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ORIGINAL RESEARCH

An observational study on blood pressure measurement discrepancies between left and right arms among Indonesian nursing students

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Abstract
Blood pressure is crucial in healthcare, and measurement deviations can lead to diagnostic errors and incorrect treatment. Additionally, blood pressure helps detect various cardiovascular diseases. Most people measure blood pressure in only one arm, neglecting the other. However, blood pressure readings can vary due to many factors. This research aims to measure differences in blood pressure between the left and right arms, specifically systolic blood pressure (SBP), diastolic blood pressure (DBP), and mean arterial pressure (MAP). The study employed a quantitative approach with a comparative observational analysis design. Probability sampling, specifically proportional stratified random sampling, was used for sample selection. A digital blood pressure monitor was utilized for measurements. Data analysis was performed using the Wilcoxon surrogate test. The statistical Wilcoxon test showed a mean difference of 0.002 ($p<0.05$) in the SBP measurements, indicating a significant difference between right and left-arm SBP measurements. The systolic blood pressure in the right arm was 102.37 mmHg, which was 1.66 mmHg higher than that measured in the left arm. While there is a difference in the average systolic, diastolic, and MAP results between the left and right arms, it is insignificant. However, the right arm's systolic blood pressure (SBP) is notably higher than the left.

Keywords: Blood pressure measurements; hypertension; health assessment; innovation; healthcare delivery

Introduction

Blood pressure is the pressure exerted by circulating blood on the walls of blood vessels, particularly in the arteries (Magder, 2018). The heart typically beats between 60 to 70 times per minute during resting conditions, such as when sitting or lying down (Avram et al., 2019). Blood is pumped into the arterial vessels, resulting in the highest pressure, known as systolic blood pressure, when the heart contracts (Flint et al., 2019). Conversely, the pressure decreases between heartbeats, referred to as diastolic pressure (Kowalski, 2010). Accurate blood pressure measurement is a critical aspect of patient care and is essential for medical staff in diagnosing, managing, and monitoring various health conditions (Handler, 2009). Blood pressure readings provide vital information about a patient's cardiovascular health, and inaccuracies can lead to misdiagnosis, inappropriate treatment, and potentially serious health consequences. For instance, an overestimation of blood pressure may result in unnecessary medication, leading to side effects and patient discomfort, while underestimation can delay treatment for conditions like hypertension, increasing the risk of heart disease, stroke, and kidney damage (Kallioinen, Hill, Horswill, Ward, & Watson, 2017). Medical staff must follow standardized protocols, including proper patient positioning, using the correct cuff size, and ensuring the patient is relaxed to avoid common errors (Ogedegbe & Pickering, 2010). Regular calibration and maintenance of blood pressure equipment are also crucial to ensure readings remain reliable (Seals et al., 2019). Continuous education and training for healthcare providers on best practices for blood pressure measurement are vital to minimize errors and enhance patient outcomes (Hayer et al., 2019). Accurate measurement is not just a routine procedure; it is a foundational practice that directly impacts clinical decision-making and patient safety (Hayer et al., 2022).

According to the Joint National Committee's Seventh Report (JNC7) on the prevention, detection, evaluation, and treatment of high blood pressure, it is important to sit or lie down with arms at the sides, ensuring the sphygmomanometer is parallel to the center of the chest for correct readings (Marhaendra, Basyar, & Adrianto, 2016). Blood pressure measurement results can vary due to several factors, including family history of blood pressure-related diseases, body mass index, activity prior to measurement, stress levels, time of day, and body position during measurement (Assa, Rondonuwu, & Bidjuni, 2014). In one study, the highest systolic and diastolic blood pressure readings were recorded in the right arm, with averages of 164 mmHg and 98 mmHg, respectively, while the left arm showed averages of 151 mmHg and 92 mmHg. Additionally, differences in Mean Arterial Pressure (MAP) were observed, with the right arm tending to have a higher MAP than the left, consistent with research indicating variations in blood pressure measurements between the two arms (Arwani & Sunarno, 2007). Our preliminary study was conducted measuring blood pressure in five healthy students using a digital sphygmomanometer. Measurements were taken while the students were seated, with three readings for each arm at an angle of 180 degrees. The results indicated a difference in blood pressure readings between the left and right arms. The average systolic blood pressure in the right arm was 101.68 mmHg, and diastolic pressure was 72.77 mmHg. In contrast, the left arm showed an average systolic pressure of 100.3 mmHg and diastolic pressure of 71.9 mmHg. The MAP for the right arm was calculated at 82.41 mmHg, while the left arm's MAP was 81.36 mmHg, further confirming that measurements in the right arm tended to be higher **(Figure 1)**.

