



THE EFFECT OF WALKING EXERCISE ON BLOOD PRESSURE CHANGES IN THE ELDERLY IN SOCIAL INSTITUTIONS

Muh. Yani, Wa Ode Nurlina*, Glorya Riana Latupeirissa, Endri Mustofa, Faysal Kastella

Sekolah Tinggi Ilmu Kesehatan RS Prof Dr J.A Latumenten, Jl. Dr. Apituley, Silale, Nusaniwe, Ambon Maluku 97112, Indonesia

*Wdnurlina93@gmail.com

ABSTRACT

One of the causes of hypertension is reduced physical activity. Physical activity that can be done to maintain blood pressure stability is walking. This study aims to determine the effect of walking exercise blood pressure in elderly with hypertension in nursing homes. This study uses a design that is pre experimental one group pre test - post test design. The population in this study were the elderly at the Trisna Werda Social Institution, Gowa Regency, namely 100 people. Sampling was selected by purposive sampling. Retrieval of data using the instrument observation sheet. Bivariate analysis using the Wilcoxon test. From the results of the research on the effect of walking exercise on changes in blood pressure in the elderly at the Trisna Werda Social Institution with a total sample of 30 people, it can be concluded that respondents with the pre-test blood pressure category who experienced special blood pressure were as much as (50.0%). Respondents in the post-test blood pressure category who experienced special blood pressure decreased to (23.3%). Seeing the results, it can be concluded that there is an effect of running on changes in blood pressure in the elderly at the Trisna Werda Social Institution.

Keywords: blood pressure; elderly; social institutions; walking exercise

First Received 09 May 2022	Revised 18 June 2022	Accepted 18 August 2022
Final Proof Received 19 August 2022		Published 28 August 2022
How to cite (in APA style) Yani, M., Nurlina, W., Latupeirissa, G., Mustofa, E., & Kastella, F. (2022). The Effect of Walking Exercise on Blood Pressure Changes in the Elderly in Social Institutions. <i>Indonesian Journal of Global Health Research</i> , 4(3), 621-628. https://doi.org/10.37287/ijghr.v4i3.2113 .		

INTRODUCTION

In the 21st century, the world's aging population is increasing. In the Asia Pacific region, the number of elderly people will increase rapidly from 410 million in 2007 to 733 million in 2025, and is expected to be 1.3 billion in 2050 (UNFPA & HelpAge International, 2012). Indonesia is the 4th most populated country in the world and the top ten have the oldest population in the world. In 2020 the number of elderly people will increase by 28.8 million (11% of the total population) and by 2050 it is estimated that 22% of the population Indonesian aged 60 years and over. That means that the number of elderly people is increasing day by day and they need special solutions to overcome them (Indraswari and Yuhan, 2017). Based on data from the Central Statistics Agency (BPS) in 2007, the number of elderly people in Indonesia reached 18.96 million people. Of these, 14% are in the province of the Special Region of Yogyakarta, or which is the area with the highest number of elderly people. Followed by Central Java Province (11.4%), East Java (11.14%), and (Bali 11.01%) (Minan and Agustin, 2020).

The results of research from Asdriyani Syatria were to determine the effect of programmed sports training, in this case, regular basketball training for 12 weeks on blood pressure. It is

estimated that after participating in basketball practice regularly for 12 weeks, blood pressure values will experience a significant decrease (Alim, 2012). Regular basketball practice for 12 weeks among Diponegoro University Medical Faculty students participating in extracurricular basketball led to a significant decrease in TDS. Further studies involving different age groups and parameters to assess muscle strength, muscle endurance, flexibility and cardiorespiratory endurance need to be carried out to get a more complete picture of the benefits of regular exercise.

Information was obtained from the survey obtained from the initial data, the number of elderly living in the Trisna Werda Social Institute, kab. Gowa, was 100 people, 39 men, while 61 women. Information from Trisna Werda Gowa Social Institute staff, the elderly in the orphanage have received maximum service, where the needs and health of the elderly are always considered, the orphanage even has a joint sports schedule for the elderly on Wednesday. Get data on the number of elderly in the Trishna Werda Panti, there were 57 elderly aged 60-74 and aged 75-90 as many as 43 elderly, around 70 elderly were still actively doing distance sports that were used by the elderly in sports at this orphanage with a distance of 1200 meters, so the purpose of this study was to examine the effect of walking on changes in blood pressure in the elderly at the Trisna Werda Institution, Gowa Regency.

