indication of head trauma, intracerebral haemorrhagik, subarachnoid haemorrhagik, hidrosepalus, stroke and cerebral edema [2].

According to the WHO, around 16,000 people die worldwide every day caused by all kinds of injuries. Injuries represent 12% of the overall burden of disease, so that injury led to increased ICT become the third important cause of death overall. In the United States the incidence of head injuries each year is estimated at 500,000 cases. Of these 10% died before arriving at hospital due to injury and increased intracerebral pressure. 80% is classified as a minor head injury (CKR), 10% including a head injury moderate (CKS) and 10% were severe head injury (CKB). Creatine phosphokinase (CPK), which is also called creatine kinase (CK), into a high-energy phosphate compounds that participate in riaksi metabolic reaction that requires energy [1].

In Indonesia, the number five intracranial injury is a common occurrence of deaths in

hospitals with a total number of 3,021 deaths (3.13%). Increased ICP is the most common occurrence in patients with head injury [3]. The Increasing of ICP the nursing management are adequate oxygenation, hyperventilation, drainage of cerebrospinal fluid (CSS), and hyperosmolar diuretic therapy, hypothermia, blood sugar control and nutrition, decompression craniotomy, position, environmental stimuli, blood pressure management, and prevention of seizures. The head-up position 30° and 15° head aims to stimulate the brain to the jugular venous drainage remains smooth.

2. Methods

In this study, researchers used a method of analytic survey research who tried to explore how and why health phenomenon happens [4], The study population was all the number of patients who has increased ICP caused by both trauma and non-trauma were treated in the ICU of RSUD Ulin Banjarmasin. and the number of respondents in this study were 12 patients. Sample collection techniques used in this research is Accidental sampling / Convenience sampling it was non-probability sampling technique which subjects have been selected for their convenient accessibility and proximity to researchers Carried out in May 2018.

Sources of data in this research is the primary data source, Primary data is the data obtained directly from the first data source location or object of research studies, the results of measurements, observations, surveys and others [5]. Primary data in this study obtained through the observation of the patient's hemodynamic condition that increased ICP in both trauma and non-trauma case were treated in the ICU RSUD Ulin Banjarmasin

Secondary data is the data obtained from another agency / agencies that routinely collect data [6]. Secondary data is data obtained by researchers, indirectly by the way of examining documents such as books, journals, and medical records to find out the number of patients who has increased ICP caused by trauma and non-trauma and were treated in the ICU RSUD Ulin Banjarmasin, where this secondary data can support the primary data. The data processing is done with the help of a computerized through the step that, Editing (checking), Coding (coding), data entry (entering data), and Cleaning (data cleansing). The data collected were processed and analyzed with univariate and bivariate analysis.

3. Result

Characteristics of respondents

Respondents in this study were all patients who treated in the ICU of Hospital Ulin Banjarmasin who are at risk of increased intracranial pressure (ICP) caused by both traumatic and non-traumatic action and were given 30° and 15° head elevation. Collecting data of respondents in this study using the technique sampling of accidental sampling with the number of respondents was divided into two groups that 1 patient was carried 15° head elevation 5 and 5 patient who were carried 30° head elevation.

Age

Characteristic respondents in this study were categorized according to age into early adulthood, adolescence, early elderly and late elderly patient in ICU RSUD Ulin Banjarmasin can be seen in the table below:

Table 1. Characteristics of Respondents by Age Carried Head 15⁰ and 30⁰ elevation.

No.	Age (years)	Frequency	Percentage (%)
1.	26-35	3	25%
2.	36-45	5	41%
3.	46-55	2	17%
4.	56-65	2	17%
Total		12	100%

Based on the above table, it can be seen that out of 12 respondents most respondents who were given Elevation Head 15⁰ and 30⁰ aged 36-45 years, as many as five people (41%).

Gender

Characteristics of respondents by sex is composed of men and women who do the elevation head of 15⁰ and 30⁰ in ICU Hospital Ulin Banjarmasin can be seen in the table below:

Table 2. Characteristics of Respondents by Gender Carried 15⁰ Elevation Head and 30⁰ in ICU Hospital Ulin Banjarmasin

No.	Gender	Frequency	Percentage (%)
1.	Man	8	67 %
2.	Woman	4	33 %
Total		12	100 %

Based on the above table, it can be seen that out of 12 respondents most respondents who give Elevation Head 15⁰ and 30⁰ in ICU Hospital Ulin Banjarmasin male sex as much as 8 people (67%).

Univariat Analysis

MAP 30⁰ head elevation in Intensive Care Unit (ICU) of Ulin Hospital Banjarmasin.