Figure 1. Illustration of blood pressure measurement (Courtesy of pexels.com).

Previous studies had been conducted, unfortunately that studies involved patients with hypertension in hospital settings (Assa, Rondonuwu, & Bidjuni, 2014; Nurmoko, Fadilah, & Pujiati, 2020; Suwarto, & Purwaningsih, 2022). Blood pressure is vital in healthcare, as discrepancies in measurement can lead to errors in diagnosing diseases or administering therapy. The observed differences in blood pressure readings between the left and right arms prompted researchers to investigate this phenomenon further. The focus of the study was on healthy students to ensure that any factors affecting blood pressure differences were not related to illness, as students are generally in optimal health. Even in healthy individuals, blood pressure can significantly impact those with circulatory and cardiovascular diseases, making this research essential for establishing accurate blood pressure measurement locations. These studies provided hypothesis that significant variations in measurement outcomes due to various therapies, such as medication and dietary changes, which patients received during their care. Additionally, many respondents in these studies were older adults, where aging is a non-modifiable factor contributing to hypertension. This rationale led the researchers to conduct blood pressure measurements on respondents in normal conditions, aiming to ensure that factors influencing blood pressure differences were not due to illness. Therefore, this study is crucial in providing recommendations for determining the most accurate location for blood pressure measurement among students. Moreover, blood pressure measurement among students is an important practice that can provide early detection of potential health issues, such as hypertension, which is increasingly being recognized in younger populations (Wieniawski & Werner, 2022). Regular monitoring in educational settings helps identify students who may be at risk for cardiovascular problems, allowing for early intervention and promoting a culture of health awareness. Since students often experience stress, irregular sleep patterns, and unhealthy dietary habits, these factors can contribute to elevated blood pressure (Hard & Urbina, 2021). Incorporating blood pressure checks in schools or universities can also serve as an educational tool, teaching students about the significance of maintaining healthy blood pressure levels and encouraging them to adopt healthier lifestyles. Early detection and education can play a crucial role in preventing long-term health complications and fostering overall well-being among students.

Method

This study utilized a comparative observational analytic design, which is well-suited for examining differences between variables in natural settings without manipulation (Taur, 2022). Specifically, the research aimed to compare blood pressure measurements taken from the left and right arms of the participants, to determine if there were significant discrepancies between the two. Such a design allows for the observation of blood pressure variations in a controlled yet realistic environment, providing valuable insights into potential differences in systolic and diastolic readings based on the arm used for measurement. The study sought to contribute to the understanding of best practices in clinical blood pressure assessment. The independent variable in this study was the arm used for blood pressure measurement, while the dependent variables were the systolic pressure, diastolic pressure, and MAP obtained from these measurements. A proportionate stratified random sampling technique was used to select the study participants. The population consisted of 207 Bachelor of Applied Nursing students from Magelang, with a final sample size of 145 respondents. The study focused on nursing students aged 17–23 years, who are categorized as late adolescents (Sonang, Purba, & Pardede, 2019). This age group was selected to minimize bias, as they generally have normal cardiovascular health in terms of structure, elasticity, and blood viscosity. Conducting the study on this demographic, rather than on patients with hypertension, ensures more balanced and reliable outcomes. Additionally, the students' daily activities were similar, which further reduced the variability in blood pressure measurements. The study was conducted at the Magelang Applied Nursing Study Program, part of Poltekkes Kemenkes Semarang, from March 2023 to May 2023. Ethical approval was obtained from the Health Research Ethics Commission of the Semarang Ministry of Health Poltekkes (No. 0300/EA/KEPK/2023), and a research permit was issued by the Investment and One-Stop Integrated Services Office (DPMPTSP) of the Magelang City Government (No. 070/III.386/330/2023).