METHOD

The research design is "Pre Experimental One Group Pre Test - Post Test Design". The population in this study were the elderly in the Trisna Werda Social Institution, Gowa Regency, namely 100 people. Sampling was selected by purposive sampling technique with the inclusion criteria of elderly research subjects aged 60-74 years, able to communicate, never exercised and willing to be respondents by giving informed consent both verbally and in writing. Retrieval of data using the instrument observation sheet. Bivariate analysis using the Wilcoxon test. The location for taking research data on walking exercise in the elderly is the Trisna Werda Panti, Gowa Regency \pm 2 weeks. In conducting the research, the researcher received a recommendation from STIKes Mega Rezky to the Head of the Trisna Werda.Kab.Gowa orphanage and obtained approval.

RESULTS

This research was conducted at the Trisna Werda Social Institution, Kab. Gowa used a pre-experimental research design with the type of one group pre-post experiment, namely the Wilcoxon Match Pairs Test with a significance level of $\alpha < 0.05$. The research was conducted using a questionnaire which was then distributed to the elderly who were the respondents. This study aims to determine the effect of walking exercise on changes in blood pressure in the elderly at Trisna Werda Social Institutions. During the study, 30 respondents were obtained. Previously, a PAR-Q test was carried out to test whether or not it was feasible to take part in running sports. After processing the data, the research results are then presented in the form of univariate and bivariate frequency distribution tables as follows:

Table 1.
Frequency Distribution Characteristics of Respondents who followed PAR-Q test

Test PAR-Q	F	%
Qualify	30	100
Total	30	100

Table 1 it can be seen that the 30 respondents in this study all met the requirements to take part in running sports.

Table 2.
Frequency Distribution of Pre-Test Respondents' Characteristics Based on Age, Gender, Education, Ethnicity and Hobbies.

Pre test	Special		High		Medium		Low		Total	
	f	%	f	%	f	%	f	%	f	%
Age										
60 – 67	6	20,0	2	6,7	1	3,3	1	3,3	10	33,3
68 – 75	9	30,0	7	23,3	2	6,7	2	6,7	20	66,7
Gende										
Male	8	26,7	5	16,7	0	0	2	6,7	15	50,0
Female	7	23,3	4	13,3	3	10,0	1	3,3	15	50,0
Education										
Elementary school	6	20,0	2	6,7	1	3,3	1	3,3	10	33,3
Junior high shcool	2	6,7	2	6,7	1	3,3	0	0	5	16,7
Senior high school	1	3,3	0	0	0	0	0	0	1	3,3
Bachelor	2	6,7	1	3,3	0	0	1	3,3	4	13,3
No School	4	13,3	4	13,3	1	3,3	1	3,3	10	33,3
Tribe										
Bugis	5	16,7	2	6,7	0	0	1	3,3	8	26,7
Macassar	6	20,0	6	20,0	2	6,7	2	6,7	16	53,3
Java	4	13,3	1	3,3	1	3,3	0	0	6	20,0
Hobbies										
Sport	11	36,7	7	23,3	2	6,7	1	3,3	21	70,0
Bicycle	2	6,7	1	3,3	1	3,3	1	3,3	5	16,7
Gardening	2	6,7	1	3,3	0	0	1	3,3	4	13,3

Table 2 it can be seen that of the 30 respondents in this study with ages 60-67 years the most were respondents who had special blood pressure as many as 6 people (20.0%), mild blood pressure as many as 2 people (6.7%), high blood pressure medium as much as 1 person (3.3%), severe blood pressure as much as 1 person (3.3%) and Age 68-75 years the most are respondents who have special blood pressure as many as 9 people (30.0%), high blood pressure mild as many as 7 people (23.3%), moderate blood pressure as many as 2 people (6.7%), severe blood pressure as many as 2 people (6.7%). From table 2 it can be seen that of the 30 respondents in this study with the male sex, the majority were respondents who had special blood pressure as many as 8 people (26.7%), mild blood pressure as many as 5 people (16.7%), high blood pressure moderate as many as 0 people (0%), severe blood pressure as many as 2 people (6.7%) and the most female gender is respondents who have special blood pressure as many as 7 people (23.3%), mild blood pressure as many as 4 people (13.3%), moderate blood pressure was 3 people (10.0%), severe blood pressure was 1 person (3.3%).

