

Physiological Changes in Hypertension in the Elderly Effected by the Combination of SEGROTAK (Ergonomics and Brain Gymnastics)

Faisnani Yogi Rochmah¹, Isna Hikmawati², Mustiah Yulistani³, Wahyu Riyaningrum⁴
^{1,2,3,4}Faculty of Health Sciences, Universitas Muhammadiyah Purwokerto, Indonesia

ARTICLE INFO

Article history:

DOI:

[10.30595/pshms.v5i.972](https://doi.org/10.30595/pshms.v5i.972)

Submitted:

Oct 13, 2023

Accepted:

Feb 25, 2024

Published:

Mar 20, 2024

Keywords:

Ergonomic gymnastics,
Physiology, SEGROTAK,
Brain gymnastics

ABSTRACT

Background: Hypertension is one of the most common diseases in Indonesia and often occurs in the elderly due to a decrease in the body's physiology. In 2021, the number of hypertension sufferers in Banyumas will be 129,817 from a total of 40 villages. There were 4,435 people who handled hypertension at Kembaran Health Center 1. Physical activity such as gymnastics is important for the elderly to do to maintain physiological function so that it can optimize the function of various systems of the elderly body, one of which is useful for lowering blood pressure. Method: This study used a pre-experimental design type of one-group pretest-posttest. The population in this study were hypertensive elderly who were active in elderly integrated health center in Lingasari Village. This study used a total sampling technique, and the sample used was 36 respondents. Results: The results of the paired t test showed a decrease in systolic and diastolic pressure after exercise (p value 0.000). The results of the Wilcoxon test showed a pulse rate of 0.018, oxygen saturation of 0.000 (SPO2), respiratory rate of 0.001, and complaints of joint pain of 0.000. Conclusion: In this study, it can be concluded that there is a significant effect of SEGROTAK exercise on the physiological changes in the elderly with hypertension.

This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).



Corresponding Author:

Isna Hikmawati

Faculty of Health Sciences, Universitas Muhammadiyah Purwokerto,
Soepardjo Rustam Street KM. 7, Banyumas, Indonesia

Email: isnahikmawati@ump.ac.id

1. INTRODUCTION

Hypertension is the most common disease in Indonesia and often affects the elderly. In Central Java Province, the prevalence of hypertension in 2020 among residents aged over 15 years will be 8,525,593. Based on data from the Banyumas District Health Service in 2021, the number of hypertension sufferers was 129,817 people from a total of 40 villages in Banyumas District. Information from 40 community health centers shows that Kembaran I Public Health Center was ranked 14th with a total of 4,435 hypertension cases, and this figure is higher than 26 other public health centers[4].

According to Maslow's theory (1993), human physiological needs consist of oxygen supply and exchange of gases, fluids, food, elimination, rest and sleep, activity, balance, and achieving body and sexual temperature[2]. Physical activity, such as exercise, can help to improve the quality of life of the elderly, both physically and psychologically. One exercise that can be used to treat changes in physiological functions such as blood pressure and oxygen to the brain is ergonomic exercise. Ergonomic exercises contain a combination of muscle movements and breathing. So that this exercise can be used to help restore body posture and optimize

Proceedings homepage: <https://conferenceproceedings.ump.ac.id/index.php/pshms/issue/view/30>

blood supply to the brain, it is suitable for use by the elderly. Ergonomic exercise movements are in accordance with the rules of prayer movements[1].

Researchers are interested in combining ergonomic exercise movements with brain exercises as an alternative therapy reference for physiological changes in the elderly. It is hoped that by combining these two types of exercise, the lack of physical activity and exercise can be overcome so that there will be an increase in physiological function in the elderly. Based on the background above, the author raises research related to the effect of the combination of SEGROTAK (Ergonomic and brainGymnastics) on physiological changes in elderly people with hypertension.