Prior to the study, respondents were informed about the blood pressure measurement process and the necessary preparations. They were advised to urinate, avoid physical activity, food, caffeine, alcohol, and smoking for at least 30 minutes before the measurement, and to calm their mind and body by sitting relaxed for 5–15 minutes. During the measurement, respondents were seated with their feet flat on the floor or on a footrest, and their backs supported by a chair to ensure a relaxed posture for accurate readings. Blood pressure was measured three times on each arm with a 2-minute interval between measurements. All measurements were taken with the respondent seated, arms at a 180-degree angle. The results were recorded on a data sheet. Data analysis was performed using SPSS, with the Kolmogorov-Smirnov normality test conducted first due to the sample size of over 50 respondents. The test revealed a p-value of less than 0.05, indicating that the data were not normally distributed, and thus the Wilcoxon test was used for further analysis.

Results

The gender distribution shows that the majority of respondents (86.9%) are female, while male respondents make up only 13.1%. This results in a significant difference in frequency, with the number of male respondents being less than one-seventh of the female respondents. Specifically, there is a gap of 107 individuals (73.8%) between the number of males and females **(Table 1)**. The tabulation of gender with blood pressure measurement results reveals that male respondents have higher systolic and diastolic blood pressure compared to females. Specifically, the systolic blood pressure difference between males and females is 14.49 mmHg on the left arm and 14.9 mmHg on the right arm. The difference in diastolic blood pressure is 4.29 mmHg on the left arm and 4.5 mmHg on the right arm. Additionally, the MAP difference between males and females is 7.69 mmHg on the left arm and 7.98 mmHg on the right arm **(Table 2)**. The age distribution of respondents shows that they fall within the range of 17 to 23 years, classifying them as late adolescents. The most common age among respondents is 21 years, representing 29.7% of the sample, while the least common age is 17 years, accounting for only 0.7%. There is a difference of 3 respondents between those aged 19 and 20 years and those aged 18 and 22 years **(Table 3)**. Cross-tabulation of age with blood pressure measurements reveals that at age 17, the recorded blood pressure is the highest compared to other age groups, though it is represented by a frequency of only 0.7%. For ages 20, 21, and 22, the blood pressure measurements are relatively consistent, with differences ranging between 0.16 and 0.55 mmHg **(Table 4)**.

The first measurement of systolic blood pressure in the left arm yielded the highest average result of 102.57 ± 11.982 mmHg. However, the differences between the second and third measurements were minimal, with the third measurement being only 0.04 mmHg higher than the second **(Table 5)**. For systolic blood pressure measurements in the right arm, the first measurement recorded the highest average at 104.59 mmHg. The average results between the second and third measurements showed only a minor difference, with the second measurement being 0.42 mmHg lower than the third. The minimum value of the first measurement was only 1 mmHg higher than the second measurement and 1 mmHg lower than the third measurement **(Table 6)**. Regarding diastolic blood pressure in the left arm, significant differences were observed between the first and third measurements, as well as between the first and second measurements. The minimum value in the second measurement was 2 mmHg lower than the first measurement and 4 mmHg lower than the third measurement. However, the average results of the second and third measurements were not significantly different, with only a 0.68 mmHg difference **(Table 7)**. In the right arm, the first and second diastolic blood pressure measurements had the same minimum value, which was 3 mmHg higher than the third measurement. The maximum values varied from 4 to 13 mmHg, with the average of the second measurement being 2.04 mmHg lower than the first **(Table 8)**. For MAP, the left arm had higher minimum and maximum values, ranging from 66.67 to 107.56, compared to the right arm. The average MAP was slightly higher in the right arm by 0.57 mmHg **(Table 9)**. Overall, blood pressure measurements between the left and right arms showed differences, although not always significant, with the right arm generally recording higher values. The most notable difference was in systolic blood pressure, with a difference of 1.66 mmHg **(Table 10)**. According to the Wilcoxon statistical test, the p-value for the mean systolic blood pressure measurement was 0.002, indicating a statistically significant difference ($p < 0.05$). Conversely, the p-values for the mean diastolic blood pressure measurement and MAP were 0.815 and 0.183, respectively, suggesting that these measurements did not differ significantly **(Table 11)**.

