



## Comparison of Mean Arterial Pressure Values in Elderly Patients Undergoing Transurethral Resection of the Prostate at Islamic Hospital Banjarnegara

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### ABSTRACT

*Basic Health Research (2017) stated that around 50% of men aged 50 years in Indonesia suffered from BPH (Benign Prostate Hyperplasia). One of the treatments for BPH is TURP (Transurethral Resection of the Prostate) using spinal anesthesia. A high degree of blockade ( $\geq T5$ ) and elderly are the two main factors of complication causing changes in MAP (Mean Arterial Pressure) values after spinal anesthesia, which is about 15.3 to 33%. MAP monitoring is very important because MAP describes the status of cerebral perfusion. The research purpose was to determine the comparison of MAP in each age group of the elderly undergoing TURP at Bajarnegara Islamic Hospital. The researcher applied a comparative analytic method with cross sectional approach. The research was conducted in March 2023 with 31 respondents. The samples were taken by using convenience sampling technique. The conclusion of the independent sample t test results shows a p value = 0.870 that there is no significant difference between the average MAP values in each age group of elderly people undergoing TURP at Bajarnegara Islamic Hospital. Suggestions for further researchers are expected not only to analyze bivariately but to be studied multivariately.*

**Keywords :** MAP (Mean Arterial Pressure), elderly, TURP

### 1. INTRODUCTION

The Global Cancer Observatory (2020) reported that there were 1,414,259 new prostate cancer cases worldwide in 2020. The Basic Health Research (2017) states that approximately 50% of 50-year-old men in Indonesia suffer from BPH, and this condition ranks second. The incidence of BPH in Indonesia has never been studied, but the prevalence in Central Java is 206.48 cases (Dinkes, 2018).

Benign Prostatic Hyperplasia can be treated in various ways, and one of the common procedures used to manage BPH is endourological surgery, such as TURP

(Transurethral Resection of the Prostate) (Muttaqin, 2011). TURP procedure requires only a short recovery time and is performed with regional anesthesia, specifically spinal anesthesia (Anggraeni, 2021). Spinal anesthesia can lead to several complications, one of which is a decrease in systolic blood pressure and Mean Arterial Pressure (MAP) in patients (Riskayanti, 2018).

Changes in MAP values are influenced by various factors, such as injection duration, bupivacaine dosage, age, height, weight, BMI, prehydration fluids, positioning during spinal anesthesia, block height, puncture site, the use of ephedrine as a vasopressor, and the amount of bleeding. High-level blocks ( $\geq T5$ ) and

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advanced age are the two primary factors in the complications of MAP value changes after spinal anesthesia, with an incidence of 15.3 to 33% (Park, 2013).

Monitoring MAP is crucial because it reflects cerebral perfusion status. An increase in MAP indicates that there is excessive pressure in the arteries, leading to heart muscle damage or blood clot formation, which poses medical risks such as heart attacks, kidney failure, and heart issues. A decrease in MAP signals that vital organs are not receiving adequate blood supply, causing organ tissue to start dying, thereby triggering permanent organ damage with various medical risks like sepsis, stroke, and internal bleeding (Haryuni, 2017)

## 2. RESEARCH METHODS

This study is a comparative analytical research using a cross-sectional approach with a population consisting of all Benign Prostatic Hyperplasia (BPH) patients aged 61-97 years who underwent Transurethral Resection of The Prostate (TURP) in March 2023 at RS Islam Banjarnegara, with a sample size of 31 respondents taken using the convenience sampling method, with research ethics approval number B.LPPM-UHB/1512/02/2023.

This study uses observation sheets as a tool for data collection. The researcher conducted a preoperative visit one day before the respondents underwent the TURP surgery, and the assessment included their names, ages, comorbidities, as well as measuring the patients' height and weight using a branded GEA measuring tape and body scale. On the day of the surgery, the researcher observed and recorded the drug dosage, prehydration fluids, puncture site, block height, vasopressor administration, blood pressure, and Mean Arterial Pressure (MAP) every 5 minutes from minute 0 to 30 after the induction of spinal anesthesia using a sphygmomanometer connected to the patient monitor.

This study uses the Shapiro-Wilk test for assessing normality. Univariate and bivariate analyses, along with an independent sample t-test, are employed in this research using computer software.