From table 2 it can be seen that of the 30 respondents in this study with elementary school education, the most were respondents who had special blood pressure of 6 people (20.0%), mild blood pressure of 2 people (6.7%), moderate blood pressure of 1 people (3.3%), 1 person (3.3%) had severe blood pressure, 2 people (6.7%) had high school education, 2 people (6.7%) had high blood pressure, 2 people (6.7%), moderate blood pressure was 1 person (3.3%), severe blood pressure was 0 people (0%), high school education was the most respondents who had special blood pressure of 1 person (3.3%), mild blood pressure as many as 0 people (0%), moderate blood pressure as many as 0 people (0%), severe blood pressure as many as 0 people (0%), most undergraduate education is respondents who have special blood pressure as many as 2 people (6,7%), mild blood pressure by 1 person (3.3%), moderate blood pressure by 0 person (0%), severe blood pressure by 1 person (3.3%) and no

education, the most are respondents who have 4 people with special blood pressure (13.3%), mild blood pressure 4 people (13.3%), moderate blood pressure 1 person (3.3%), severe blood pressure 1 person (3.3%)).

From table 2 it can be seen that the 30 respondents in this study with the most Bugis ethnicity were respondents who had special blood pressure of 5 people (16.7%), mild blood pressure of 2 people (6.7%), moderate blood pressure of 0 people (0%), severe blood pressure as many as 1 person (3.3%), the Makassar tribe with the most respondents who have special blood pressure as many as 6 people (20.0%), mild blood pressure as many as 6 people (20.0 %), moderate blood pressure as many as 2 people (6.7%), severe blood pressure as many as 2 people (6.7%) and Javanese ethnicity is the most respondents who have special blood pressure as many as 4 people (13.3%), mild blood pressure by 1 person (3.3%), moderate blood pressure by 1 person (3.3%), severe blood pressure by 0 person (0%).

From table 2 it can be seen that the 30 respondents in this study with the most sports hobbies were respondents who had special blood pressure of 11 people (36.7%), mild blood pressure of 7 people (23.3%), moderate blood pressure of 2 people (6.7%), 1 person (3.3%) with severe blood pressure, the most bicycle hobbyists are respondents who have special blood pressure as many as 2 people (6.7%), 1 person with mild blood pressure (3.3%), moderate blood pressure was 1 person (3.3%), severe blood pressure was 1 person (3.3%) and the hobby of gardening was mostly respondents who had special blood pressure of 2 people (6.7%) , mild blood pressure of 1 person (3.3%), moderate blood pressure of 0 people (0%), severe blood pressure of 1 person (3.3%).

Table 3.
Frequency Distribution of Post Test Respondents Characteristics Based on Age, Gender, Education, Tribe and Hobby

Post test	Special		High		Moderate		Low		Total	
	f	%	f	%	f	%	f	%	F	%
Age										
60 – 67	2	6,7	5	16,7	2	6,7	1	3,3	10	33,3
68 – 75	5	16,7	8	26,7	4	13,3	3	10,0	20	66,7
Gender										
Male	2	6,7	7	23,3	4	13,3	2	6,7	15	50,0
Female	5	16,7	6	20,0	2	6,7	2	6,7	15	50,0
Education										
Elementary school	1	3,3	5	16,7	3	10,0	1	3,3	10	33,3
Junior high school	2	6,7	2	6,7	1	3,3	0	0	5	16,7
Senior high school	0	0	1	3,3	0	0	0	0	1	3,3
Bachelor	2	6,7	1	3,3	0	0	1	3,3	4	13,3
No School	2	6,7	4	13,3	2	6,7	2	6,7	10	33,3
Tribe										
Bugis	2	6,7	4	13,3	1	3,3	1	3,3	8	26,7
Macassar	4	13,3	5	16,7	4	13,3	3	10,0	16	53,3
Java	1	3,3	4	13,3	1	3,3	0	0	6	20,0
Hobbies										
Sport	4	13,3	10	33,3	5	16,7	2	6,7	21	70,0
Bicycle	1	3,3	2	6,7	1	3,3	1	3,3	5	16,7
Gardening	2	6,7	1	3,3	0	0	1	3,3	4	13,3

Table 3 it can be seen that the 30 respondents in this study aged 60-67 years, namely respondents who had special blood pressure were 2 people (6.7%), mild blood pressure were 5 people (16.7%), moderate blood pressure were 2 people (6.7%), 1 person (3.3%) with severe blood pressure and aged 68-75 years, the most respondents who have special blood pressure are 5 people (16.7%), mild blood pressure 8 people (26.7%), moderate blood pressure 4 people (13.3%), severe blood pressure 3 people (10.0%). From table 3 it can be seen from the 30 respondents in this study with male gender, namely respondents who had special blood pressure as many as 2 people (6.7%), mild blood pressure as many as 7 people (23.3%), moderate blood pressure as many as 4 people (13.3%), severe blood pressure 2 people (6.7%) and female gender, namely respondents who have special blood pressure 5 people (16.7%), mild blood pressure 6 people (20.0%), moderate blood pressure in 2 people (6.7%), severe blood pressure in 2 people (6.7%).