Table 1. Gender distribution.

Gender	Frequency	Percentage (%)
Female	126	86.9
Male	19	13.1

Table 2. Cross-tabulation of gender with blood pressure.

Gender	Average Blood Pressure Measurement Results (mmHg)				Left-arm MAP	Right-arm MAP
	Left Systolic	Right Systolic	Left Diastolic	Right Diastolic		
Female	98.81	100.42	73.46	73.46	81.91	82.44
Male	113.30	115.32	77.75	77.96	89.60	90.42

Table 3. Age frequency distribution.

Age (years old)	Frequency	Percentage (%)
17	1	0.7
18	14	9.7
19	32	22.1
20	35	24.1
21	43	29.7
22	17	11.7
23	3	2.0

Table 4. Analysis among variables.

Age (years old)	Average Measurement Results (mmHg)						Frequency	Percentage (%)
	Left systolic	Right systolic	Left Diastolic	Right Diastolic	Left-arm MAP	Right-arm MAP		
17	114.67	112.33	83	77	93.56	88.78	1	0.7
18	97	96.40	71.78	73.33	80.20	81.02	14	9.7
19	99.20	100.24	72.75	74.97	81.57	83.40	32	22.1
20	101.39	103.69	75.08	74.44	83.85	84.19	35	24.1
21	101.55	103.56	74.48	72.66	83.50	82.96	43	29.7
22	101.94	104.74	74.55	75.16	83.68	85.02	17	11.7
23	102.56	103.56	73.22	75.56	83	84.89	3	2.0

Table 5. Left-arm systolic blood pressure measurement results.

Measurement	Frequency	Mean (mmHg)	Standard deviation
I	145	102.57	11.982
II	145	99.76	11.015
III	145	99.80	10.907

Table 6. Right-arm systolic blood pressure measurement results.

Measurement	Frequency	Mean (mmHg)	Standard deviation
I	145	104.59	11.771
II	145	101.05	11.984
III	145	101.47	10.904

Table 7. Left-arm diastolic blood pressure measurement results.

Measurement	Frequency	Mean (mmHg)	Standard deviation
I	145	74.81	8.489
II	145	73.29	8.466
III	145	73.97	8.887

Table 8. Right-arm diastolic blood pressure measurement results.

Measurement	Frequency	Mean (mmHg)	Standard deviation
I	145	75.04	8.438
II	145	73.00	7.612
III	145	74.10	8.370

Table 9. MAP calculation results.

MAP	Frequency	Mean (mmHg)	Standard deviation
Left-arm MAP	145	82.92	7.802
Right-arm MAP	145	83.49	7.672

Table 10. Blood pressure comparison of left-arm and right-arm.

Location	Average Measurement Results (mmHg)		
	Systolic	Diastolic	MAP
Left-arm	100.71 ± 10.12	74.03 ± 7.6	82.92 ± 7.8
Right-arm	102.37 ± 10.48	74.05 ± 7.15	83.49 ± 7.67

Table 11. Wilcoxon testing.

