ORIGINAL RESEARCH ARTICLE

Prevention and management of hypertension in middle-aged and elderly through screening and education (Pre-post intervention)

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Abstract

Maintaining quality of life and physical health in the elderly is crucial for their overall well-being. Hypertension, a prevalent condition among the elderly in Indonesia, requires targeted interventions to mitigate its impact. A quasi-experimental pre-post intervention study was conducted in Bandar Lor, Kediri City, Indonesia, involving 106 elderly participants. The Paguyuban Raga Paruh Baya Lansia Sejahtera (PURABAYA), a senior wellness group program aimed to improve hypertension management through educational sessions on physical activity, nutrition, and hypertension management exercises. The program significantly increased participants' knowledge of physical activity (median increase from 59.62 to 82.69) and nutrition (median increase from 80.51 to 95.38). Systolic blood pressure decreased markedly (median from 173.86 mmHg to 142.53 mmHg), indicating improved hypertension control. However, there was no significant change in diastolic blood pressure. The findings underscore the effectiveness of targeted educational interventions in enhancing health literacy and managing systolic blood pressure among the elderly. The PURABAYA program's success suggests its potential for scalability and adaptation to broader public health initiatives. *(Afr J Reprod Health 2024; 28 [10s]: 125-133).*

Keywords: Quality of Life; Elderly; Hypertension; Kediri; Intervention

Résumé

Le maintien de la qualité de vie et de la santé physique des personnes âgées est crucial pour leur bien-être général. L'hypertension, une maladie répandue chez les personnes âgées en Indonésie, nécessite des interventions ciblées pour atténuer son impact. Une étude quasi-expérimentale pré-post-intervention a été menée à Bandar Lor, dans la ville de Kediri, en Indonésie, auprès de 106 participants âgés. Le Paguyuban Raga Paruh Baya Lansia Sejahtera (PURABAYA), un programme de groupe de bien-être pour seniors visant à améliorer la gestion de l'hypertension grâce à des séances éducatives sur l'activité physique, la nutrition et des exercices de gestion de l'hypertension. Le programme a considérablement accru les connaissances des participants en matière d'activité physique (augmentation médiane de 59,62 à 82,69) et de nutrition (augmentation médiane de 80,51 à 95,38). La pression artérielle systolique a nettement diminué (médiane de 173,86 mmHg à 142,53 mmHg), ce qui indique un meilleur contrôle de l'hypertension. Cependant, il n'y a eu aucun changement significatif dans la pression artérielle diastolique. Les résultats soulignent l'efficacité des interventions éducatives ciblées pour améliorer les connaissances en matière de santé et gérer la tension artérielle systolique chez les personnes âgées. Le succès du programme PURABAYA suggère son potentiel d'évolutivité et d'adaptation à des initiatives de santé publique plus larges. *(Afr J Reprod Health 2024; 28 [10s]: 125-133).*

Mots-clés: Qualité de vie ; Âgé; Hypertension; Kédiri ; Intervention

Introduction

Quality of life and physical health are fundamental aspects that profoundly influence our overall well-being, happiness, productivity, and ability to relish life[1]. Striking a balance between these elements is paramount in enabling individuals to lead satisfying lives optimized for their potential. This delicate equilibrium becomes especially critical as individuals age, underscoring the importance of assessing and enhancing the quality of life for the elderly.

In a previous study conducted in Rukun Warga 09 (RW 09), a specific neighborhood in

Bandar Lor sub-district of Kediri City, Indonesia, quality of life for the middle aged and elderly is evaluated across four essential domains: physical health, psychological well-being, social relationships, and the environment[2]. Of these domains, physical health emerges as a central concern, given its pivotal role in shaping an elderly individual's perception of life and daily experiences.

The physical health domain is multifaceted, encompassing various aspects of an elderly person's life[3]. It entails their perceptions regarding the frequency of illnesses and anxiety, the quality of sleep and rest, levels of energy and fatigue, mobility, day-to-day activities, and dependence on medications and medical assistance. These components together form the fabric of an elderly person's physical well-being and, consequently, significantly affect their quality of life.

In a previous study, the evaluation of the physical health domain in the Bandar Lor area revealed a concerning score of 52.9, the lowest among the four assessed domains. The range of this score spans from a minimum of 25 to a maximum of 89.2, indicating considerable room for improvement[4]. Enhancing the physical health of the elderly population in this region is thus a pressing priority.