2. RESEARCH METHOD

This study used a pre-experimental design type of one-group pretest-posttest. The study population was the elderly with hypertension who attended the integrated health center in Linggasari Village. Sampling used total sampling and obtained 36 respondents who met the inclusion criteria. The research was conducted for 1 month with the implementation of gymnastics once a week. Measurement of physiological changes was carried out using observation sheets at the beginning and end of the week. The measurement of physiological changes was done using the paired t test and wilcoxon.

3. RESULT AND DISCUSSIONS

a. Respondent Characteristics

3.1. Univariate

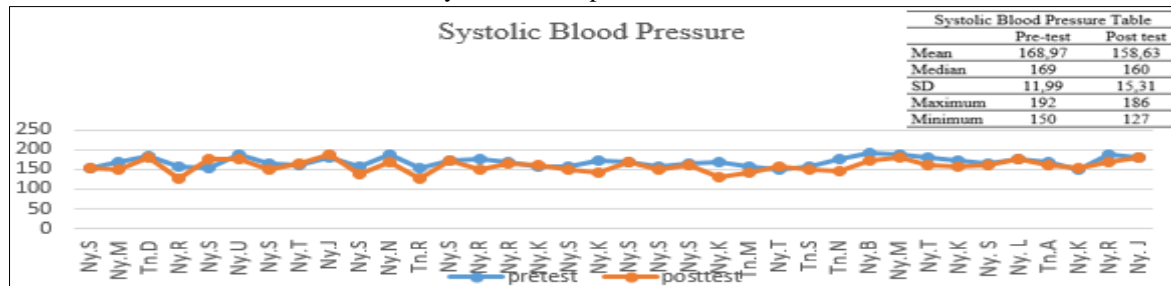
Table 1. Distribution of respondent characteristics

Characteristics	N N=36	%	Mean	Min-max
Age				
60-69 years	20	55,6		
70-79 years	11	30,6	68,91	60-92
80-89 years	4	11,1		
90-99 years	1	2,8		
Gender				
Male	7	19,4		
Female	29	80,6		
Respondent's Occupation				
Housewife	27	75,0		
Farmer	6	16,7		
Civil servants	2	5,6		
Self-employed	1	2,8		
Long diagnosed with hypertension				
1-5 years	20	55,6		
6-10 years	14	38,9	3,94	1-15
10-15 years	2	5,6		
Medication				
Not taking medication	2	5,6		
Amplodipine	34	94,4		

Based on the table 1, it can be seen that most of the respondents were aged between 60 -69 years, and most were female. The occupation of most respondents is that of a housewife with a long history of suffering from hypertension (1–5 years). Respondents mostly took anti-hypertensive drugs in the form of amlodipine.

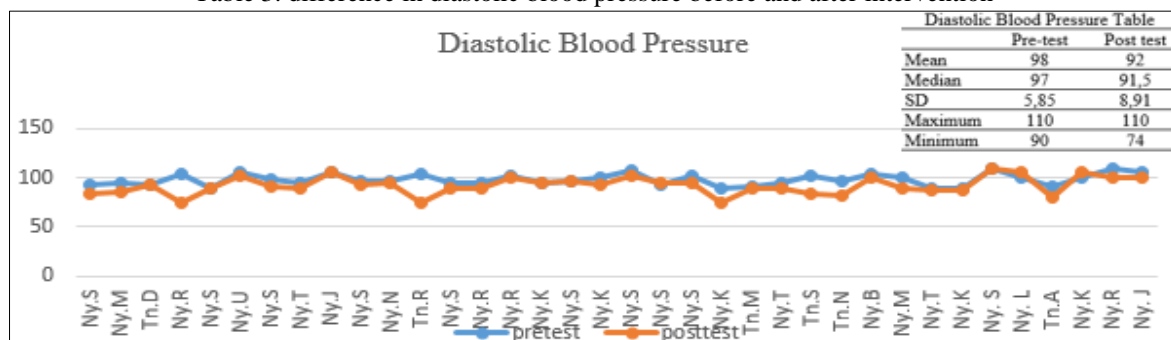
b. Physiological description before and after the SEGROTAK exercise