Table 3. Frequency Distribution MAP 30⁰ head elevation in Intensive Care Unit (ICU) of Ulin hospital Banjarmasin

No.	MAP (MmHg)	Frequency & Percentage (%) pre	Frequency & Percentage (%) post
1.	70-80	2 (33%)	3 (50%)
2.	81-90	1 (17%)	0 (0%)
3.	91-100	0 (0%)	2 (33%)

4.	> 100	3 (50%)	1 (17%)
Total		6 (100%)	6 (100%)

According to the table above, it can be seen that the 12 respondents who were given 30° head elevation action as much as 6 Orang (50%). Most respondents prior to the elevation of the head 30° has a value of MAP> 100, 3 (50%), and after the act of 30° head elevation has a value of 70-80 mmHg MAP is 3 people (50%).

MAP elevation in patient 15° Head elevation Intensive Care Unit (ICU) of Ulin hospital Banjarmasin

Table 4. MAP Frequency Distribution 15° head elevation diruang Intensive Care Unit (ICU) of the hospital Ulin Banjarmasin

No.	MAP (MmHg)	Frequency & Percentage (%) pre	Frequency & Percentage (%) post
1.	70-80	0 (0%)	0 (0%)
2.	81-90	1 (17%)	2 (33%)
3.	91-100	1 (17%)	1 (17%)
4.	> 100	4 (66%)	3 (50%)
Total		6 (100%)	6 (100%)

According to the table above, it can be seen that of the 12 respondents who do 15° head elevation action as much as 6 people. Most respondents prior to the elevation of the head 15° has a value of MAP> 100, 4 (66%), and after the act of 15° head elevation has a value of MAP> 100 mmHg is 3 people (50%).

Blood pressure with head elevation 30° in Intensive Care Unit (ICU) of Ulin hospital Banjarmasin

Table 5. Frequency Distribution of blood pressure with head elevation 30° of Intensive Care

No.	Blood Pressure (MmHg)	Frequency & Percentage (%) pre	Frequency & Percentage (%) post
1.	Normal	0 (0%)	0 (0%)
2.	High	3 (50%)	3 (50%)
3.	Low	3 (50%)	3 (50%)
Total		6 (100%)	6 (100%)

According to the table above, it can be seen that 12 respondents who has given 30° head elevation action as much as 6 people. Most respondents prior to the elevation of the head 30° has a high value of TD 3 (50%) and low 3 patient (50%), and after the act of 30° head elevation has a value of Blood Presure remains the same 3 people (50%).

Blood pressure elevation 15⁰ head in Intensive Care Unit (ICU) of Ulin hospital Banjarmasin

Table 6. Frequency Distribution of blood pressure elevation 15⁰ head in Intensive Care Unit (ICU) of Ulin hospital Banjarmasin

No.	Blood Pressure (MmHg)	Frequency & Percentage (%) pre	Frequency & Percentage (%) post
1.	Normal	0 (0%)	1 (17%)
2.	High	4 (67%)	4 (67%)
3.	Low	2 (33%)	1 (17%)
Total		6 (100%)	6 (100%)

Heart Rate in 30⁰ head elevation in Intensive Care Unit (ICU) of Ulin hospital Banjarmasin

Table 7. Frequency Distribution of blood pressure elevation 30⁰ head diruang Intensive Care Unit (ICU) of the hospital Ulin Banjarmasin

No.	Blood Pressure (mmHg)	Frequency & Percentage (%) pre	Frequency & Percentage (%) post
1.	Normal	0 (0%)	0 (0%)
2.	High	3 (50 %)	3 (50%)
3.	Low	3 (50 %)	3 (50%)
Total		6 (100%)	6 (100%)

According to the table above, it can be seen that 12 respondents who do 30⁰ head elevation action as much as 6 people. Most respondents prior to the elevation of the head 30⁰ value high pulse 4 people (67%) and normal 2 people (33%) and after the act of elevation of the head 30⁰ has a value of pulse fixed at a height of 4 (67%) and normal 2 people (33%).

Heart Rate 15⁰ head elevation in Intensive Care Unit (ICU) of Ulin hospital Banjarmasin.

Table 8. Distribution Frequency Nadi 15⁰ head elevation diruang Intensive Care Unit (ICU) of the hospital Ulin Banjarmasin

No.	Pulse	Frequency & Percentage (%) pre	Frequency & Percentage (%) post
1.	Normal	3 (50%)	4 (67%)
2.	High	2 (33%)	1 (17%)
3.	Low	1 (17%)	1 (17%)
A	Total	6 (100%)	6 (100%)

C

According to the table above, it can be seen that of the 12 respondents who do 15° head elevation action as much as 6 people. Most respondents prior to the elevation of the head 15° have a normal pulse value of 3 (50%) and after the act of 15° head elevation has a normal pulse values also are 4 people (67%).