To achieve the goal of promoting health among the elderly, it is essential to adopt a holistic approach that begins during middle age. A crucial aspect of this approach involves improving the physical well-being of older individuals to an optimal level. This requires implementing targeted strategies and programs that address multiple facets encompassed within the physical domain[5–7].One of the health problems frequently experienced by the elderly is hypertension.The number of hypertension and diabetes patients in Kediri City is increasing year after year. Hypertension affected 99,289 persons, whereas diabetes affected 23,551 people. In the next ten years the number is predicted to increase threefold. Hypertension, however in general continues to cause significant disease burden globally[8].

Prevention of hypertension is crucial for improving the wellness among middle-aged and elderly individuals in Indonesia. Little is known, however, about how a combination of lifestyle changes, such as regular exercise and a balanced diet, affects hypertension prevention in this population. For instance, in Kediri, a city in East Java, Indonesia, the prevalence of hypertension among the elderly is significant. According to the 2018 Indonesia Basic Health Survey, the prevalence of hypertension among elderly people in Indonesia who are currently taking antihypertensive drugs was 89.2%, which tends to be higher in urban areas (89.6%) compared to rural areas (85.1%)[3]. This highlights the need for targeted interventions to address hypertension in the elderly, particularly in urban settings where the prevalence is higher[9,10].

Additionally, the implementation of the Hypertension Prevention Program Through Hypertension Exercise for the Elderly at Wisma Cempaka UPT PSTW Puger Jember Regency Indonesia has shown promising results. This program involved health education and anti-hypertensive exercise, which significantly reduced blood pressure among the elderly participants. The study found that the average systolic blood pressure decreased from 128.75 mmHg to 119.38 mmHg, and the average diastolic blood pressure decreased from 80.94 mmHg to 77.19 mmHg. This demonstrates the effectiveness of targeted programs in controlling hypertension among the elderly[11].

Furthermore, community service activities carried out at Posbindu Kenanga II Jatimelati Pondok Melati Bekasi Indonesia in October 2023 targeted 25 older adults, all women. These activities included measuring blood pressure and hypertension knowledge, as well as health education. The results showed that the average knowledge of the elderly increased significantly from 43.6 to 70.4, with a p-value of 0.001. This indicates that community-based interventions can significantly boost the elderly's understanding of hypertension and its prevention[12].

These programs highlight the importance of adopting a holistic approach to hypertension prevention, which includes health education, lifestyle modifications, and targeted interventions. This approach is crucial for improving the health and wellness of middle-aged and elderly individuals in Indonesia, particularly in urban areas where the prevalence of hypertension is higher.

Many studies in Indonesia have focused on the effects of exercise on blood pressure without combining it with another intervention. The Paguyuban Raga Paruh Baya Lansia Sejahtera (PURABAYA), a senior wellness group program aims to address this gap by promoting physical activity and healthy eating. Nevertheless, further research is required to evaluate the program's long-

term impact with the huge number and scalability to comprehensively improve elderly physical health and quality of life.

This PURABAYA program was carried out after going through the community deliberation process with the Bandar Lor sub-district head and staff, and representatives from the Sukorame Community Health Center and the village midwife. The program involved 106 elderly participants, who receive education to increase knowledge about hypertension, and engage in exercise together.

Methods

Study design and sampling

Quasi-experimental study designs (pre-post intervention) was used in this research. This research was carried out in the Bandar Lor sub-district of Kediri City, East Java, Indonesia. The population of the study were 1279 people aged 45-65, living in the Bandar Lor district area[13]. By applying the Slovin formula and allowing for a 0.1 margin of error, the number of samples is calculated to be 106 individuals. In this study, cluster sampling was the method of sampling. The Bandar Lor sub-district consists of 9 community units or Rukun warga (RW). From these 9 RW, there are 42 neighborhood units or Rukun Tetangga (RT). RWs 09 and 06 were chosen out of the nine RWs in Bandar Lor using lottery system. Afterwards, we randomly selected the (RT), and this RT is out of the draw (RT 21, RT 38, RT 39, RT 31, RT 16 and RT 26). The number of people involved at the RT level is calculated proportionally based on the number of each neighborhood unit. We concentrating efforts on 2 RW and 6 RT, because our limited resources of personnel, budget and materials. Figures 1 and 2.