Table 2. difference in systolic blood pressure before and after intervention



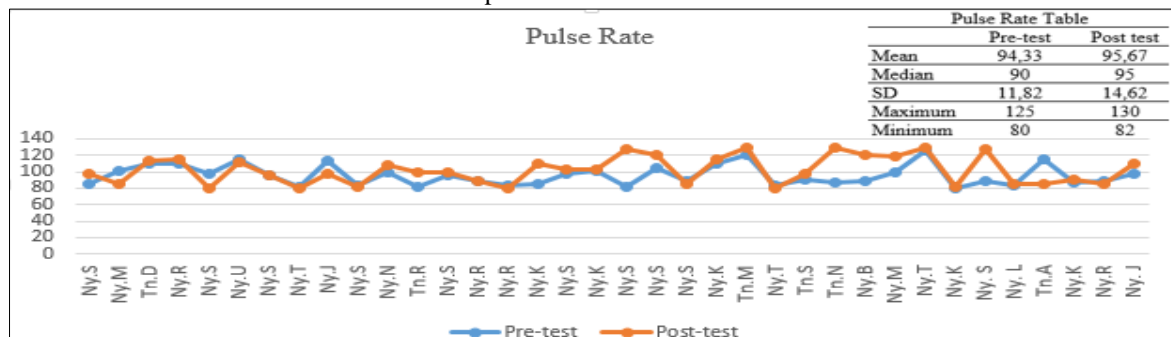
Based on table 2, the average value of systolic blood pressure before SEGROTAK exercise is 168.97, and the average value of systolic blood pressure after SEGROTAK exercise is 158.63.

Table 3. difference in diastolic blood pressure before and after intervention



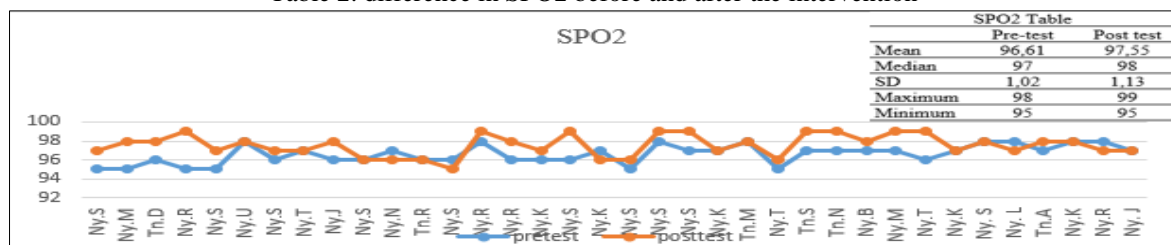
Based on table 3, the average diastolic blood pressure before and after SEGROTAK exercise is 98 and 92.

Table 1. difference in pulse rate before and after the intervention



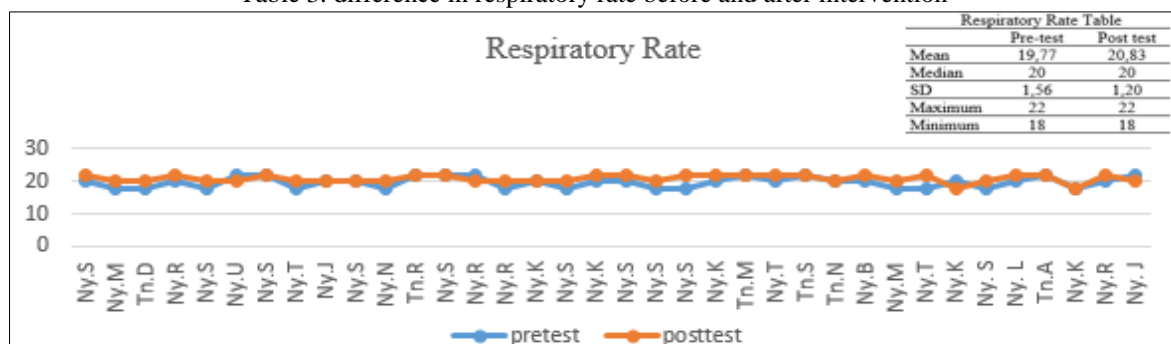
Based on table 4, the average pulse before and after SEGROTAK exercise is 94.33 and 98.