Respiration Status in 30° head elevation in Intensive Care Unit (ICU) of Ulin hospital Banjarmasin.

Table 9. Distribution Frequency 30° head elevation to Respiratory status patient in Intensive Care Unit (ICU) of Ulin hospital Banjarmasin

No.	RR	Frequency & Percentage (%) pre	Frequency & Percentage (%) post
1.	fast	5 (83%)	3 (50%)
2.	Slow	0 (0%)	0 (0%)
3.	Normal	1 (17%)	3 (50%)
Total		6 (100%)	6 (100%)

According to the table above, it can be seen that of the 12 respondents who do 30° head elevation action as much as 6 people. Most respondents prior to the elevation of the head 30° has a value of RR fast 5 people (83%) and after the act of elevation of the head 30° have normal RR value to 3 people (50%).

Respiration 15° head elevation in Intensive Care Unit (ICU) of Ulin hospital Banjarmasin

Table 10. Distribution Frequency 15° head elevation to Respiratory rate patient in Intensive Care Unit (ICU) of Ulin hospital Banjarmasin

No.	RR	Frequency & Percentage (%) pre	Frequency & Percentage (%) post
1.	fast	2	1
2.	Slow	0	0
3.	Normal	4	5
Total		6 (100%)	6 (100%)

According to the table above, it can be seen that the 12 respondents who do 15° head elevation action as much as 6 people. Most respondents prior to the elevation of the head 15° has a value of normal RR 4 people (67%) and after the act of elevation of the head 15° have normal RR value to 5 people (83%).

The level of Conciousness in 30° head elevation in Intensive Care Unit (ICU) of Ulin hospital Banjarmasin

Table 11. Levels of Conciuness in 30° head elevation in Intensive Care Unit (ICU) Ulin hospital Banjarmasin

No.	LOC	Frequency & Percentage (%) pre	Frequency & Percentage (%) post
-----	-----	--------------------------------	---------------------------------

1.	Coma	3 (50%)	3 (50%)
2.	sopor	1 (17%)	1 (17%)
3.	Samnolen	1 (17%)	1 (17%)
4.	Apathetic	0 (0%)	0 (0%)
5.	cm	1 (17%)	1 (17%)
	amount	6 (100%)	6 (100%)

According to the table above, it can be seen that of the 12 respondents who do 30° head elevation action as much as 6 people. Most respondents prior to the elevation of the head has a level of consciousness coma 30° 3 people (50%) and after the act of elevation of the head 30° have the same level of consciousness that is coma 3 people (50%).

The level of Conciouness in 15° head elevation in Intensive Care Unit (ICU) of Ulin hospital Banjarmasin

Table 11. Frequency Distribution 15° head elevation level of conciouness in Intensive Care Unit (ICU) of Ulin hospital Banjarmasin

No.	LOC	Frequency & Percentage (%) pre	Frequency & Percentage (%) post
1.	Coma	3 (50%)	3 (50%)
2.	Sopor	1 (17%)	1 (17%)
3.	Samnolen	1 (17%)	1 (17%)
4.	Apathetic	0 (0%)	0 (0%)
5.	Composmentis	1 (17%)	1 (17%)
	Total	amount	6 (100%)

According to the table above, it can be seen that of the 12 respondents who do 15° head elevation action as much as 6 people. Most respondents prior to the elevation of the head has a level of consciousness coma 15° 3 people (50%) and after the act of elevation of the head 15° have the same level of consciousness that is coma 3 people (50%).

Bivariate analysis

Bivariate analysis were used to analyze two variables of dependent and independent variables. In this research is used to determine the effectiveness of 30° and 15° head elevation to prevent an increase of intracranial pressure petient in Intensive Care Unit (ICU) of Ulin hospital Banjarmasin.

Table 12. Analysis of the effectiveness 30° and 15° head elevation to prevent an increase of intracranial pressure patients in Intensive Care Unit (ICU) of the hospital Ulin Banjarmasin

Hemodynamics	N	mean	p-value
FOLDER	6	5:25	0003
BP	6	6:00	0017
Pulse	6	2.66	0174
Rerpiration	6	11.5	0:56

Based on the above table it can be concluded that the MAP $p = 0.003$ means that there are differences in the value of MAP before and after the elevation of the head 15° and 30° , the TD value of $p = 0.017$ means that there are differences in the value of the TD before and after the elevation of the head 15° and 30° , on Heart rate $p = 0.174$ means there is no difference in the value of the pulse before and after the elevation of the head 15° and 30° , on respiration $p = 0.56$ means no difference in respiration values before and after the elevation of the head 15° and 30° .

