

THE COMPARISON BETWEEN PROGRESSIVE MUSCLE RELAXATION AND SLOW DEEP BREATHING EXERCISE ON BLOOD PRESSURE IN HYPERTENSIVE PATIENTS

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ABSTRACT

Background: There has been an epidemiological transition in which non-communicable diseases dominate compared to infectious diseases. One of the fastest growing non-communicable diseases is hypertension. Non-pharmacological treatment that can be done, is progressive muscle relaxation and slow deep breathing. In hypertensive patients, it is recommended to regulate pattern of breath and recommended for those who feel restless, but do not use in lowering blood pressure. Likewise, muscle relaxation in general only use for bed rest and never given special relaxation to lower blood pressure.

Objectives: This study aims to analyze the differences in blood pressure of hypertension sufferers who are given progressive muscle relaxation and slow deep breathing.

Methods: This research was conducted on May 24 - July 2, 2018, *Quasi-experimental design with Non-Equivalent Pretest-Posttest Design and Comparisons Group design*. Sampling technique used is *Non-Probability with Consecutive* with 48 samples.

Results: This research concluded that there was no significant difference between the progressive muscle relaxation group and slow deep breathing against decrease blood pressure with the results *p value* (0.273).

Conclusion: Many factors can be influencing this result that is age, education, (history of hypertension & time suffering from hypertension), (smoking history, duration, and number of packs / day), stress level and hypertension medication.

Key words: Blood pressure, progressive muscle relaxation, slow deep breathing.

INTRODUCTION

Up until now, hypertension is still become a big challenge in Indonesia. That because hypertension is a condition that is often found in primary health care. It's a health problem with high prevalence, that is equal to 25,8%, according to Riskesdas data in 2013. Furthermore, hypertension control is yet adequate even though there's many effective medicines available (Pusat Data dan Informasi Kementerian Kesehatan RI, 2014)

Prevalence according *World Health Organization (WHO)* in 2011 shows that one billion people in the world suffers from hypertension, with 2/3 among them is in the

developing country that have low to medium income. Hypertension prevalence will continue to increase significantly and was predicted that in 2025, about 29% adult in the world will suffer from hypertension. Hypertension was the death cause of about 8 million every year, where 1,5 million deaths occurs in South East Asia where the 1/3 population suffers from hypertension and can cause increase of the health expense (*World Health Organization, 2011*)

According to Riskesdas (2013), it was said that hypertension prevalence in Indonesia which gained from ≥ 18 years old age measure data is about 25,8%, the

highest occurred in Bangka Belitung (30,9%), followed by South Kalimantan (30,8%), East Kalimantan (29,6%), and West Java (29,4%).

According to Health Profile East Java Province in 2015, report acquired from regency/city in East Java Province, according from the acquired data, it is said that the second most case of disease in that year is hypertension case with patient age measured >18 years old, about (685.994) case, and followed by other disease (Dinas Kesehatan Provinsi Jawa Timur, 2015).

According to the results of the preliminary study performed by researcher in Inpatient Room Wawa Husada Hospital Kepanjen at September 17-30th 2017. Prevalence in January to December 2015, about 423 patient with an average total of 13 patient per month, next in January to December 2016, hypertension patient increased to 633 patient with an average total of 53 patient per month, while in January to October 2017 there's 570 patient with an average total of 57 patient per month, but this number was predicted to pass the total patient in 2016 because 2017 data wasn't full 12 month when the preliminary survey was concluded.

Hypertension increasing stroke attack risk four times more and two times to suffer kidney illness than people who have normal blood pressure. Hypertension can cause organ damage, either directly or indirectly, for example (coronary heart disease, dysrhythmias, and heart failure), brain (*stroke encephalopathy*), kidney, (nephrosclerosis, insufficiency), peripheral arteries, and retinopathy (LeMone & Burke, 2008; IPD FKUI, 2006 dalam Hamarno, 2010).

Hypertension management can be used with pharmacology and non-pharmacological. Pharmacological treatment consists of administration of drugs that are diuretic, sympathetic, beta blockers, and vasodilators which have side effect of decreased cardiac output. While non-pharmacological treatment is a treatment that is consist of weight loss, regular exercise, low salt and fat diets, and complementary therapies (Lubis, 2014).