Table 2. difference in SPO2 before and after the intervention



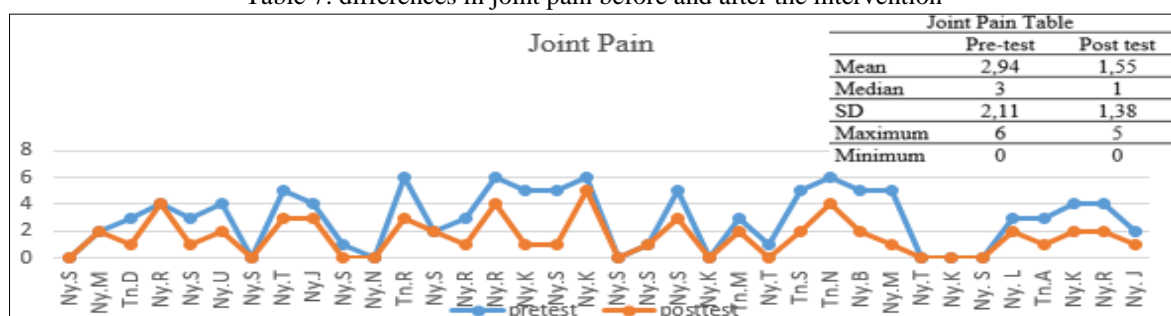
Based on table 5, the initial average SPO2 of 96.6 has increased to 97.5.

Table 3. difference in respiratory rate before and after intervention



Based on table 6, the average value of respiratory rate before exercise was 19.78 to 20.83 after SEGROTAK exercise.

Table 7. differences in joint pain before and after the intervention



Based on table 7, respondents' complaints of joint pain decreased from 2.11 to 1.38.

The results of the achievement of sweat production were obtained before the exercise was carried out by all respondents who were not sweating. After the exercise intervention, 36 respondents sweated; 34 of them sweated a little, and 2 people sweated quite a lot.

3.2. Bivariat

c. The Effect of the SEGROTAK Exercise Combination on Physiological Changes

Table 4. The Effect of the SEGROTAK Exercise Combination on Physiological Changes

	Statistic analysis	
Systolic blood pressure before and after SEGROTAK exercise	4.835 (t)	.000 Sig. (2-tailed)
Diastolic blood pressure before and after SEGROTAK exercise	4.697 (t)	.000 Sig. (2-tailed)
Pulse before and after SEGROTAK exercise	-2.369 ^b (Z)	.018 Asymp. Sig. (2-tailed)
SPO2 before and after SEGROTAK exercise	-3.641 ^b (Z)	.000 Asymp. Sig. (2-tailed)
Respiratory rate before and after SEGROTAK exercise	-3.409 ^b (Z)	.001 Asymp. Sig. (2-tailed)
Joint pain before and after SEGROTAK exercise intervention	-4.349 ^b (Z)	.000 Asymp. Sig. (2-tailed)

Based on table 8, the results of statistical tests using the paired t test to measure systolic blood pressure 0.000 and diastolic 0.000, as well as the Wilcoxon test to measure pulse rate 0.018, oxygen saturation 0.000 (SPO2), respiratory rate 0.001, and complaints of joint pain 0.000, show that there is a significant influence after doing a combination of SEGROTAK exercises.

The results showed that there was a decrease in systolic and diastolic blood pressure after the SEGROTAK exercise. Exercises to increase brain focus can facilitate blood and oxygen flow to the brain and balance both sides of the brain so that it can optimize the function of blood pressure in the body and other organs. This research is in accordance with previous research which found that ergonomic exercises are a fairly effective way to control blood pressure. Ergonomic exercises and movements, simple and effective, can be used for old age, osteoporosis, controlling blood sugar, and increasing good cholesterol (HDL), which in turn can cause changes in blood pressure. The research conducted by researchers indicates that ergonomic gymnastics has an effect on changes in the respondent's blood pressure⁵.