Intervention

In general, the participants are divided into two activities: full program and half program.

Some of the participants did not want to participate in the full program activities because they did not commit themselves to performing joint gymnastics on a regular basis three times a week so they chose the part of the educational program only. Participants of the full program will receive education and exercise to manage their hypertension. In other words, the program focuses on two activities: educational activities (to prevent hypertension) and hypertensive management programmes.

The educational program is to provide information to participants that covers three topics: The importance of physical activity, healthy food and anti-hypertensive drink. The educational activities were carried out by dividing the participants into small groups of 10 people in the village hall. Educators are tutoring lecturers and volunteers who deliver prepared talks about the topic, using LCD Projector and Power Point. Below is s information about the activities performed by the hypertension management participants.

In this educational activity, participant knowledge was measured through pre-tests and post-tests. Each topic was measured with individual questions with correct or incorrect answer options. Each correct answer from the healthy topic was given a score of 20 points. Each correct answer from the physical activity topic was given a score of 25. The scores of both were added and compared before and after the education.

In conducting blood pressure measurements, we determined the participants' hypertension status based on the table from the 2017 American College of Cardiology/American Heart Association (ACC/AHA) Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults. Blood measurements were carried out again by the IIK Bhakta Field Learning Practice (PBL) student team using blood pressure classification references from the 2017 American College of Cardiology/American Heart Association (ACC/AHA) Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults[14].

Outcome and explanatory variables

The outcome variables in this study include knowledge scores and blood pressure levels. Knowledge scores reflect participants' understanding of how healthy food and physical activity impact on hypertension, evaluated through pre-tests and post-tests on three educational topics: healthy food, physical activity, and anti-hypertensive drinks. Blood pressure levels are measured before and after the intervention, with participants' hypertension status classified according to the 2017 American College of Cardiology/American Heart Association (ACC/AHA) guidelines.
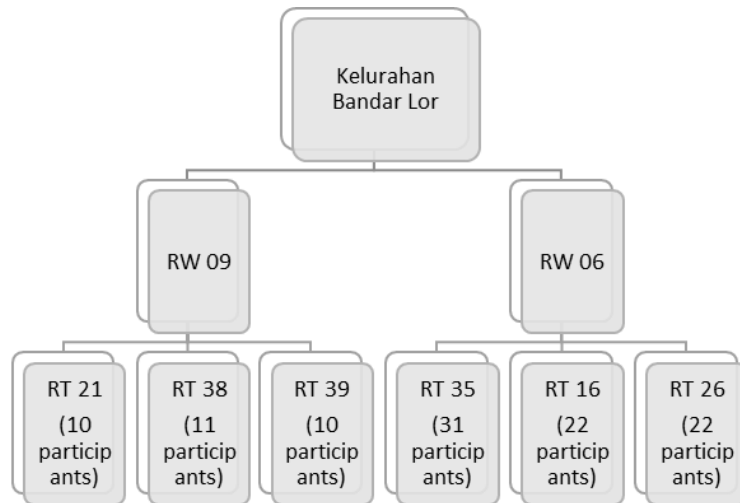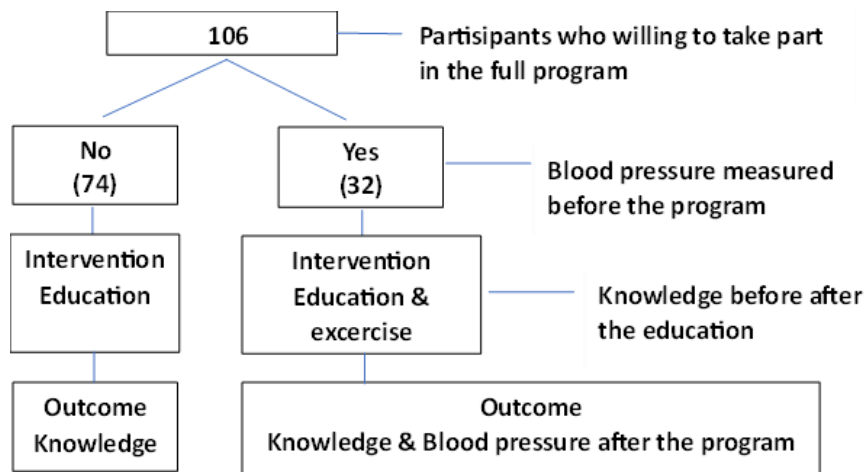
Figure 1: Sampling technique