Some non-pharmacological action that cannot be done, for example progressive muscle relaxation and slow deep breathing. According to research results from Valentine et al., 2013, explained that there's a blood pressure difference on elderly with hypertension before and after given progressive muscle relaxation technique in intervention group in Pringapus Village, Pringapus District, Semarang Regency (Valentine et al, 2013)

According to the research result from Tri Cahyo Sepdianto et al., explained that the decrease in the average systolic and diastolic blood pressure in the group that did the slow deep breathing exercise was greater than the group who didn't do the slow deep breathing exercise, slow deep breathing exercise in patients with primary hypertension can reduce systolic blood pressure and diastolic blood pressure (Sepdianto et al, 2010). Both progressive muscle relaxation and slow deep breathing can reduce blood pressure so researchers are interested in analyzing the differences between these two actions in lowering blood pressure.

METHODS

Study Design

This Study Design is using a *Quasi-experimental Design with Non-Equivalent Pretest-Posttest Design and Group Comparisons*. This design is used to overcome difficulties in determining the control group in the study (Sugiyono, 2016).

Setting

This research was conducted at the Wawa Husada Hospital Kepanjen on May 24th to July 2nd, 2018.

Research Subject

The samples in this study were 48 respondents. The samples divided into 2 sample groups, namely group A (progressive muscle relaxation treatment group), and group B (slow deep breathing

treatment group). The observation stage was carried out 2 times, namely before the experiment and after the experiment. Progressive muscle relaxation is carried out for 6 days, which each session takes 20 minutes. Slow deep breathing exercises carried out as much as once a day for 3 days, each session takes as long as 15 minutes.

Instruments

The instrument in this study used observation of blood pressure.

Data Analysis

In this study, the researchers used parametric statistical tests and chose a Paired T Test that functioned to determine blood pressure changes pre-test and post-test between progressive muscle relaxation and slow deep breathing exercises. Researchers also conducted different tests using the *Independent Sample T Test* between progressive muscle relaxation groups and slow deep breathing exercises group.

Ethical Consideration

This research has gone through an ethical test from the Health Polytechnic of the Ministry of Health, Malang and obtained permission from Management of the Wava Husada Hospital, Kepanjen.

RESULTS

The description of the characteristics of the respondents was patients suffering from hypertension who were hospitalized in Wava Husada Hospital Kepanjen Malang as follows:

Characteristics of Respondents by Gender

Table 1. Distribution of Frequency of Respondents by Gender at the Wava Husada Hospital Kepanjen in May 24th-July 2nd 2018 (n = 48).

Gender	Total	Percentage (%)
Male	29	60.5
Female	19	39.5
Total	48	100.0

Based on table 1, it was found that the frequency distribution of respondents based on the highest gender was male as many as 29 people (60.5%).

Characteristics of Respondents by Age

Table 2. Distribution of Frequency of Respondents by Age at the Wava Husada Hospital Kepanjen in May 24th-July 2nd 2018 (n = 48).

Variable	N	Maximum	Median	Mode
Age	48	85	55.5	54

Based on table 2, the frequency distribution of respondents' characteristics by age, the average age of the maximum respondents was 85 years old with a median of 85 years old and a mode of 54 years.

Characteristics of Respondents by Educational Level

Table 3. Distribution of Frequency of Respondents by Educational Level at the Wava Husada Hospital Kepanjen in May 24th-July 2nd 2018 (n = 48).

Last Education	Total	Percentage (%)
Primary School	25	52.08
Junior High	10	20.8
Senior High	11	22.91
College	2	4.16
Total	48	100.0

Based on table 3, the frequency distribution of the characteristics of respondents based on the last education were respondents who goes to Primary School with a total of 25 people (52.08%).

Characteristics of Respondents by History of Hypertensive Descent and Duration of Hypertension

Table 4. Distribution of Frequency of Respondents by History of Hypertensive Descent and Duration of Hypertension at the Wawa Husada Hospital Kepanjen in May 24th-July 2nd 2018 (n = 48).