	Right systolic mean – left systolic mean	Right diastolic mean – left diastolic mean	Right MAP - left MAP
Wilcoxon testing	-3.131b	-.234c	-1.332b
Asymp. Sig.(2-tailed)	.002	.815	.183

Discussion

The characteristics of the respondents based on gender reveal that the majority are female, accounting for 86.9%, while males represent 13.1%. Generally, blood pressure tends to be higher in men in the study. The differences in blood pressure measurements between genders include a left systolic blood pressure difference of 14.49 mmHg, a right systolic blood pressure difference of 14.9 mmHg, a left diastolic blood pressure difference of 4.29 mmHg, and a right diastolic blood pressure difference of 4.5 mmHg. This finding aligns with studies, which indicates that males typically have higher blood pressure measurements compared to females (Dua, Bhuker, Sharma, Dhall, & Kapoor, 2014; Gosal, Firmansyah, & Su, 2020). Gender is a significant factor associated with hypertension, as males are more likely to experience high blood pressure than females (Connelly, Currie, & Delles, 2022). Lifestyle choices among males often contribute to elevated blood pressure, and hormonal differences further exacerbate this issue (Defianna, Santosa, Probandari, & Dewi, 2021). However, after menopause, the prevalence of hypertension in females increases, and from the age of 65 onward, high blood pressure due to hormonal factors becomes more common in females than in males (Widiyanto, Atmojoyo, Fajriah, Putri, & Akbar, 2020). The hormones that play a critical role in increasing blood pressure in males are androgens and testosterone. These hormones activate the renin-angiotensin system, leading to elevated blood pressure. Specifically, androgens stimulate endothelial and smooth muscle cells to produce Endothelin-1, a potent vasoconstrictor (Widiyatmoko, 2010; Yusrizal, Indarto, & Akhyar, 2016). However, this study contradicts of which suggest that metabolic syndrome, including hypertension and hypotension, is more prevalent among females. In adolescent females, hypertension may arise from a preference for high-fat and high-sodium diets (Jalal, Liputo, Susanti, & Oenzil, 2008). Also, excessive sodium intake can lead to increased extracellular fluid due to the release of intracellular fluid, resulting in higher blood volume and, consequently, hypertension (Xue et al., 2023).

In this study, respondents were aged 17 to 23 years, with the majority being 21 years old (29.7%). Age is a significant risk factor for increased blood pressure, affecting both systolic and diastolic pressures, which in turn raises mean arterial pressure (Dua, Bhuker, Sharma, Dhall, & Kapoor, 2014). All respondents fall into the late adolescence category (Sonang, Purba, & Pardede, 2019). Blood pressure typically rises with age due to structural changes in the arteries and neurohormonal disturbances, particularly involving the renin-angiotensin-aldosterone system. As the lumen diameter narrows, the capacity for blood recoil diminishes, leading to an increase in systolic blood pressure (Widiyanto, Atmojoyo, Fajriah, Putri, & Akbar, 2020). Among the 145 respondents, each underwent three measurements on both the left and right arms to collect data on systolic blood pressure, diastolic blood pressure, and MAP. The findings indicated that the highest average blood pressure values—systolic, diastolic, and MAP—were recorded during the second measurement, which had the lowest average compared to the others. For instance, the average systolic blood pressure in the first measurement was 102.57 ± 11.982 mmHg, while the second measurement yielded the lowest average at 99.76 ± 11.015 mmHg. In the right arm, the first measurement recorded the highest average at 104.59 ± 11.771 mmHg, while the lowest occurred in the second measurement at

101.05 ± 11.984 mmHg. For diastolic blood pressure in the left arm, the first measurement averaged 74.81 ± 8.489 mmHg, with the second measurement showing a decrease to 73.29 ± 8.466 mmHg. In the right arm, the first measurement yielded an average of 74.05 ± 8.438 mmHg, while the second measurement resulted in 73.00 ± 7.612 mmHg **(Figure 2)**.

Figure 2. Data collection process (Authors' documentation).