Figure 2: Flow chart of the study participants recruitment process

Table 1: Activity of hypertension management in PURABAYA program

Week 1	Screening blood pressure	
	Education Topic	Group exercises
Week 2	The importance of physical activity	45 minutes simple work out 3 times a week
Week 3	Healthy food	45 minutes simple work out 3 times a week
Week 4	Anti-hypertensive drink	45 minutes simple work out 3 times a week
Measuring blood pressure and knowledge		

Data analysis

The Wilcoxon Signed Rank Test was employed to analyze the differences in knowledge scores and blood pressure levels before and after the intervention. This non-parametric test is suitable for paired data, allowing for the assessment of changes within the same group of participants. The significance level was set at $\alpha = 0.05$, and the results were interpreted based on the test statistic and corresponding p-values.The analysis aimed to determine whether the educational and exercise interventions significantly improved participants' knowledge and reduced blood pressure levels.

Table 2: Topics in education activity

Healthy food topic:
People with hypertension should consume lots of vegetables and fruit (Correct/Wrong)
Consuming more than 1 teaspoon of salt per day can increase the risk of developing hypertension (Correct/Wrong)
Obesity is not associated with an increased risk of hypertension (Correct/Wrong)
Hypertension can be prevented by eating a balanced diet
Consuming egg yolks and fried foods is not dangerous for people with hypertension(Correct/Wrong)
Physical activity Topic
People with hypertension shouldn't exercise? (Correct/Wrong)
Walking is the only exercise that is suitable for hypertension (Correct/Wrong)
The recommended duration of exercise for hypertensive people is 30 minutes a day (Correct/Wrong)
It is best to walk every day for a week, with a duration of 1 hour a day (Correct/Wrong)
Anti-hypertensive drink
Participant were able to mentioned 3 ingredients of juice from vegetables or fruits that are often found on a daily basis. Celery juice, cucumbers, strawberries, and just tomatoes as well as mix between the four, drunk without added sugar once a day.

Table 3: Blood Pressure Classification of PURABAYA Participantss in Bandar Lor Kediri, based on ACC/AHA 2017

Classification	Systole (mmhg)		Diastole (mmhg)
Normotenssion	<120	and	<80
Elevated	120-129	and	<80
Hypertension Stage 1	130-139	or	80-89
Hypertension Stage 2	>140	or	>90
Hypertension Crisis	>180	or	>90

Results

Below are the data on the characteristics of participants involved in the PURABAYA program. From the table above, we can see that the majority of participants in the PURABAYA program are women aged 45-65. The majority of respondents have completed their highest level of education at high school level and their monthly income exceeds the regional minimum wage. The majority of the elderly who enroll in the PURABAYA program are between the ages of 46 and 65 (87%).

1. Measurement of respondents' knowledge before and after the program

Physical activity knowledge

Before education, the median score for knowledge of physical activity before education is 59.62. The interquartile range (IQR) is 40, indicating that the scores are spread out between 40 and 80. After education, the median score for knowledge of

Table 4: Characteristics of participants who participated in the PURABAYA program

Variables	Frequency (N)	Percentage (%)
Sex		
Male	51	48,5
Female	55	51,50
Age		
46-55	47	44
56-65	45	43
65-81	14	13
Educational Level		
Unschooled	2	2,4
Elementary School	19	17,4
Junior High school	24	22,8
High School	48	45,5
College	13	12
Participant's Income		
>Regional minimum wage (>IDR2.300.000/ USD 148)	84	79,0
< Regional minimum wage (>IDR2.300.000/ USD 148)	22	21

physical activity after education is 82.69. The IQR is 50, showing that the scores are spread out between 50 and 100.

The median before education score of 59.62 indicates that the participants had a moderate level of knowledge about physical activity before the education program. After Education the median score of 82.69 indicates a significant improvement in knowledge about physical activity after the education program.