History of Hypertensive Descent	Total	Percentage (%)
Yes	19	39.5
No	29	60.4
Total	48	100.0

Duration of Hypertension	Total	Percentage (%)
Less than 7 years	38	79.17
More than 7 years	10	20.83
Total	48	100.0

Based on table 4, the frequency distribution of respondents based on a history of hypertensive descent and duration of hypertension, the results of the most respondent were obtained that those who didn't have a history of hypertensive descent with a total of 29 people (60.4%). While respondents according to the duration of hypertension found that the highest number of respondents who suffer from hypertension was less than 7 years with a total of 38 people (79.17%).

Characteristics of Respondents by Smoking History, Smoking Time, and Amount (Pack per Day)

Table 5. Distribution of Frequency of Respondents by Smoking History, Smoking Time, and Amount (Pack per Day) at the Wawa Husada Hospital Kepanjen in May 24th-July 2nd 2018 (n = 48).

Smoking History	Total	Percentage (%)
Yes	16	33.33
No	32	66.67
Total	48	100.0

Smoking Time	Frequency	Percentage (%)
<5 Years	1	6.25
5-10 Years	1	6.25
20-30 Years	12	75.0
>30 Years	2	12.5
Total	16	100.0

Amount (Pack per Day)	Frequency	Percentage (%)
<1/2 Pack	2	12.5
1/2 Pack	3	18.75
1 Pack	11	68.75
Total	16	100.0

Based on table 5, the frequency distribution of respondents based on smoking history, duration of smoking, and amount (pack per day), the results of the most respondents were not having a smoking history of 32 people (66.67%). In smoking time, the results of the most respondents were smoking for 20-30 years with a total of 12 respondents (75.0%). The amount of cigarettes, the results of the highest number of respondents were consumed in the amount of 1 pack / day, which was 11 respondents (68.75%).

Characteristics of Respondents by Having Been Given Similar Therapy

Table 6. Distribution of Frequency of Respondents by Having Been Given Similar Therapy at the Wava Husada Hospital Kepanjen in May 24th-July 2nd 2018 (n = 48).

Have Been Given Similar Therapy	Total	Percentage (%)
Yes	0	0
No	48	100.0
Total	48	100.0

Based on table 6, the frequency distribution of respondents, the results of all respondents were never given similar therapy to reduce blood pressure, both progressive muscle relaxation and slow deep breathing exercises.

Characteristics of Respondents by Medication for Hypertension Consumed

Table 7. Distribution of Frequency of Respondents by Medication for Hypertension Consumed at the Wava Husada Hospital Kepanjen in May 24th-July 2nd 2018 (n = 48).

Hypertension Drugs Consumed	Total	Percentage (%)
None	9	18.75
Captopril	25	52.08
Amlodipin	5	10.42
Captopril dan Amlodipin	9	18.75
Total	48	100.0

Based on table 7, the frequency distribution of respondent characteristics based on hypertension drugs consumed, the results showed that the highest number of respondents who consumed captopril drugs were 25 people (52.08%), and the smallest respondents who consumed (amlodipine and captopril) and those who didn't take hypertension drugs with the same results that is 9 people (18.75%).

Table 8. Average Blood Pressure Group Progressive Muscle Relaxation and Slow Deep Breathing Exercises at Wava Husada Hospital Kepanjen in May 24th-July 2nd 2018 (n = 48).

(ROP)	Day 1		Day 2		Day 3		Average Difference
	Systolic (mmHg)	Diastolic (mmHg)	Systolic (mmHg)	Diastolic (mmHg)	Systolic (mmHg)	Diastolic (mmHg)	
Before Average	150	92	143	88	140	84	Systolic
After Average	150	92	142	87	137	83	11:6=1.83
Difference	0	0	1	1	3	1	(2mmHg)
	Day 4		Day 5		Day 6		Average Difference
	Systolic (mmHg)	Diastolic (mmHg)	Systolic (mmHg)	Diastolic (mmHg)	Systolic (mmHg)	Diastolic (mmHg)	
Before Average	137	84	136	83	135	83	Diastolic
After Average	134	83	134	81	133	81	7:6=1.16
Difference	3	1	2	2	2	2	(1mmHg)
(SDB)	Day 1 Session1		Day 3 Session 2		Day 5 Session 3		Average Difference
	Systolic (mmHg)	Diastolic (mmHg)	Systolic (mmHg)	Diastolic (mmHg)	Systolic (mmHg)	Diastolic (mmHg)	
Before Average	154	92	143	86	138	83	Systolic
After Average	152	91	140	84	135	82	8:3=2.67
Difference	2	1	3	2	3	1	(3mmHg)
							Diastolic
							4:3=1.33
							(1mmHg)