The research findings also indicated that the average MAP for the left arm ranged from a minimum of 66.67 mmHg to a maximum of 107.56 mmHg. Notably, the average MAP for the right arm was 0.57 mmHg higher than that of the left arm. Although fluctuations were observed during each measurement, the differences were not significantly large. The difference between the average results of the third and second measurements ranged from only 0.04 to 1.1 mmHg. Primary data were processed using SPSS software, employing the Wilcoxon alternative test. The data distribution was assessed using the Kolmogorov-Smirnov test, given the sample size exceeded 50 respondents. The results indicated a p-value <0.05, suggesting that the data were not normally distributed. These findings are consistent with a study, which demonstrated differences in blood pressure measurements, including average systolic and diastolic pressures and MAP calculations (Assa, Rondonuwu, & Bidjuni, 2014). Blood pressure is generated by the force of blood against the walls of blood vessels (Hall, 2011). Regular blood pressure checks are essential for determining its stability. High blood pressure increases the workload on the heart, which can compensate to maintain a normal stroke volume. However, a continuous increase in workload may lead to pathological changes in heart cells and trigger complications, including heart failure (Sherwood, 2013). The average blood pressure of all respondents primarily falls within the optimal and normal categories, indicating that none experienced hypotension or hypertension. Additionally, as respondents are in the late adolescent age category, they remain in the growth stage and have not yet reached a degenerative phase. According to the Indonesian Society of Hypertension (2019), blood pressure classifications are as follows: optimal (<120/<80 mmHg), normal (120-129/80-84 mmHg), normal-high (130-139/85-89 mmHg), hypertension stage 1 (140-159/90-99 mmHg), hypertension stage 2 (160-179/100-109 mmHg), hypertension stage 3 (≥180/≥110 mmHg), and isolated systolic hypertension (≥140/<90 mmHg). However, the classification for adolescents differs from that for adults; adolescents are considered normal if their blood pressure is below the 90th percentile (Varda, 2016) and hypertensive if it exceeds 130-139/80-89 mmHg or the 95th percentile plus 11 mmHg (Shaumi & Achmad, 2019).

Several factors contribute to blood pressure, including resistance to blood flow, blood viscosity, elasticity of blood vessels, the volume of blood pumped by the heart, cardiac output (CO), and blood flow velocity relative to the cross-sectional area of blood vessels (Ma & Chen, 2022). Additional influences on blood pressure encompass physical activity, stress, race, medications, obesity, medical conditions, body temperature and environment, genetic factors, and lifestyle choices (Choi & Kim, 2023; Li et al., 2023). The research findings indicate a difference in systolic blood pressure (SBP) results between the arms, with the right arm measuring 102.37 mmHg, which is 1.66 mmHg higher than the left arm **(Figure 3)**. The Wilcoxon test results showed negative ranks, positive ranks, and ties, with a signed rank test result of 0.002 ($p < 0.05$). This indicates that the alternative hypothesis (Ha) is accepted, confirming a significant difference in systolic pressure measurements between the right and left arms. This finding aligns with a study reported an average systolic pressure of 151 ± 19.18 mmHg in the left arm and 164 ± 10.06 mmHg in the right arm (Solon, 2018). The Mann-Whitney statistical test yielded a result of 0.002, indicating a significant difference between the systolic blood pressure measurements of the left and right arms. Differences in blood pressure measurements between the left and right arms are considered normal, with a typical range for the difference in systolic blood pressure (SBP) being a maximum of 5-10 mmHg. If the difference exceeds 10 mmHg, it may suggest vascular disease, and differences greater than 20-30 mmHg could indicate organic circulatory disorders in the arm region (Nurmoko, Fadilah, & Pujiati, 2020).

Figure 3. Data collection process (Authors' documentation).