## 3. RESULTS AND DISCUSSION

### 3.1 Results of Univariate Analysis

Table 4.1 Characteristics of respondents based on comorbidities, prehydration fluids, puncture site, block height, vasopressor usage, and age at RS Islam Banjarnegara in 2023

Variable	f	%
<b>Comorbidities</b>		
1. None	23	74,2
2. Hypertension	8	25,8
<b>Total</b>	31	100
<b>Prehydration Fluids</b>		
1. Given	11	35,5
2. Not Given	20	64,6
<b>Total</b>	31	100
<b>Puncture Site</b>		
1. L3-L4	23	74,2
2. L4-L5	8	25,8
<b>Total</b>	31	100
<b>Block Height</b>		
1. Block <T4	28	90,3
2. Block >T4	3	9,7
<b>Total</b>	31	100
<b>Vasopressor Usage</b>		
1. Given	1	3,2
2. Not Given	30	96,7
<b>Total</b>	31	100
<b>Age</b>		
1. <i>Presenile</i> 61-72 years	18	58,1
	13	41,9
2. <i>Senile</i> 73-84 years	0	0
3. <i>Elderly</i> 85-97 years		
<b>Total</b>	31	100

The research results in Table 4.1 show that the majority of respondents did not have comorbidities, with 23 respondents (74.2%), and 20 respondents (64.6%) did not receive prehydration fluids. Meanwhile, the research findings regarding the characteristics of respondents based on the puncture site indicate that the most common puncture site was at L3-L4, administered to 23 respondents (74.2%), and 28 respondents (90.3%) reached a block height <T4.

The results of this study revealed that the majority of respondents were not administered vasopressors, with a total of 30 respondents (96.7%). The characteristics of respondents based on age indicate that there were 18 respondents (58.1%) in the 61-72 age

group (presenile), 13 respondents (41.9%) in the 73-84 age group (senile), and no respondents in the 85-97 age group (elderly).

Table 4.2 Characteristics of respondents based on Body Mass Index (BMI) and medication dosage at RS Islam Banjarnegara in 2023

Variable	Mean	Min	Maks
Body Mass Index (BMI) (kg/m <sup>2</sup> )	22,3	17	27
Bupivacaine Medication Dosage (mg)	17,9	15	20

Based on Table 4.2 regarding the characteristics of respondents according to Body Mass Index (BMI), it was found that the highest BMI was 27 kg/m<sup>2</sup>, and the lowest BMI was 17 kg/m<sup>2</sup>. The characteristics of respondents based on medication dosage showed the lowest dosage to be 15 mg and the highest dosage to be 20 mg.

Table 4.3 Univariate Analysis of Mean Arterial Pressure (MAP) Values by Age Group at RS Islam Banjarnegara in 2023

Variable	Mean	Min	Maks
<b>Age (mmHg)</b>			
1. <i>Presenile</i> 61-72 years	98,44	78	126
2. <i>Senile</i> 73-84 years	99	89	111

Table 4.3 provides the average Mean Arterial Pressure (MAP) values for the age group 61-72 (presenile), with a mean of 98.44 mmHg, a minimum of 78 mmHg, and a maximum of 126 mmHg. Respondents in the age group 73-84 (senile) have an average MAP value of 99 mmHg, with a minimum of 89 mmHg and a maximum of 111 mmHg.

### 3.2 results of Bivariate Analysis

Table 4.4 Independent Sample T-Test for Mean Arterial Pressure (MAP) Averages in Each Age Group at RS Islam Banjarnegara in 2023

Variable	Mean	Normality	Difference	P value
<b>Age (mmHg)</b>				
1. <i>Presenile</i> 61-72 years	98,44	0,592	0,56	0,87
2. <i>Senile</i> 73-84 years	99	0,719		

Based on Table 4.4, it can be observed that the mean MAP values for the 61-72 age group (presenile) and the 73-84 age group (senile) are 98.44 mmHg and 99 mmHg, with a difference of 0.56 mmHg. The normality test results yielded p-values of 0.592 for the 61-72 age group (presenile) and 0.719 for the 73-84 age group (senile), indicating that the data distribution in both age groups is normal. The independent sample t-test resulted in a p-value of 0.870, which is greater than the alpha value of 0.05. This means that there is no significant difference in the mean MAP (Mean Arterial Pressure) between the elderly age groups undergoing TURP (Transurethral Resection of The Prostate) at RS Islam Banjarnegara.

### 3.3 Discussion

1. The characteristics of research subjects include Body Mass Index (BMI), comorbidities, medication dosage, prehydration fluids, puncture site, block height, and vasopressor usage.