From table 3 it can be seen that 30 respondents in this study with elementary school education, namely respondents who had special blood pressure were 1 person (3.3%), mild blood pressure were 5 people (16.7%), moderate blood pressure were 3 people (10.0%), severe blood pressure was 1 person (3.3%), junior high school education, namely respondents who had special blood pressure were 2 people (6.7%), mild blood pressure were 2 people (6.7%), moderate blood pressure of 1 person (3.3%), severe blood pressure of 0 people (0%), high school education, namely respondents who have special blood pressure of 1 person (3.3%), mild blood pressure of 0 people (0%), moderate blood pressure was 1 person (3.3%), severe blood pressure was 0 people (0%), most undergraduate education was respondents who had special blood pressure as many as 2 people (6.7%), mild blood pressure by 1 person (3.3%), moderate blood pressure by 0 person (0%), severe blood pressure by 1 person (3.3%) and no education, namely respondents who have special blood pressure by 2 people (6.7%), mild blood pressure in 4 people (13.3%), moderate blood pressure in 2 people (6.7%), severe blood pressure in 2 people (6.7%).

From table 3 it can be seen that the 30 respondents in this study with the Bugis ethnicity, namely respondents who had special blood pressure were 2 people (6.7%), mild blood pressure were 4 people (13.3%), moderate blood pressure were 1 person (3.3%), severe blood pressure as many as 1 person (3.3%), ethnic Makassar, namely respondents who have special blood pressure as many as 4 people (13.3%), mild blood pressure as many as 5 people (16.7%), moderate blood pressure as many as 4 people (10.0%), severe blood pressure as many as 3 people (13.3%) and Javanese, namely respondents who have special blood pressure as many as 4 people (13.3%), mild blood pressure 1 person (3.3%), moderate blood pressure 1 person (3.3%), severe blood pressure 0 person (0%). From table 3 it can be seen that of the 30 respondents in this study with a hobby of sports, namely respondents who had special blood pressure as many as 4 people (13.3%), mild blood pressure as many as 10 people (33.3%), moderate blood pressure as many as 5 people (16.7%), 2 people (6.7%) had severe blood pressure, 1 person (3.3%) had a special blood pressure hobby, 2 people (6.7%) had mild blood pressure, moderate blood pressure was 1 person (3.3%), severe blood pressure was 1 person (3.3%) and gardening hobbies, namely respondents who had special blood pressure were 2 people (6.7%), mild blood pressure was 1 person (3.3%), moderate blood pressure of 0 people (0%), severe blood pressure of 1 person (3.3%).

Table 4 from the 30 respondents, it can be seen that during the pre-test of 30 respondents, the most were respondents with special blood pressure of 15 people (50.0%), mild blood pressure of 9 people (30.0%), moderate blood pressure of 3 people (10.0%), severe blood pressure in 3 people (10.0%). After the post test, it was found that respondents with special blood pressure

decreased to 7 people (23.3%), mild blood pressure increased to 13 people (43.3%), moderate blood pressure increased to 6 people (20.0%) and high blood pressure heavy blood increased to 4 people (13.3%).

Table 4.
Frequency Distribution based on Respondent Characteristics Changes in blood pressure pre test and post test

Tekanan darah	pre test		post test	
	f	%	f	%
Istimewa	15	50	7	23,3
Ringan	9	30	13	43,3
Sedang	3	10	6	20,0
Berat	3	10	4	13,3

Table 5.
Differences in average blood pressure changes during pre-test and post-test in the elderly

Blood pressure	Pre Test	Post Test	Different Mean	P
Running sport	11,0	12,35	1,35	0,016

Table 5 shows that in the study there was a significant increase in blood pressure with an average difference = 1.36 obtained through the Wilcoxon test with a value of $p = 0.016$ ($p < 0.05$), which means there is a difference in blood pressure during the pre-test and post-test. test on the elderly after walking sports, where there is an increase in blood pressure that occurs in the elderly. So it can be concluded that there is an effect of walking exercise on changes in blood pressure in the elderly.