Based on table 8, after given treatment from progressive muscle relaxation group, it was known the highest mean value happened on day 1 with systolic and diastolic blood pressure as much as 150 mmHg and 92 mmHg while the lowest mean value happened on day 6 with systolic and diastolic blood pressure as much as 133 mmHg and 81 mmHg. In the treatment of the group slow deep breathing exercise, the highest mean value occurred on the day 1 (session 1), with systolic and diastolic blood pressure of 152 mmHg and 91 mmHg, and the lowest mean value occurred on day 5 (session 3) with systolic and diastolic blood pressure of 135 mmHg and 82 mmHg.

The Effect of Progressive Muscle Relaxation on Blood Pressure

Table 9. The Effect of Progressive Muscle Relaxation on Blood Pressure at Wava Husada Hospital Kepanjen in May 24th-July 2nd 2018 (n = 48).

Variable	N	Mean	Mean Differences	t	Asymp. Sig. (2-tailed)
Pre-Test Systolic ROP	24	140.10			
Post-Test Systolic ROP	24	138.24	1.854	14.264	0.000

Based on table 9, after an effect test using the Paired T-Test, it was found that the *p* value of systolic blood pressure in the progressive muscle relaxation group was 0.000 ($\alpha \leq 0.05$). It can be concluded that there's a significant effect of progressive muscle relaxation on blood pressure reduction.

The Effect of Slow Deep Breathing Exercises on Blood Pressure

Table 10. The Effect of Slow Deep Breathing Exercises on Blood Pressure at Wava Husada Hospital Kepanjen in May 24th-July 2nd 2018 (n = 48).

Variable	N	Mean	Mean Difference	t	Asymp. Sig. (2-tailed)
Pre-Test Systolic SDB	24	138,24	4,617	3,76	0,000
Post-Test Systolic SDB	24	142,48			

Based on table 10, after an effect test using the Paired T-Test, it was found that the *p* value of systolic blood pressure was 0.000 ($\alpha \leq 0.05$). It can be concluded that there's a significant effect of giving slow deep breathing exercises to decrease blood pressure.

Blood Pressure Difference between Progressive Muscle Relaxation Group and Slow Deep Breathing Exercises Group

Table 11. Blood Pressure Difference between Progressive Muscle Relaxation Group and Slow Deep Breathing in Wava Husada Hospital Kepanjen May 24th-July 2nd 2018 (n = 48).

Variable	N	Mean Differences	t	Asymp. Sig. (2-tailed)
Systolic ROP	24	2.181	17.807	0.273
Systolic SDB	24			

Based on table 11, after different tests using Independent Sample T-Test, the results of the *p* value of systolic blood pressure between progressive muscle relaxation and slow deep breathing exercise are 0.273 ($\alpha \leq 0.05$). It can be concluded that there's no significant difference in

blood pressure between progressive muscle relaxation and slow deep breathing exercises.

DISCUSSION

Mean Systolic and Diastolic Blood Pressure Measurements of Pre-Test and Post-Test in Progressive Muscle Relaxation Groups and Slow Deep Breathing Exercises Groups

In the progressive muscle relaxation group, it began to show a decrease in blood pressure starting from day 2, evidenced by the mean pre-systolic value of 143 mmHg and 142 mmHg post systolic, while day 2 pre-post diastolic was 88 mmHg in the pre and 87 mmHg on the data post. Each of these data has the same difference in value of 1 mmHg. While on the day 6 progressive muscle relaxation is increasingly changing in blood pressure, as evidenced by mean pre-post systolic blood pressure of 135 mmHg in the pre data and 133 mmHg in the post data, and from the diastolic blood pressure of 83 mmHg in the pre data and 81 mmHg on the data post.