Table 5: Measurement of respondents' knowledge before and after the program

Physical Activity Knowledge			
Statistic	Value	Min	Max
Median (Before)	59.62	0	100
Lower Quartile (Q1)	40		
Upper Quartile (Q3)	80		
Interquartile Range (IQR)	40		
Median (After)	82.69	50	100
Lower Quartile (Q1)	50		
Upper Quartile (Q3)	100		
Interquartile Range (IQR)	50		
Knowledge of Nutrition			
Median (Before)	80.51	40	100
Lower Quartile (Q1)	64		
Upper Quartile (Q3)	96		
Interquartile Range (IQR)	32		
Median (After)	95.38	80	100
Lower Quartile (Q1)	87		
Upper Quartile (Q3)	100		
Interquartile Range (IQR)	13		

Table 6: Blood pressure (systolic) test results before and after the program

Systolic Statistic	Pre-Intervention (Presystol)	Post-Intervention (Postsystol)
N (Number of respondents)	32	32
Minimum	145	131
Maximum	246	190
Median	173.86	142.53
IQR (Interquartile Range)	31.71	16.72
Statistic	Pre-Intervention (Prediastole)	Post-Intervention (Postdiastole)
N (Number of respondents)	32	32
Minimum	69.00	77.00
Maximum	115.00	98.00
Median	93.07	84.19
IQR (Interquartile Range)	14.92	6.57

Nutrition knowledge

Before Education the median score for knowledge of nutrition before education is 80.51. The IQR is 32, indicating that the scores are spread out between 64 and 96. After education, the median score for knowledge of nutrition after education is 95.38. The IQR is 13, showing that the scores are very concentrated between 87 and 100.

The median score of 80.51 indicates that the participants had a good level of knowledge about nutrition before the education program. But after education the median score of 95.38 indicates a significant improvement in knowledge about nutrition after the education program.

There were no respondents who experienced a decrease in knowledge about physical activity after the counseling was carried out. A total of 70 (66.67%) respondents experienced an increase in knowledge about physical activity after the counseling was carried out, while 36 (33.33%) others experienced no change in knowledge. The results of the Wilcoxon Signed Ranks Test show a p-value of $0.000 < 0.005$, meaning that there is a difference in respondents' knowledge about physical activity between before being given counseling and after being given counseling.

There were no respondents who experienced a decrease in knowledge about nutrition after the counseling was carried out. A total of 61 (58.97%) experienced an increase in knowledge about physical activity after providing counseling while the other 45 (41.03%) did not experience an increase in knowledge. The results of the Wilcoxon Signed Ranks Test showed a p-value of $0.000 < 0.005$, meaning that there was a difference in respondents' knowledge about nutrition between before being given counseling and after being given counseling.

2. Blood pressure measurement results of respondents before and after the program

Systole

The intervention led to a notable improvement in systolic blood pressure among the participants. The mean systolic blood pressure decreased from 163.69 mmHg before the intervention to 149.28 mmHg after the intervention. The median values also show a significant reduction from 173.86 mmHg to 142.53 mmHg, suggesting that the intervention was effective for the majority of the participants.

Additionally, the reduction in the interquartile range (from 31.71 mmHg to 16.72 mmHg) indicates that the blood pressure readings became more consistent and less variable post-intervention. This suggests that the intervention not only lowered the systolic blood pressure but also stabilized it across the group.

Table 7: Results of wilcoxon signed rank test regarding participant's pre- and post test knowledge of the SPSS

Physical Activity					
Pre-Post measurement	N	Mean Rank	Sum of Ranks	z	p
Negative Ranks	0	0.00	0.00	-7.538	0.000
Positive Ranks	70	35.50	2485.00		
Ties	36				
Nutrition					
Pre-Post measurement	N	Mean Rank	Sum of Ranks	z	p
Negative Ranks	0	0.00	0.00	-7.211	0.000
Positive Ranks	61	31.00	1891.00		
Ties	45				
Based on negative ranks.					

Table 8: Results of wilcoxon signed rank test regarding participant's pre- and post blood pressure of the SPSS

Systole					
Pre-Post measurement	N	Mean Rank	Sum of Ranks	z	p
Negative Ranks	30	16.37	491.00	-4.252	0.000
Positive Ranks	2	18.50	37.00		
Ties	0				
Diastole					
Pre-Post measurement	N	Mean Rank	Sum of Ranks	z	p
Negative Ranks	17	14.47	246.00	-0.981	0.327
Positive Ranks	11	14.55	160.00		
Ties	4				
Based on positive ranks.					