DISCUSSION

The effect of running exercise on changes in blood pressure in the elderly

Based on the results of the study using the Wilcoxon Pairs Test, it showed a value of $p=0.016$ ($p < 0.05$). It was obtained an illustration that there was a change in blood pressure during the pre-test and post-test in the elderly after walking sports, where there was an increase in blood pressure in the elderly. The results of the study showed that of the 30 elderly who had done walking, 7 (23.3%) respondents experienced a decrease in blood pressure, because a decrease in blood pressure after exercise can relax the blood vessels. So that by dilating blood vessels, blood pressure will decrease. According to Davis (2004) exercise helps achieve and maintain ideal body weight and is beneficial for the elderly to lower blood pressure. Aerobic activity of 30-45 minutes on foot each day helps improve stroke volume, which lowers heart rate and systolic blood pressure.

However, the results of the study also showed that 13 of the 30 respondents in this study had increased blood pressure. This could be caused by several things, including: namely a healthy lifestyle and not doing regular exercise. Changes in cardiovascular function due to regular exercise will affect blood pressure value, this is in accordance with the theory that therapy for hypertension to control blood pressure other than drugs can be done with non-pharmacological therapy, namely with a healthy lifestyle, one of which is by doing regular and regular exercise (Verma *et al.*, 2021). From the results above, the researchers assume that walking exercise functions to maintain body fitness, namely reducing stress (Sharon-David and Tenenbaum, 2017). Stress is also one of the causes of high blood pressure. Stressful conditions can trigger the release of hormones that can vasoconstrict blood vessels, thereby increasing blood pressure (Ayada, Toru and Korkut, 2015). From several research results concluded, elderly who are not active and who are less fit, the risk of experiencing high blood pressure increases 20% - 50% compared to those who are active and fit (Oliveros *et al.*,

2020). According to the researchers' assumptions, aerobic exercise will improve endurance, and if this exercise is done by elderly people, it will improve their physical condition and also control blood pressure. Intense weight-bearing exercise, such as walking, is the safest, cheapest and easiest and most beneficial for most of the elderly. With exercise the need for oxygen in the cells will increase for the process of forming energy, resulting in an increase in heart rate, so that cardiac output and stroke volume increase (Lopes *et al.*, 2018). Thus blood pressure will increase. After resting, the blood vessels will dilate or stretch, and blood flow will temporarily decrease, about 30-120 minutes later it will return to the pre-exercise blood pressure. If you exercise regularly and continuously, the decrease in blood pressure will last longer (Joyner and Casey, 2015). The blood vessels will be more elastic (Sharon-David and Tenenbaum, 2017).

Changes in blood pressure depend on oxygen demand (oxygen consumption), pulse rate, cardiac output and stroke volume, which are interrelated. The need for oxygen depends on many things, one of which is physical activity such as sports. The pulse rate is regulated by the sympathetic and parasympathetic nerves (Gordan, Gwathmey and Xie, 2015). Stroke volume is also determined by sympathetic and parasympathetic nerve input that affects the myocardial muscle fibers (Kingma, Simard and Rouleau, 2017). Exercise is very beneficial for the elderly, including: increasing the strength of the heart muscle, reducing the risk of heart attacks, improving blood circulation in the body thereby reducing blood pressure and avoiding high blood pressure, reducing levels of fat in the body so as to help reduce excess body weight and avoid diabetes. obesity, strengthens the muscles of the body so that the muscles of the body become flexible and avoids rheumatic diseases, boosts the immune system so that it avoids diseases that attack the elderly, can reduce stress and tension in the mind (Langhammer, Bergland and Rydwik, 2018).

According to researchers, a decrease in blood pressure occurs because in old age there is a decrease in muscle mass, the strength of the maximum heart rate, and an increase in body fat capacity. The cause of all of this can be prevented by exercising regularly both from youth to old age. Exercise and regular movement exercises can overcome problems due to changes in body function. The benefits of exercise are improving blood circulation, strengthening muscles, preventing bone loss, lowering blood pressure, lowering bad cholesterol, and increasing good cholesterol. Exercise is also beneficial for burning calories, improving balance and muscle coordination, increasing immunity. The available evidence shows that exercise and exercise in the elderly can prevent or slow down this functional loss, even regular exercise can reduce morbidity and mortality caused by cardiovascular disease. Research conducted in Japan provides one piece of evidence that regular exercise is very effective for lowering blood pressure (Cao *et al.*, 2019).