Almost the same as progressive muscle relaxation groups, in systolic blood pressure the slow deep breathing group also undergoes changes in the process, starting from day 3 (session 2), as evidenced by the mean pre-post of 143 mmHg in the pre data and 142 mmHg in the post data, as well with diastolic changes of 88 mmHg in the pre data and 87 mmHg in the post data. The change was increasingly seen in the mean pre-post systolic pressure of day 5 (session 3), the mean pre-post was 140 mmHg in the pre data and 137 mmHg in the post data, while that also applies to diastolic blood pressure which gets a value of 84 mmHg in the pre data and 83 mmHg in the post data.

The researchers argue that on the measurement of day 1, generally the results between the 2 groups above illustrate that

there's no significant change in blood pressure between the results of the pre and post, but if you see the results during the whole action, you will get a significant decrease in blood pressure even though the results difference between the 2 groups tends to approach each other, but each group has an influence in reducing blood pressure, so the researchers concluded that systolic and diastolic blood pressure isn't only influenced by the 2 treatment groups, but also influenced by the conditions in outside the body, including age, education, (history of hypertensive descent and duration of hypertension), (smoking history, smoking time, and amount of packs per day), stress levels, and hypertension drugs.

The Effect of Progressive Muscle Relaxation on Blood Pressure

Based on table 9, after an effect test using the Paired T-Test, it was found that the p value of systolic blood pressure in the progressive muscle relaxation group was 0.000 ($\alpha \leq 0.05$). It can be concluded that there's a significant effect of progressive muscle relaxation on blood pressure reduction.

This result is in the line with the research conducted by Leny Khairani in the Babus Salam Nurul Hikmah Foundation about reducing blood pressure in the hypertensive patients, who obtained *p-Value* = 0.000 with ($\alpha \leq 0.05$), so that it concluded that there was a significant difference before and after progressive muscle relaxation.

The researcher argues that the provision of progressive muscle relaxation is a process of identifying muscles that are experiencing tension to be carried out by relaxation actions of all the muscle of the body from head to foot with added regulation of breathing patterns. This of

course can suppress the release of the hormone norepinephrine, so that it will cause a person to enter a relaxed state that stimulates blood vessels to experience vasodilation so that in the end the results can control and help in lowering blood pressure.

The Effect of Slow Deep Breathing Exercises on Blood Pressure

Based on table 10, after an effect test using the Paired T-Test, it was found that the p value of systolic blood pressure was 0.000 ($\alpha \leq 0.05$). It can be concluded that there's a significant effect of giving slow deep breathing exercises to decrease blood pressure.

The results in this study are in line with those carried out by Fike Leleh et al (2013), in their research the results of the effect of giving slow deep breathing exercises to decrease blood pressure get *p value* 0.000 or ($\alpha \leq 0.05$), which means giving slow deep breathing exercises before and after has obtained significant results in reducing blood pressure.

Researchers argue that by giving slow deep breathing exercises in the form of slow and deep breathing, can help a person to reduce stress and anxiety levels because basically there's an attachment to the role of baroreceptors in sending impulses to the cardiovascular control system that can affect the occurrence of vasodilation mechanism that can reduce pulse pressure and blood pressure. Both increasing and decreasing, blood pressure has mechanoreceptor from the baroreceptor as a receptor to control and monitor blood pressure activity.

Blood Pressure Differences between Progressive Muscle Relaxation Groups and Slow Deep Breathing Exercise Groups

Based on table 11, after different tests using Independent Sample T-Test, the results of the p value of systolic blood pressure between progressive muscle relaxation and slow deep breathing exercise are 0.273 ($\alpha \leq 0.05$). It can be concluded that there's no significant difference in blood pressure between progressive muscle relaxation and slow deep breathing exercises.

Although the provision of progressive muscle relaxation and slow deep breathing exercises have no differences, basically the 2 groups of treatment have an influential contribution in lowering blood pressure. According to (Mohamed, 2013 in Anugraheni, 2017), slow breathing increases baroreflex sensitivity and reduces sympathetic activity and chemoreflex activation, which shows a potentially beneficial effect in hypertension where baroreflex is a system in the body that regulates blood pressure and increases baroreflex sensitivity in hypertensive patients. This effect appears potentially beneficial in the management of hypertension.