4. DISCUSSION

Respondents by age

Based on the research that the majority of patients with risk of increased intracranial pressure in the ICU of Ulin hospital Banjarmasin in late adulthood (36-45 years) as many as five people (41%) of early adulthood 3 people (25%), the elderly, the initial 2 people (17%) and the elderly end of 2 (17%). Productive age be a factor most vulnerable age for future ICT occurrence that age can be affected by stress factors and environmental conditions that trigger the appearance of a head injury trauma and non-trauma are increasingly. This study is also in line with research Daughter (2014) as head trauma often about adolescence and adulthood (17-39) years. This is due to the age of an active and productive age, this age are more likely to experience one of head trauma caused by motor vehicle accidents

Respondents by sex

Based on the research that the majority of patients degean risk of increased intracranial pressure in the ICU of Ulin hospital Banjarmasin on gender male 8 (67%) and women 4 people (33%). Men are at risk of experiencing increased of Intracranial Pressure non-trauma (stroke) is greater for males because of testosterone, where in these hormones can increase levels of LDL, where LDL levels high, it can increase cholesterol levels in the blood are a risk factor for degenerative diseases such as stroke [7]. Besides the male becomes more risky due to have habits such as smoking for example stroke. Smoking can increase the concentration of fibrinogen, this increase will facilitate the occurrence of thickening of blood vessel walls also increase blood viscosity. This results also correspond expressed by Iskandar (2012), head trauma often occurs in men aged 15-24, usually due to motor vehicle accidents. According to research in dr. Ciptomangunkusumo hospital, men are more frequently affected by trauma to the head due to motor vehicle accidents. This is because males are the largest users of motor vehicles [8].

Effectiveness and 30° 15° head elevation to the prevention of intracranial pressure

Based on research conducted by researchers it can be concluded that 15° and 30° equally as effective against the condition of the patient's hemodynamic risk Staff College, where this is in line with research [9] that the position of the head up 30° aiming to secure the patient in the fulfillment of oxygenation to avoid hypoxia in patients, and intracranial pressure can be stabilized within the normal range. 30° head-up position is also effective for brain homeostasis and prevent secondary brain damage due to the stability of the respiratory function to maintain adequate cerebral perfusion. The study's findings also revealed that there was a statistically significant effect on the head-up position 150 and 300 in the MAP. Based on the position Headup done make smooth the blood flow to the brain, blood pressure so as to reduce stress and lower blood pressure intracerebral patients because there was no weighing of the patient's blood stream. This is consistent with previous studies showing that the head-up

position in the range of 15-30 ° can reduce cerebral perfusion pressure and stabilize the MAP. Variable Mean Arterial Pressure (MAP) was measured in this study because of the peculiarities of the clinical symptoms of the head injury is decreased level of consciousness and blood pressure changes. Cerebral perfusion pressure is cerebral perfusion pressure, which is associated with intracranial pressure. On the other hand, Olviani stated that the Mean Arterial Pressure must be kept above 60 mmHg to ensure perfusion to the brain, coronary and renal arteries during a head-up position. Other than that, an increase in blood pressure or enlarged pulse pressure (the difference between systolic and diastolic blood pressure) or changes in vital signs are clinical symptoms of increased intracranial pressure. Systolic and diastolic changes will also affect the value of average arterial pressure in patients with head injuries. Positioning is one of the common forms of nursing intervention in the implementation of patient care. Head-up position 30° is part of a progressive mobilization level I in patients with head injury can be non-pharmacological techniques for maintaining the stability of intracranial pressure. 30° head-up position to launch the venous drainage from the head and stable condition; and prevent neck flexion, rotation of the head, coughing and sneezing. Also in line with the explanations Systolic and diastolic changes will also affect the value of average arterial pressure in patients with head injuries.