Diastole

The median blood pressure value before the intervention is 93.07 mmHg. This means that half of the respondents had a blood pressure lower than 93.07 mmHg and half had a higher blood pressure. The IQR is 14.92 mmHg. This indicates that the middle 50% of the data (from the 25th percentile to the 75th percentile) falls within this range. It gives a measure of the spread of blood pressure values around the median.

The median blood pressure value after the intervention is 84.19 mmHg. This suggests that after the intervention, the median blood pressure decreased compared to before the intervention. The IQR is 6.57 mmHg. This indicates that the middle 50% of the data (from the 25th percentile to the 75th percentile) is narrower compared to before the intervention. It suggests that there is less variability in blood pressure values after the intervention compared to before.

The Wilcoxon Signed Ranks Test results show a p-value of 0.000 (<0.005), indicating that there is a difference in systolic blood pressure before and after the program. However, the Wilcoxon Signed Ranks Test result on diastolic blood pressure was 0.327 (>0.05), indicating that there was no difference in diastolic blood pressure before and after participating in the program.

Discussion

The results from the PURABAYA program indicate significant improvements in the knowledge and health outcomes of participants. The program's educational component led to substantial improvements in physical activity and nutrition knowledgeas indicated by the substantial increases in median scores post-intervention. The Wilcoxon Signed Rank Test results, with p-values of 0.000 for both knowledge areas, confirm the effectiveness of the education provided. The absence of any decrease in knowledge among participants further underscores the program's positive impact. These findings suggest that targeted educational interventions can effectively improve health literacy, which is crucial for preventing, managing hypertension and promoting overall wellness among middle-aged and elderly individuals in Kediri City.

These findings highlight the effectiveness of the PURABAYA program in improving health knowledge and reducing systolic blood pressure.

The theory behind the PURABAYA program is that education and awareness can significantly improve health outcomes by increasing knowledge about physical activity and nutrition. This aligns with the concept of health literacy, which emphasizes the importance of education and understanding in maintaining good health[15]. Additionally some study showed that health education could improve hypertension management knowledge and attitude among uncontrolled hypertension in the rural and urban area[11,16]. PURABAYA focus on physical activity and nutrition education, combined with its demographic targeting, suggests that it can be a valuable tool in addressing public health issues, particularly in the context of hypertension.

The results from the PURABAYA program can be compared with those from other programs, such as the Indonesian Chronic Disease Management Program (PROLANIS). PROLANIS aimed to improve the health outcomes of patients with chronic diseases, including hypertension. However, a preliminary study on the impacts of hypertension on PROLANIS participants showed that health outcomes, including blood pressure, deteriorated during the pandemic, particularly among the elderly[17]. This contrasts with the PURABAYA program, which showed improvements in systolic blood pressure despite not being specifically designed to address hypertension.

The PURABAYA program's success in improving health knowledge and reducing systolic blood pressure has significant implications for public health. The program's focus on education and targeted demographic suggests that it can be adapted and scaled up to address broader public health issues. This is particularly relevant given the ongoing challenges posed by chronic diseases and the need for effective interventions to mitigate their impact.

Limitations

The study's sample size is limited to a specific demographic group, which may not be representative of the broader population. The finding of this study may not be generalizable to other populations or settings, as the study was conducted in a specific region Bandar Lor District, with a specific demographic profile. Another limitation is the study only measured short-term effects and did not assess the long-term sustainability of the program's impact.

Conclusion

The PURABAYA program has demonstrated significant improvements in health knowledge and systolic blood pressure, indicating its effectiveness in addressing public health issues. The program's success highlights the importance of targeted educational interventions and underscores the need for further research and adaptation to ensure its continued impact on public health.

Authors contribution

Ekawati Sutikno conceptualized and prepare the manuscript. Hari Basuki Notobroto conducted analysis data. Nunik Puspitasari designed the methodology. Ratna Frenty Nurkhalim collected the data. Dianti Ias Oktaviasari wrote the abstract and discussion. All the authors read and approved the content of the manuscript.

Acknowledgements

References

1. Jambrino-Maldonado C, Rando-Cueto D, Núñez-Sánchez JM, Iglesias-Sanchez PP and De las Heras-Pedrosa C. Bibliometric Analysis of International Scientific Production on the Management of Happiness and Well-Being in Organizations. Soc Sci. 2022;11(7):272.
2. Anwar SA, Arsyad DS, Dwinata I, Ansar J and Rachmat M. Quality life of PROLANIS participants using WHOQOL BREF Indonesian version: A community in primary health care. Enfermería Clínica. 2020;30:213–7.