According to (Sheps, 2005 in Valentine et al., 2013), relaxation response are part of a general decline in cognitive, physiological, and behavioral stimulation. Relaxation results in a stretch in the arteries due to vasodilation in the arteria and veins facilitated by the vasomotor center, there are several types of vasomotor namely femoreceptor reflex, brain pain reflex, and respiratory reflex. In this case the strongest is the baroreceptor reflex where relaxation will reduce the activity of the sympathetic nerves and epinephrine and increase the parasympathetic nerve so that the heart rate decreases, the volume of stroke (CO)

decreases, and arteriolar vasodilation and venules occur. In addition, cardiac output and total peripheral resistance also decrease and blood pressure decreases.

The researchers argue that in this study certainly cannot be separated from the things that affect the decrease in blood pressure, but to get more optimal results in the reduction of blood pressure can be done by making tighter observations on all respondents in order to obtain more effective results to decrease blood pressure and be added by minimize other confounding factors so that the measured blood pressure value isn't too affected but only when after the treatment of progressive muscle relaxation or slow deep breathing exercises.

CONCLUSION

Based on the results of the study, it can be concluded that progressive muscle relaxation and slow deep breathing exercises have an influence in efforts to reduce blood pressure in patients with hypertension against blood pressure significantly and both can be selected in an effort to reduce blood pressure.

SUGGESTION

Progressive muscle relaxation or slow deep breathing exercises can be used as a companion to pharmacological therapy to prevent complications and the adverse effects of increased blood pressure. This action can be carried out by the wider community as well as health workers in the health service order.

REFERENCES

Anggriani, A. D., Waren, A., Situmorang, E., Asputra, H., & Siahaan, S. S. (2009). Faktor-Faktor Yang Berhubungan Dengan Kejadian Hipertensi Pada Pasien Yang Berobat di Poliklinik Dewasa Puskesmas