Positioning is one of the common forms of nursing intervention in the implementation of patient care. Head-up position 30° is part of a progressive mobilization level I in patients with head injury can be non-pharmacological techniques for maintaining the stability of intracranial pressure. 30° head-up position to launch the venous drainage from the head and stable condition; and prevent neck flexion, rotation of the head, coughing and sneezing. Also in line with the explanations Systolic and diastolic changes will also affect the value of average arterial pressure in patients with head injuries. Positioning is one of the common forms of nursing intervention in the implementation of patient care. Head-up position 30° is part of a progressive mobilization level I in patients with head injury can be non-pharmacological techniques for maintaining the stability of intracranial pressure. 30° head-up position to launch the venous drainage from the head and stable condition; and prevent neck flexion, rotation of the head, coughing and sneezing. Also in line with the explanations Head-up position 30° is part of a progressive mobilization level I in patients with head injury can be non-pharmacological techniques for maintaining the stability of intracranial pressure. 30° head-up position to launch the venous drainage from the head and stable condition; and prevent neck flexion, rotation of the head, coughing and sneezing. Also in line with the explanations Head-up position 30° is part of a progressive mobilization level I in patients with head injury can be non-pharmacological techniques for maintaining the stability of intracranial pressure. 30° head-up position to launch the venous drainage from the head and stable condition; and prevent neck flexion, rotation of the head, coughing and sneezing. Also in line with the explanations by AMN Healthcare Education Services (2016) which describes in his journal Patient position effect on ICP. Patients should be positioned on the bed head and their neck in the midline and the position of the head of the bed was up to 30 degrees so it does not impede venous returns [10].

5. Conclusion

Based on research conducted by researchers it can be concluded that

1. 30° 15° and equally as effective against the patient's hemodynamic condition with PTIK risk.
2. The majority of patients with risk of increased intracranial pressure in the ICU of Ulin

hospital Banjarmasin in late adulthood (36-45 years) as many as five people (41%) of early adulthood 3 people (25%), the elderly, the initial 2 people (17%) and the elderly end 2 (17) The majority of patients dengan risk of increased intracranial pressure in the ICU Hospital Ulin Banjarmasin on gender male 8 (67%) and women four people (33%).

Men at risk

3. Based on the results penelitian berdasarkan test value t that the MAP $p = 0.003$ means that there are differences in the value of MAP before and after the elevation of the head 15^0 and 30^0 , the TD value of $p = 0.017$ means that there are differences in the value of the TD before and after the elevation of the head 15^0 and 30^0 , on Nadi $p = 0.174$ means there is no difference in the value of the pulse before and after the elevation of the head 15^0 and 30^0 , on respiration $p = 0.56$ means no difference in respiration values before and after the elevation of the head 15^0 and 30^0 .

6. Acknowledgement

The Researcher express their gratitude to God For His Blessing, opportunity and mercy to finished this study. The Researcher also present their sincere appreciation to The Head of ICU and also the clinical instructure for allowing us to conduct our research there. This research will never finished without their contribution.

7. References

- [1] Priasojo DA. *Evaluasi Perubahan Gejala Peningkatan Intracranial Pada Pasien Cedera Kepala Setelah Dilakukan Posisi Elevasi 15-30⁰ Di IGD RSUD dr. Soedirman Kebumen*. [skripsi]. Kebumen. Sekolah Tinggi Ilmu Kesehatan Muhammadiyah Gombong. (2016).
- [2] Amri. 2017. *Pengelolaan Peningkatan Tekanan Intrakranial*. Jurnal Ilmiah Kedokteran. 4(3): 1-17. (2017)
- [3] Windhiarti L. *Pengetahuan Perawat Tentang Manajemen Tekanan Intracranial (TIK) Pada Pasien Cedera Kepala Sedang-Berat Di Rumah Sakit Di Kota Malang*. Semarang. Universitas Diponegoro Semarang. (2015).
- [4] Sugiyono. *Metodologi Penelitian Kualitatif dan Kuantitatif dalam Bidang Kesehatan*. Yogyakarta: Nuha Medika. (2013).
- [5] Bungin B. 2012. *Analisis Data Penelitian Kualitatif*. Rajawali Pers. Jakarta. (2012).
- [6] Setiadi. *Konsep dan Proses Keperawatan Keluarga*. Graha Ilmu. Yogyakarta. 2008.
- [7] Raharjo J, Agustin WR, Wulandari IS. *Tingkat Kecemasan Keluarga Pasien Stroke yang Dirawat di Ruang ICU Rumah Sakit Panti Waluyo Surakarta*. Skripsi. STIKes Kusuma Husada. Surakarta. (2015).
- [8] Iskandar J. *Penatalaksanaan Cidera Kepala Akut*. USU digital library. (2010).
- [9] Pertami SB, Sulastyawati, Anami P. *Public Health of Indonesia*. (2017)
- [10] AMN Healthcare Education Services. *Increased Intracranial Pressure and Monitoring*. lms.rn.com. (2016).