SEGROTAK exercise consists of combined ergonomics exercise and brain exercise. According to previous research on brain exercise and changes in blood pressure, the average difference in systolic pressure before and after was 3.913 mmHg, while diastolic pressure was 2.783 mmHg. Systolic pressure before and after was 3.913 mmHg, and diastolic pressure was 2.783 mmHg⁸. The SEGROTAK exercise movement consists of ergonomic exercises that focus on anatomy and physiology related to optimizing functions, health, safety, and comfort. Exercise that applies ergonomic principles can keep the elderly's body fit and healthy, as well as make the heart work more optimally. Measures of heart rate during training and rest sessions are used to determine the effect of training. Not long after exercise, the pulse rate will definitely increase, but after 15 minutes of rest, the pulse rate will decrease and return to normal¹⁰.

Research shows that physical activity can help maintain the physiological functions of the elderly so that they continue to function as they should. The need for rest and mobility is one of the most basic physiological needs (Maslow, 1993). Physical activity is an activity that involves almost all of the body's organs and is a very effective calorie burner. Pulse rate is used to determine exercise intensity and ensure safety in older adults. After practice, there is an increase in the average value of SPO₂. SEGROTAK gymnastics is an exercise made for the elderly, who use their movements to dilate blood vessels so that oxygen can be transported throughout the body, especially in the brain, so that the brain can function optimally. The results of a previous study measured pulse and oxygen saturation before and after exercise with an oximetry device for 40 respondents. Research shows that there is a comparison between the male (32.5%) and female (67.5%) genders. In the calculation of oxygen saturation, there is a difference before and after exercise with a p value of 0.001. After carrying out sports activities, there is generally an increase in the respiratory rate. But after resting, the respiratory rate will return to normal⁹. The deep breaths used in the SEGROTAK exercise help make breathing more stable so that you don't experience a lack of oxygen. Previous research results show that deep breathing therapy can help the lungs store more oxygen than spontaneous breathing[3].

Respondents experienced a decrease in the average complaint of joint pain, as measured using a numerical scale. SEGROTAK exercise can reduce the scale of joint pain because it consists of ergonomic movements, which are exercise techniques to correct the position and flexibility of the nervous system and blood flow, maximize oxygen intake to the brain, musculoskeletal system, sweat system, and body heating system. Similar research results showed that before ergonomic exercises were carried out on elderly women, 29 people (64.4%) were categorized as experiencing severe, uncontrolled pain. After the intervention was carried out, there was a decrease in the pain scale in 18 people (40.0%), 9 people (20.0%) decreased to moderate pain, and 2 people (4.4%) decreased to moderate pain. The results of the marginal homogeneity test analysis show that there is an influence of ergonomic exercise on changes in the scale of joint pain in elderly women, with a significant value of 0.000 (p value ≤ 0.05)[6]⁶.

The results of the research show that after physical activity, there is an increase in body heat, so the body will sweat. Fitness differences due to sweating are further accentuated at higher net heat stress thresholds. In the elderly, the body's heat function begins to decrease, so that in hot conditions or after activity, they usually don't sweat too much. The results of previous research show that there are several things that can affect sweat production when doing physical activities, such as clothing. In addition to clothing, personal physical characteristics (height and weight) and the level of acclimatization to heat can also be taken into account, as can the indoor environment [7]⁷.

4. CONCLUSION AND RECOMMENDATION

Most of the elderly who experience hypertension are elderly with less physical activity and exercise. Physical activity can help the elderly maintain physiological functions so that they can continue to run as they should. This study shows that there is an effect of SEGROTAK gymnastics on physiological changes in elderly people with hypertension.

The results in this study are expected to be used as a reference for conducting further research regarding the effect of the SEGROTAK exercise combination (ergonomics and brain gymnastics) on physiological changes in the elderly with hypertension while maintaining gender homogeneity among respondents.