- Bangkinang Periode Januari Sampai Juni 2008, (Hipertensi), 42.
- Anugraheni, M. L. (2017). *Pengaruh Slow Deep Breathing Terhadap Tekanan Darah Lansia Hipertensi Yang Mendapat Senam Lansia di Wilayah Kerja Puskesmas Purwosari*. Universitas Muhammadiyah Surakarta
- Astria, I., Utami, S., & Utomo, W. (2015). Efektivitas Kombinasi Teknik Slow Deep Breathing dan Teknik Effleurage Terhadap Intensitas Nyeri Disminorea, 2(2).
- Badan Penelitian dan Pengembangan Kesehatan. (2013). Riset Kesehatan Dasar (RISKESDAS) 2013. *Laporan Nasional 2013*, 1–384. <https://doi.org/10.1177/109019817400200403> Desember 2013
- Berek, P. A. L., Nurachmah, E., & Gayatri, D. (2015). Effectiveness Of Slow Deep Breathing On Decreasing Blood Pressure In Primary Hypertension : A Randomized Contrrolled Trial Of Patients In Atambua , East Nusa Tenggara, 1(2), 1–14.
- Breathesy. (2006). Reduction, Blood Pressure Question, : Frequently asked. Retrieved January 1, 2017, from <http://www.control-your-blood-pressure.com/faq.html>,
- Devicaesaria, A. (2014). Hipertensi Krisis, 27(hipertensi), 9–17.
- Dinas Kesehatan Provinsi Jawa Timur. (2015). *Profil Kesehatan Jawa Timur 2015*.
- Direktorat Jenderal Pengendalian Penyakit dan Penyehatan Lingkungan. (2015). Rencana Aksi Program Pengendalian Penyakit dan Penyehatan Lingkungan Tahun 2015-2019. *Kesehatan*, 59.
- Gleadle, J. (2007). *Anamnesis dan Pemeriksaan Fisik*. (A. Safitri, Ed.). Jakarta: Penerbit Erlangga. Retrieved from [https://books.google.co.id/books?id=DesM50iZsucC&pg=PA79&dq=pemeriksaan+penunjang+hipertensi&hl=id&sa=X&ved=0ahUKEwioioiJ9tnXAhXKP48KHXshC-kQ6AEILTAC#v=onepage&q=pemeriksaan penunjang hipertensi&f=true](https://books.google.co.id/books?id=DesM50iZsucC&pg=PA79&dq=pemeriksaan+penunjang+hipertensi&hl=id&sa=X&ved=0ahUKEwioioiJ9tnXAhXKP48KHXshC-kQ6AEILTAC#v=onepage&q=pemeriksaan%20penunjang%20hipertensi&f=true)
- Hamarno, R. (2010). *Pengaruh Latihan Relaksasi Otot Progresif Terhadap Penurunan Tekanan Darah Klien Hipertensi Primer Di Kota Malang*.
- Hidayat, A. A. A. (2007). *Riset Keperawatan dan Teknik Penulisan Ilmiah*. (Nurchasanah, Ed.) (Edisi 2). Jakarta: Salemba Medika.
- Kemenkes.RI. (2014). Pusdatin Hipertensi. *Infodatin, (Hipertensi)*, 1–7. <https://doi.org/10.1177/109019817400200403>
- Khairani, L., & Fadhila, E. (2015). *Pengaruh Relaksasi Otot Progresif Terhadap Penurunan Tekanan Darah Pada Lansia Penderita Hipertensi Di Yayasan Babus Salam Nurul Hikmah Tahun 2015*.
- Kurniawan, A. B. (2017). *Pengaruh Pemberian Teknik Relaksasi Otot Progresif Terhadap Penurunan Tekanan Darah Pada Pasien Hipertensi Di RSUD Lawang*. Poltekkes Kemenkes Malang.
- Leleh, F., Elysabeth, D., & Kristiani, D. (2013). Pasien Hipertensi Primer Melalui Latihan Slow Deep Breathing di Puskesmas Binong Kabupaten Tangerang, (November), 1–10.
- Lubis, I. R. (2014). *Pemberian Teknik Relaksasi Otot Progresif Jacobson Terhadap Penurunan Tekanan Darah Pada Asuhan Keperawatan NY. T Dengan Hipertensi Di Instalasi Gawat Darurat RSUD Karanganyar, (Hipertensi)*.
- Mary Baradero, Dayrit, M. W., & Siswadi, Y. (2008). *Klien Gangguan Kardiovaskular*. Jakarta: EGC.
- Muhdar. (2014). *Pengaruh Pemberian Teknik Relaksasi Progresif Terhadap*