Based on Table 4.1 regarding respondent characteristics, it was found that respondents with comorbidities, particularly hypertension, were most commonly observed among the younger elderly population aged 61-72 (presenile). This aligns with a study conducted in Kelurahan Makamhaji, indicating that there is no significant relationship between age and blood pressure. Hypertension is influenced not only by age but also by other factors such as inadequate consumption of fruits and vegetables, excessive intake of fast food, and various other factors (Widyaningrum, 2014).

The most common puncture site is L3-L4, administered to 23 respondents (74.2%), especially those with a height of ≤160 cm, due to the relatively narrow anatomy of the spinal

bones. Lowering the puncture site to L4-L5 is avoided because it may result in suboptimal penetration of the subarachnoid space due to its narrowness. These research findings are consistent with a study at RSUD Dr. Soedirman Kebumen, indicating that the L3-L4 lumbar level is frequently used for spinal punctures because it is below L1 or L2 and provides a high sensitivity to local anesthetic agents, forming the cauda equina (nerve roots) (Lin, 2016).

The height of the puncture site also affects the level of the block achieved. In this study, the most common block level was >T4. This aligns with research conducted at RSU Muhammadiyah Lampung, which indicates that the block level will be higher when the puncture site is higher, leading to a decrease in blood pressure. Spinal anesthesia that reaches the middle thoracic region results in sympathetic blockage of the heart fibers, affecting venous return (Mulroy, 2009).

The majority of respondents are aged 61-72 (presenile). This study is consistent with research conducted by Kemalasari et al. (2015), which found that the most common BPH patients are in the 61-70 age group. Another study conducted at RSUD Arifin Achmad, Riau Province, states that the most prevalent BPH patients are in the 60-69 age group, totaling 23 respondents (38.3%). The occurrence of BPH increases in the 51-60 age group and peaks in the 61-70 age group, then decreases after the age of 71 (Nadya et al., 2014).

The research results indicate that the highest BMI is 27 kg/m<sup>2</sup>, and the lowest BMI is 17 kg/m<sup>2</sup>. Most respondents with comorbidities, especially hypertension, fall into the overweight category. This aligns with a study conducted in Kota Padang, where half of the hypertensive patients were obese (56.6%) and centrally obese (54.9%). This occurs because one of the contributing factors to hypertension is obesity, which requires more blood for oxygen supply to body tissues, leading to an increased cardiac output and, consequently, higher blood pressure (Sulastri et al., 2012).

It is also noted that the lowest medication dosage is 15 mg, while the highest dosage is 20 mg. The MAP values of respondents given a 20 mg dosage tend to be lower than those with dosages of 15 mg or 17

mg. These research findings are consistent with a study conducted at RSUP dr. Sardjito, Yogyakarta, indicating that the group of respondents with larger doses of bupivacaine will experience a greater decrease in blood pressure due to a high sympathetic blockage, leading to vasodilation (Suhanda et al., 2015).

2. Mean Arterial Pressure (MAP) of patients according to age groups: presenile (61-72 years), senile (73-84 years), and elderly (85-97 years) during intraoperative procedures.

This study shows that the average MAP values in the age groups of 61-72 (presenile) and 73-84 (senile) are 98.44 mmHg and 99 mmHg, respectively. There is an average MAP difference of 0.56 mmHg. According to theory, blood pressure increases proportionally with age, which is associated with a decline in physiological function, changes in blood vessel structure, and decreased immune response. These research findings align with a study conducted at the Paceda Health Center in Bitung city, indicating that blood pressure tends to rise with age due to factors such as declining kidney function as a regulator of blood pressure and reduced blood vessel elasticity (Tamamilang et al., 2018).

3. Differences in the average MAP among the age groups: presenile (61-72 years), senile (73-84 years), and elderly (85-97 years).

The results of the normality test revealed that the p-value for the age group 61-72 (presenile) was 0.592, and for the age group 73-84 (senile) was 0.719, indicating that the data distribution in both the presenile and senile age groups is normal. The independent sample t-test yielded a p-value of 0.870, which is greater than the  $\alpha$  value of 0.05. Therefore, there is no significant difference in the average MAP (Mean Arterial Pressure) among the elderly age groups undergoing TURP (Transurethral Resection Of The Prostate) at RS Islam Banjarnegara.

This study aligns with the findings of a study conducted by Cahyaningrum (2022), which showed that there is no relationship between age and education level with an increase in blood pressure among the elderly. Based on in-depth interviews conducted, some

elderly individuals have been regularly undergoing medical check-ups, enabling them to acquire sufficient information regarding changes in blood pressure among the elderly. As a result, these elderly individuals pay great attention to their lifestyle by avoiding fried and sweet foods and adopting a healthy lifestyle, including exercise and regular check-ups.