Systolic blood pressure (SBP) differentials exceeding 10–15 mmHg are closely associated with peripheral vascular disease and subclavian stenosis. Such differences may serve as an index for assessing the risk of mortality from vascular and heart disease. Disparities in blood pressure measurements between the left and right arms can arise from various factors, including vascular occlusion, peripheral vascular abnormalities, aortic coarctation, and heart disease (Solon, 2018). Age also influences the differences in blood pressure between the arms (Assa, Rondonuwu, & Bidjuni, 2014). As individuals age, both systolic and diastolic pressures tend to rise, with a more pronounced increase in systolic pressure (Arwani & Sunarno, 2007; Dua, Bhuker, Sharma, Dhall, & Kapoor, 2014). The aging process leads to wider and stiffer arteries, reducing their capacity to accommodate blood, which contributes to increased systolic pressure (Pinto, 2007). In this study, differences in diastolic blood pressure results were also noted between the arms. The average diastolic pressure in the left arm was 74.03 mmHg, while in the right arm, it was 74.05 mmHg, resulting in a minimal difference of only 0.02 mmHg. The Wilcoxon test findings indicated no significant difference between the diastolic blood pressure measurements in the left and right arms, with a p-value of 0.815 ($p > 0.05$). This is consistent with findings reported mean diastolic pressures of 102.0323 ± 18.5031 mmHg in the right arm and 98.6129 ± 20.715 mmHg in the left arm (Arwani & Sunarno, 2007). The t-test result of 0.186 confirms that there is no discernible difference between the measurements for the left and right arms.

Additionally, differences in the calculated MAP between the left and right arms were observed. Although the measurement results may not appear significant, the MAP in the right arm was consistently higher than that in the left arm, with a systolic pressure difference of 1.66 mmHg. The Wilcoxon test yielded a p-value of 0.183 ($p > 0.05$), indicating no significant difference between the calculated MAP of the left and right arms. This finding contrasts with research, which utilized a dependent t-test and found a p-value of 0.0000 (< 0.05), indicating a significant difference in MAP measurements between the arms (Nurmoko, Fadilah, & Pujiati, 2020). In that study, the average MAP in the right arm was 122.94 mmHg, higher than in the left arm. The theory suggests that normal individuals should exhibit similar blood pressure measurement results in both arms, which may explain this discrepancy. Furthermore, considering the structure of the heart, the aorta branches into three arteries, one of which is the innominate artery, leading to the left and right subclavian arteries (Suwarto & Purwaningsih, 2022). The previous study focused on hypertensive patients, which may account for the significant differences in blood pressure measurements observed. In contrast, this study measured respondents without hypertension. Although the statistical test results indicate no significant difference in MAP, the mean comparison table shows variations between the measurements in the right and left arms. The findings of this study diverge from previous research due to several factors, including the use of a sample of healthy respondents and the selection of an age group between 17 and 23 years. Additionally, variations in timing, location, and respondent characteristics across studies may also contribute to the differences observed.

Conclusion

The Wilcoxon statistical test results indicate a p-value of 0.002 for the mean systolic blood pressure measurement, which is less than 0.05. This suggests a statistically significant difference in systolic blood pressure measurements. In contrast, the p-values for mean diastolic blood pressure and MAP are 0.815 and 0.183, respectively, both exceeding 0.05. This indicates no statistically significant difference in diastolic blood pressure and MAP measurements. For future studies, researchers are encouraged to examine a broader age range among healthy respondents and include patients with cardiovascular diseases to assess potential differences in blood pressure measurements. Additionally, it is advisable to conduct blood pressure measurements at the same time to minimize bias in the results.

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Author's perspective

Key points

- Blood pressure measurement deviations can lead to diagnostic errors and incorrect treatment
- Blood pressure can significantly impact those with circulatory and cardiovascular diseases
- The right arm's systolic blood pressure measurement is notably higher than the left

Potential areas of interest

- Why is accurate blood pressure measurement crucial in healthcare?
- What are the potential consequences of measurement deviations?
- How does the systolic blood pressure (SBP) in the right arm compare to that in the left arm, according to the study's results?

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