- Perubahan Tekanan Darah Pada Lansia Penderita Hipertensi Di Panti Sosial Tresna Werdha (Pstw) Yogyakarta Unit Budi Luhur Kasongan Bantul*. Sekolah Tinggi Ilmu Kesehatan Aisyiyah Yogyakarta.
- Notoatmodjo, S. (2012). *Metodologi Penelitian Kesehatan* (Revisi Cet). Jakarta: Rineka Cipta.
- Nuraini, B. (2015). Risk factors of hypertension, 4, 10–19.
- Pramana, K. D., Okatiranti, & Ningrum, T. P. (2016). Hubungan Tingkat Kecemasan Dengan Kejadian Hipertensi di Panti Sosial Tresna Werdha Senjarawi Bandung, *IV*(2), 116–128.
- Rachmawati, A. N., & Ekarini, D. (2015). Pengaruh Relaksasi Progresif Terhadap Penurunan Tekanan Darah Pada Penderita Hipertensi Stage 1 di Puskesmas Gondagrejo Karanganyar, 111–114.
- Resti, I. B. (2015). *Teknik Relaksasi Otot Progresif Untuk Mengurangi Stres Pada Penderita Asma*. Universitas Muhammadiyah Malang.
- Rusnoto, & Alviana, I. (2017). Pengaruh Terapi Progressive Muscle Relaxation Terhadap Penurunan Tekanan Darah Pada Peserta Prolanis, (February), 367–372.
- Sebastianus Kurniadi Tahu. (2015). Efektivitas Kombinasi Musik dan Slow Deep Breathing Terhadap Penurunan Tekanan Darah Pada Pasien Hipertensi.
- Sepdianto, T. C. (2008). *Pengaruh Latihan Slow Deep Breathing Terhadap Tekanan Darah dan Tingkat Kecemasan Pasien Hipertensi Primer di Kota Blitar*. Universitas Indonesia.
- Sepdianto, T. C., Nurachmah, E., & Gayatri, D. (2010). Penurunan Tekanan Darah dan Kecemasan Melalui Latihan Slow Deep Breathing Pada Pasien Hipertensi, 2–6.
- Setiadi. (2007). *Konsep & Penulisan Riset Keperawatan* (Edisi Pert). Yogyakarta: Graha Ilmu.
- Shanty, M. (2011). *Silent Killer Diseases (Penyakit yang Diam-Diam Mematikan)* (Cetakan Pe). Jogjakarta: Javalitera.
- Sherwood, L. (2011). *Fisiologi Manusia Dari Sel Ke Sistem*. (N. Yesdelita, Ed.) (Edisi 6). Jakarta: EGC.
- Soenarta, A. A., Erwinanto, Mumpuni, A. S. S., Barack, R., Lukito, A. A., Hersunarti, N., & Pratikno, R. S. (2015). Pedoman Tatalaksana Hipertensi Pada Penyakit Kardiovaskular. *Perhimpunan Dokter Spesialis Kardiovaskuler Indonesia*, (Hipertensi), 24.
- Sugiyono. (2010). *Statistika Untuk Penelitian*. Bandung: Alfabeta.
- Sugiyono. (2016). *Metode Penelitian Kuantitatif, Kualitatif, dan R & D*. Bandung: ALFABETA.
- Tarwoto. (2011a). *Pengaruh Latihan Slow Deep Breathing Terhadap Intensitas Nyeri Kepala Akut Pada Pasien Cedera Kepala Ringan*. Universitas Indonesia.
- Tarwoto. (2011b). *Pengaruh Latihan Slow Deep Breathing Terhadap Pada Pasien Cedera Kepala Ringan*. Universitas Indonesia.
- Tyani, E. S., Utomo, W., & N, Y. H. (2015). Efektifitas Relaksasi Otot Pogresif Terhadap Tekanan Darah Pada Penderita Hipertensi Esensial. *Keperawatan*, 2(2).
- U.S Department of Health and Human Services. (2004). The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure, 104.
- University of Pittshburgh Medical Centre. (2003). *Slow Deep Breathing*

- Technique. Retrieved November 10, 2017, from <http://www.upmc.com/patients-visitors/education/smoking/Pages/deep-breathing.aspx>
- Valentine, D. A., Rosalina, & Saparwati, M. (2013). Pengaruh Teknik Relaksasi Otot Progresif Terhadap Tekanan Darah pada Lansia Dengan Hipertensi di Kel.Pringapus, Kec. Pringapus Kab. Semarang 1, 1–7.
- Wardani, D. W. (2015). *Pengaruh Teknik Relaksasi Nafas Dalam Sebagai Terapi Tambahan Terhadap Penurunan Tekanan Darah Pada Pasien Hipertensi Tingkat 1*. Universitas Negeri Semarang.
- Widharto. (2009). *Bahaya Hipertensi*. Jakarta Selatan: PT Sunda Kelapa Pustaka.
- Wiharja, W. (2017). Slow Deep Breathing Pada Hipertensi. Retrieved January 22, 2018, from <http://uphmd.com/index.php/2017/06/01/slow-deep-breathing-pada-hipertensi/>
- World Health Organisation. (2011, September). Hypertension fact sheet, 1–2. Retrieved from www.searo.who.int/entity/.../non_communicable_diseases_hypertension_fs.pdf
- Yanti, N. P. E. D., Mahardika, I. A. L., & Prapti, N. K. G. (2016). Pengaruh Slow Deep Breathing Terhadap Tekanan Darah Pada Penderita Hipertensi di Wilayah Kerja Puskesmas I Denpasar Timur, (Hipertensi).
- Zulkeflie, N. A. S. B. (2010). Pengaruh Tekanan Darah Pada Perokok di Universitas Sumatera Utara di Kalangan Mahasiswa Lelaki Angkatan 2007 Fakultas Kedokteran Universitas Sumatera Utara.