The researcher's assumption is that there is no significant difference in the average MAP (Mean Arterial Pressure) among the elderly age groups in this study. This is because several confounding factors, such as comorbidities and the administration of prehydration fluids, have an impact on the differences in the final average MAP values.

The research findings revealed that 8 respondents had comorbid hypertension. Comorbidities were more prevalent in the age group of 61-72 (presenile). These results are consistent with a study conducted in Sekuro Village, Jepara Regency, which showed that early elderly individuals had a higher percentage (44.4%) of hypertension compared to late elderly individuals (17.8%). This occurs because age is just one of the factors contributing to hypertension, and there are other factors at play, such as lifestyle choices like inadequate consumption of fruits and vegetables, excessive consumption of fast food, and other contributing factors. (Faridah et al., 2022).

Prehydration fluids were administered to 11 respondents (35.5%). Ringer Lactate (RL) was the fluid administered intravenously, which has a composition similar to extracellular fluid (ECF). RL fluid is effective in replenishing intravascular volume deficit when administered in sufficient quantities. A study conducted at IBS RSUD Dr. Dradjat Prawiranegara Serang showed that patients who received preload had an average blood pressure of 115.60 mmHg, while those who did not have preload had an average blood pressure of 96.80 mmHg. This significant difference in average blood pressure between patients receiving preload and those without preload is due to the influence of RL fluid on the regulation of blood pressure, as it affects the extracellular fluid volume (Dewi et al., 2021).

Another factor that the researcher briefly observed during the informed consent process, which is suspected to also have an influence on the study results, is anxiety, stress, and the quality of sleep among the elderly, causing non-significant differences in averages. In the morning when the researcher was obtaining informed consent, most respondents were still asleep, and family members reported that the respondents had experienced sleep disturbances the night before. On the day of the TURP surgery in the pre-medication room, the average patients appeared restless and anxious. A study conducted at RSUD Jend. Ahmad Yani in Metro City showed a significant relationship between the level of preoperative elective patient anxiety and blood pressure, with severe anxiety occurring in 17 respondents (56.7%) and mild to moderate anxiety in 13 respondents (43.3%). This is because the preoperative phase is a complex and stressful event (Inayati et al., 2017).

Another study conducted at the Parongpong Community Health Center in West Bandung Regency showed that stress can affect the blood pressure of the elderly because harmful compounds are formed in the body due to stress. The heart's effort to pump blood also increases, leading to elevated blood pressure (Situmorang, 2020).

Research conducted at the Elderly Care Unit in Pucang Gading, Semarang City, also showed that most respondents with poor sleep quality will experience high blood pressure. A percentage of 63.6% of them experienced pre-hypertension while having good sleep quality, and 73.1% of them experienced hypertension with poor sleep quality. This is because the sympathetic and parasympathetic systems greatly influence blood pressure. Sympathetic activity increases, while parasympathetic activity decreases in individuals with poor sleep quality (Adinatha & Wulaningsih, 2019).

## CONCLUSION

The average BMI in this study is 98.67 mmHg. Most respondents do not have comorbidities, with 23 respondents (74.2%). The average dose of bupivacaine given is 17.93 mg, with the most common injection site at L3-L4, involving 23 respondents (74.2%), and the highest level of blockade is mainly <T4, with a

total of 28 respondents (90.3%). Most respondents were not given prehydration, specifically 20 respondents (64.4%).

The lowest MAP value for the 61-72 age group (presenile) is 78 mmHg, and the highest is 126 mmHg. For the 73-84 age group (senile), the lowest MAP value is 89 mmHg, and the highest is 111 mmHg. The average MAP for respondents in the 61-72 age group (presenile) is 98.44 mmHg, while the 73-84 age group (senile) has an average MAP of 99 mmHg, with a difference of 0.56 mmHg. The results of the independent sample t-test show a p-value of 0.870, which is greater than the alpha value of 0.05. Therefore, there is no significant difference in the average Mean Arterial Pressure (MAP) among the elderly age groups undergoing Transurethral Resection of the Prostate (TURP) at RS Islam Banjarnegara.

## RECOMMENDATION

For RS Islam Banjarnegara, it is advisable to consistently monitor the anxiety levels and sleep quality of patients undergoing TURP procedures. Universitas Harapan Bangsa is encouraged to expand the curriculum on factors that have the most significant impact on blood pressure changes. For future researchers, it is recommended to not only analyze in a bivariate manner but also investigate in a multivariate approach, including the elderly age group (85-97 years).

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