

## **SURAT KETERANGAN**

Nomor: 2071/UNUSA-LPPM/Adm.I/IX/2022

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Judul : The Differences in the Position of the 135 Arrows with the Results of Blood Pressure in Indonesia 0 0 and 180

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No. Pemeriksaan : 2022.09.26.869

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**Submission date:** 20-Oct-2022 09:17PM (UTC+0700)

**Submission ID:** 1930581760

**File name:** 15756-Article\_Text-IJFMT\_The\_diferent\_position.pdf (830.05K)

**Word count:** 2499

**Character count:** 12377

## The Differences in the Position of the 135° and 180° Arrows with the Results of Blood Pressure in Indonesia

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### Abstract

Measuring blood pressure is considered an easy routine procedure, but carries many potential errors. The large number of health workers, especially practical students and nurses, does not pay attention to proper and correct standard operating procedures (SOP). Analytic research design with cross-sectional approach. The research population consisted of residents of in Surabaya city Indonesia with ages 12-30 years of 92 residents. The size of the sample is 75 respondents. The sampling technique uses simple random sampling, the data collection instrument uses an observation sheet. Data were analyzed using the T test with a significance level of  $\alpha = 0.05$ . The results showed that a small portion (22.6%) was 110/90 mmHg measurements with an angle of 180° and a small portion (13.3%) was 100/90 mmHg measurements with an angle of 135° and most (72%) results of blood pressure changed T test results  $p = 0.001$  with  $\alpha = 0.05$ , which means that there are differences in the position of the angle of 135° and 180° arms with the results of blood pressure Wonokromo Surabaya. When measuring blood pressure, it must be in the correct position or correct because it can make the results of blood pressure tests different. It is expected that during the examination the officer will use the correct and the right patient position so that the blood pressure results are accurate.

**Keywords:** Angle of arm, Blood Pressure, Indonesia

### Introduction

Blood pressure is one of the vital signs used by health workers, especially nurses, as a basis for assessing and treating a patient. Blood pressure measurement will provide important information regarding the patient's cardiovascular status and response to activity. Accurate blood measurement is needed in the patient's hemodynamic condition and diagnosis of the disease<sup>1,2</sup>. Blood pressure measurement is a routine procedure but carries a lot of potential errors<sup>3,4</sup>. The number of health workers especially practice students and nurses do not pay attention to standard operating procedures (SOP) which are good and correct. One factor that is often overlooked is the position of the arms and body during blood pressure measurements, which can affect the results of blood pressure checks. If the blood pressure check is not done properly and correctly, it will get inaccurate results. These results have fatal consequences such as incorrectly assessing and treating a patient<sup>5,6</sup>.

In the study, the measurement results were obtained in a sitting position that was 6.5 mmHg higher than lying down while in the study<sup>7,8</sup>, the results were obtained from a higher standing position. 6 mmHg compared to lying down and in a sitting position 4 mmHg higher than lying down. In the study<sup>9,10</sup>, the measurement results of the arm position on the table were 5.8 mmHg higher compared to the position of the arm parallel to the heart level. Factors that affect the results of blood pressure checks, internal factors include age, stress, ethnicity, gender. External factors include the influence of arm position, day variation, drugs, activity and weight, smoking. Body position can affect the results of blood pressure checks<sup>11,12</sup>. The use of cufflinks in adults and children must also be differentiated because the inappropriate size of the cuff can also affect the result. Inaccurate results can be fatal, especially in patients with hypertension<sup>13,14</sup>. The role of the nurse in acting, especially the examination of vital signs (TTV), namely the measurement of blood pressure must be following

standard operating procedures such as paying attention to the position of the arm and the size of the cuff must be following the patient's arm circumference to get accurate results.

### 5 Methods

The design of this study was analytic observational with a cross-sectional approach. The population of the research was 92 in Wonokromo, the city of Surabaya. The sample size is 75 respondents. The sampling technique used was the Probability Sampling technique with the simple random sampling technique. This study contained 2 independent variables for the angle of the arm while the dependent variable was the result of blood pressure. The data collection instrument used an observation sheet. Data were analyzed using the T-test. With a significant level  $\alpha = 0.05$ .

### Results and Discussion

Based on table 1, it shows that of the 75 respondents,

the results of blood measurements at an angle of 135° obtained 10 respondents with a blood pressure of 100/90 mmHg. The position of the arm can have a big influence when blood pressure is measured, if the upper arm is below the level of the right atrium (when the arm hangs to the down while in a sitting position), the reading will be too high. Likewise, if the arm is above the heart level the reading will be too low. This difference can be caused by the effect of hydrostatic pressure<sup>15,16</sup>. The 135° position is a sitting position that is often used by health workers to check blood pressure in conscious patients and this position is considered comfortable for patients to do blood pressure checks. This is following research that measurements can give different results in sitting, lying, standing, and speaking positions, BP measurements should be done in different body positions in patients with suspected orthostatic hypertension, and patients should not speak during measurement<sup>17,18</sup>.