Acknowledgements

Thank you to my supervisor, Dr IsnaHilmawati SKM,M.Kes (epid), Universitas Muhammadiyah Purwokerto as well as respondents who have helped this study to finish.

REFERENCES

- Andari, F. N., Deoni, V., Panzilion, Nurhayati, & Padila. (2020). Penurunan Tekanan darah pada lansia dengan senam Hipertensi. *Journal of Telenursing (JOTING)*, 2, 81–90.
- Bari, A., & Hidayat, R. (2022). Catatan Editor JPS - Setelah pandemi: Preferensi individu dan kelompok dalam interaksi sosial. *Jurnal Psikologi Sosial*, 20(2), 8–14. <https://doi.org/10.7454/jps.2022.11>
- Citherlet, T., Roten, F. C. von, Kayser, B., & Guex, K. (2021). Acute Effects of the Wim Hof Breathing Method on Repeated Sprint Ability: A Pilot Study. *Frontiers in Sports and Active Living*, 3(August), 1–13. <https://doi.org/10.3389/fspor.2021.700757>
- DINKES. (2021). *DINKES Jawa Tengah Tahun 2021*. https://dinkesjatengprov.go.id/v2018/dokumen/Profil_Kesehatan_2021/files/downloads/Profil_Kesehatan_Jateng_2021.pdf
- Haripuddin, R. H., Andi Nuddin, & Hengky, H. K. (2021). Efektivitas Senam Ergonomik Penderita Hipertensi Sebagai Upaya Penurunan Tekanan Darah Lanjut Usia Di Kota Parepare. *Jurnal Ilmiah Manusia Dan Kesehatan*, 4(1), 81–91. <https://doi.org/10.31850/makes.v4i1.395>
- Malo, Y., Ariani, N. L., & Yasin, D. D. F. (2019). Pengaruh Senam Ergonomis Terhadap Skala Nyeri Sendi Pada Lansia Wanita. *Nursing News: Jurnal Ilmiah Keperawatan*, 4(1), 190–199. <https://publikasi.unitri.ac.id/index.php/fikes/article/view/1502>
- Morris, N. B., Piil, J. F., Morabito, M., Messeri, A., Levi, M., Ioannou, L. G., Ciuha, U., Pogačar, T., Kajfež Bogataj, L., Kingma, B., Casanueva, A., Kotlarski, S., Spirig, C., Foster, J., Havenith, G., Sotto Mayor, T., Flouris, A. D., & Nybo, L. (2021). The HEAT-SHIELD project — Perspectives from an inter-sectoral approach to occupational heat stress. *Journal of Science and Medicine in Sport*, 24(8), 747–755. <https://doi.org/10.1016/j.jsams.2021.03.001>
- Pratama, A. Y., & Listyaningsih, E. (2020). Pengaruh Brain Gym Terhadap Tekanan Darah Pada Orang Dengan Hipertensi Di Rw 13 Giwangan Umbulharjo Yogyakarta. *Jurnal Kesehatan*, 8(1), 42–51. <https://doi.org/10.35913/jk.v8i1.193>
- Suwanto, Y. A., Lusiana, & Purnama, Y. (2021). Perbedaan Denyut Nadi dan Saturasi Oksigen Sebelum dan Sesudah Senam Bhineka Tunggal Ika (SBTI) di Era Pandemi Covid-19. *Journal of Sport Coaching and Physical Education*, 6(1), 59–62. <https://doi.org/10.15294/jsce.v6i1.46034>
- Teixeira, E., Fonseca, H., Diniz-Sousa, F., Veras, L., Boppre, G., Oliveira, J., Pinto, D., Alves, A. J., Barbosa, A., Mendes, R., & Marques-Aleixo, I. (2021). Wearable devices for physical activity and healthcare monitoring in elderly people: A critical review. *Geriatrics (Switzerland)*, 6(2), 1–19. <https://doi.org/10.3390/geriatrics6020038>