CONCLUSION

From the results of a study on the effect of walking exercise on changes in blood pressure in the elderly at the Trisna Werda Social Institution, which was conducted on August 12 with a total sample of 30 people, the following conclusions can be drawn as follows: Respondents with pre-test blood pressure category who experienced special blood pressure were (50.0%), mild blood pressure (30.0%), moderate blood pressure (10.0%) and severe blood pressure (10.0%). Respondents with the post-test blood pressure category who experienced special blood pressure decreased to (23.3%), mild blood pressure increased (43.3%), moderate blood pressure increased to (20.0%) and severe blood pressure increased to (13.3%). There is an effect of running exercise on changes in blood pressure in the elderly at the Trisna Werda Social Institution.

REFERENCES

- Alim, A. (2012) 'Pengaruh Olahraga Terprogram Terhadap Tekanan Darah Dan Daya Tahan Kardiorespirasi Pada Atlet Pelatda Sleman Cabang Tenis Lapangan', *Medikora*, VIII(2).
- Ayada, C., Toru, Ü. and Korkut, Y. (2015) 'The relationship of stress and blood pressure effectors.', *Hippokratia*. Greece, 19(2), pp. 99–108.
- Cao, L. *et al.* (2019) 'The effectiveness of aerobic exercise for hypertensive population: A systematic review and meta-analysis.', *Journal of clinical hypertension (Greenwich, Conn.)*. United States, 21(7), pp. 868–876. doi: 10.1111/jch.13583.
- Gordan, R., Gwathmey, J. K. and Xie, L.-H. (2015) 'Autonomic and endocrine control of cardiovascular function.', *World journal of cardiology*. United States, 7(4), pp. 204–214. doi: 10.4330/wjc.v7.i4.204.
- Indraswari, R. R. and Yuhan, R. J. (2017) 'Faktor-Faktor Yang Memengaruhi Penundaan Kelahiran Anak Pertama Di Wilayah Perdesaan Indonesia: Analisis Data Sdki 2012', *Jurnal Kependudukan Indonesia*, 12(1), p. 1. doi: 10.14203/jki.v12i1.274.
- Joyner, M. J. and Casey, D. P. (2015) 'Regulation of increased blood flow (hyperemia) to muscles during exercise: a hierarchy of competing physiological needs.', *Physiological reviews*. United States, 95(2), pp. 549–601. doi: 10.1152/physrev.00035.2013.
- Kingma, J. G., Simard, D. and Rouleau, J. R. (2017) 'Influence of cardiac nerve status on cardiovascular regulation and cardioprotection.', *World journal of cardiology*. United States, 9(6), pp. 508–520. doi: 10.4330/wjc.v9.i6.508.
- Langhammer, B., Bergland, A. and Rydwik, E. (2018) 'The Importance of Physical Activity Exercise among Older People.', *BioMed research international*. United States, p. 7856823. doi: 10.1155/2018/7856823.
- Lopes, S. *et al.* (2018) 'Exercise as a tool for hypertension and resistant hypertension management: current insights.', *Integrated blood pressure control*. New Zealand, 11, pp. 65–71. doi: 10.2147/IBPC.S136028.
- Minan, B. W. and Agustin, H. (2020) 'The Association between Social Activity and Health-Related Quality of Life in Yogyakarta, Indonesia', *Journal of Health Promotion and Behavior*, 5(2), pp. 87–95. doi: 10.26911/thejhp.2020.05.02.03.
- Oliveros, E. *et al.* (2020) 'Hypertension in older adults: Assessment, management, and challenges.', *Clinical cardiology*. United States, 43(2), pp. 99–107.
- Sharon-David, H. and Tenenbaum, G. (2017) 'The Effectiveness of Exercise Interventions on Coping with Stress: Research Synthesis', *Studies in Sport Humanities*, 22(December), pp. 19–29. doi: 10.5604/01.3001.0012.6520.
- UNFPA & HelpAge International (2012) *Ageing in the twenty-first century: A Celebration and A Challenge Executive summary*. Available at: https://www.researchgate.net/publication/314205132_Ageing_in_the_Twenty-First_Century_A_Celebration_and_A_Challenge.
- Verma, N. *et al.* (2021) 'Non-pharmacological management of hypertension.', *Journal of clinical hypertension (Greenwich, Conn.)*. United States, 23(7), pp. 1275–1283. doi: 10.1111/jch.14236.