**Table 1. Characteristics of Respondents Based on Arm Position Angle 135° Blood Pressure in Wonokromo, Surabaya.**

No	Blood Pressure (mmHg)	Respondent	
		Frequency (n)	Presentase (%)
1.	90/70	1	1,3
2.	90/80	4	5,3
3.	100/70	1	1,3
4.	100/80	6	8
5.	100/90	10	13,3
6.	110/70	2	2,7
7.	110/80	3	4
8.	110/90	14	18,7
9.	110/100	9	12
10.	112/100	1	1,3
11.	115/80	1	1,3
12.	115/90	3	4
13.	115/100	1	1,3
14.	120/80	4	5,3
15.	120/90	2	2,7
16.	120/100	2	2,7
17.	120/110	4	5,3
18.	120/115	2	2,7
19.	125/115	1	1,3
20.	130/90	2	2,7
21.	135/80	1	1,3
22.	140/80	1	1,3
Total		75	100

Based on table 2, it shows that the respondent's blood measurement results at 180° obtained the results of 17 respondents with a blood pressure of 110/90 mmHg. Blood pressure is the force that artery walls produce by pumping blood away from the heart. Blood flows because of a change in pressure, where there is a move from an area of high pressure to an area of low pressure. Systemic or arterial blood pressure is the best indicator of cardiovascular health. The force of contraction of the heart pushes blood into the aorta. The maximum pressure peak when an ejection occurs is called systolic pressure. When the ventricles relax, the blood that remains in the arteries results in minimal pressure or diastolic pressure.

Diastolic pressure is the minimum pressure generated against the artery wall at any time<sup>15,19</sup>.

The 180° angle position (lying down) is the best position to do because the results of the examination are more accurate. Reclining position Better than a sitting position because when sitting position blood pressure will be 5-10 mmHg higher. From the results of interviews from respondents, it is known that respondents feel more comfortable when they are checked for blood pressure in a sleeping position (180°), this is because the respondent is in a more relaxed sleeping position and feels lighter when he checks blood pressure<sup>15,20</sup>.

**Table 2. Characteristics of Respondents Based on Arm Position Angle 180° Blood Pressure in Wonokromo, Surabaya**

No	Blood pressure (mmHg)	Respondent	
		Frequency (n)	Percentage (%)
1.	80/70	2	2,7
2.	90/60	1	1,3
3.	90/70	5	6,7
4.	90/80	7	9,3
5.	92/80	2	2,7
6.	96/80	1	1,3
7.	98/80	1	1,3
8.	100/70	3	4
9.	100/80	4	5,3
10.	100/90	17	22,7
11.	102/90	1	1,3
12.	104/90	1	1,3
13.	110/80	4	5,3
14.	110/90	11	14,7
15.	110/100	2	2,7
16.	115/80	1	1,3
17.	115/90	1	1,3
18.	118/90	2	2,7
19.	120/70	1	1,3
20.	120/90	2	2,7
21.	120/100	1	1,3
22.	120/110	1	1,3
24.	125/115	1	1,3
25.	130/80	2	2,7
27.	140/80	1	1,3
Total		75	100

**Table 3. Respondent Category Based on Blood Pressure Results in Wonokromo, Surabaya**

No	Blood Pressure (mmHg)	Frekuensi (n)	Persentase (%)
1.	Fixed	5	6,7
2.	Change	70	93,3
Total		75	100

Based on the results of the T-test with SPSS for Windows with a significance level of  $\alpha = 0.05$ , the research hypothesis is that the results are  $\rho < \alpha$  or  $0.001 < 0.05$ , then  $H_0$  is rejected, which means that there is a difference in the position of the angle of  $135^\circ$  and  $180^\circ$  of the arm with the results of blood pressure in Wonokromo Surabaya. Blood pressure is the pressure generated by the blood against the blood vessels. Blood pressure is influenced by blood volume and the elasticity of blood vessels. The increase in blood pressure is due to an increase in blood volume or a decrease in the elasticity of blood vessels. Conversely, a decrease in blood volume will lower blood pressure<sup>19,21</sup>. Based on the data above, there is a response with fixed and changing blood pressure due to the different positions of the blood pressure measurement arm. This is following research conducted by Ernest (2018) that the systolic and diastolic blood pressure is higher in a sitting position (19.9%) than in the supine position (13.5%) with an average value in the sitting position 2, 9032, and the supine position 2.7097. There are differences in pressure measurement results between blood sitting position and supine position<sup>22,23</sup>.

### Conclusion

There is a difference between the results of blood pressure with an angle of  $135^\circ$  and  $180^\circ$  in Surabaya, Indonesia. Suggestion It is hoped that the results of this study can develop the ability of further researchers to carry out more specific research related to the position of the angle of the arm with blood pressure.

**Conflict of Interest :** The author declare that they have no conflict of interest.

**Source of Funding:** This study supported by the

Ministry of Education and Culture of the Republic of Indonesia.

**Acknowledgements :** We thank Arif Nur Muhammad Ansori for editing the manuscript.

**Ethical Approval:** This study approved by the Universitas Nahdlatul Ulama, Surabaya, Indonesia.

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