3. Rodriguez Espinosa P, Chen YC, Sun CA, You SL, Lin JT, Chen KH, Hsing AW and Heaney CA. Exploring health and well-being in Taiwan: what we can learn from individuals' narratives. BMC Public Health. 2020;20(1).

4. Sholehah A, Wardhani AM, Setyono, Dandi, Irene Sabina, Meike Nur Cahyani SNR, Pratama S, Siti Marisah, Janan Nafisah, Nehru Salsabil Winarto, Lega Bintang Yauba MBIK and Nabila SN. LAPORAN PRAKTIK BELAJAR LAPANGAN DI RW 09 KELURAHAN BANDAR LOR KECAMATAN MOJOROTO KOTA KEDIRI TANGGAL 8 - 27 Mei 2023. Kediri; 2023.

5. Eckstrom E, Neukam S, Kalin L, Wright J. Physical activity and healthy aging. Clin Geriatr Med. 2020;36(4):671–83.

6. Rudnicka E, Napierała P, Podfigurna A, Męczekalski B, Smolarczyk R and Grymowicz M. The World Health Organization (WHO) approach to healthy ageing. Maturitas. 2020;139:6–11.

7. Fulmer T, Reuben DB, Auerbach J, Fick DM, Galambos C, Johnson KS. Actualizing Better Health And Health Care For Older Adults: Commentary describes six vital directions to improve the care and quality of life for all older Americans. Health Aff. 2021;40(2):219–25.

8. Badan Pusat Statistik Kota Kediri [Internet]. kedirikota.bps.go.id. 2019. Available from: https://kedirikota.bps.go.id/indicator/30/148/1/jumlah-kasus-10-penyakit-terbanyak-di-kota-kediri.html

9. Rakhmawati E, Megasari E, Diyah AW and Eka SA. Hubungan Kepatuhan Penggunaan Obat Antihipertensi Terhadap Kejadian Stroke Dan Kualitas Hidup Penderita Hipertensi Di Kota Kediri, Jawa Timur. Java Heal Jounal. 2021;8(1).

10. Lailli NF and Restyana A. Analisis Faktor-faktor yang mempengaruhi terjadinya hipertensi pada pasien Lansia di Kelurahan Semampir Kota Kediri Tahun 2018. Java Heal Jounal. 2020;5(2).

11. Kurnia AD, Melizza N, Ruhyanudin F, Masruroh NL, Prasetyo YB, Setyowati CI and Khoirunnisa O.The Effect of Educational Program on Hypertension Management Toward Knowledge and Attitude Among Uncontrolled Hypertension Patients in Rural Area of Indonesia. Community Heal Equity Res Policy [Internet]. 2020 Nov 30;42(2):181–8. Available from: https://doi.org/10.1177/0272684X20972846

12. Agustina D, Achirda N, Pambudi RA and Aminoto T. Penyuluhan sebagai upaya pengendalian hipertensi pada lansia. J Pengabdi Masy Fisioter dan Kesehat Indones. 2023;2(2):164–70.

13. BPS. Mojoroto dalam Angka. Kediri: Indonesian statistic Bearau; 2018.

14. Muntner P, Carey RM, Gidding S, Jones DW, Taler SJ, Wright JT Jr and Whelton PK. Potential US Population Impact of the 2017 ACC/AHA High Blood Pressure Guideline. Circulation [Internet]. 2018;137(2):109–18. Available from: https://www.ahajournals.org/doi/abs/10.1161/CIRCULATIONAHA.117.032582

15. Auld ME, Allen MP, Hampton C, Montes JH, Sherry C, Mickalide AD, Logan RA, Alvarado-Little W and Parson K. Health literacy and health education in schools: collaboration for action. NAM Perspect. 2020;2020.

16. Xia T, Zhao F and Nianogo RA. Interventions in hypertension: systematic review and meta-analysis of natural and quasi-experiments. Clin Hypertens. 2022;28(1):13.

17. Yusransyah, Halimah E and Suwantika AA. Measurement of the quality of life of prolanis hypertension patients in sixteen primary healthcare centers in Pandeglang District, Banten Province, Indonesia, using EQ-5D-5L instrument. Patient Prefer Adherence. 2020;1103–9.