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Initiation of *Gerai Tensi* for screening and prevention of non-communicable diseases in the community

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ABSTRACT

Background: The increased incidence of non-communicable diseases (NCDs) necessitates continuous promotional and preventive activities to reduce morbidity and mortality. Since NCDs cannot spread like infectious diseases, they are frequently neglected. In addition, NCDs represent a significant health burden as they can develop chronic consequences and lead to fatalities. The growing burden of NCDs is attributed to increased risk factors, including elevated blood pressure, obesity, body mass index, and blood sugar levels. Furthermore, NCDs can be the primary factor in long-term decreased productivity, leading to detrimental effects on social and economic resources. Some NCDs that are receiving the most attention and have the highest prevalence are hypertension and obesity. This paper aimed to present the prevalence of hypertension and obesity in a village community.

Methods: We hosted a *Gerai Tensi* program as one of the community-based attempts to identify and screen for NCDs. This program was conducted in Dukuh Gowongan RT 003/ RW 002, Pucangan Village, Kartasura District, Sukoharjo Regency, Central Java Province, Indonesia. All the residents aged ≥15 years old were invited to attend *Gerai Tensi*. The participant's blood pressure, height, weight, and waist circumference were measured.

Results: A total of 75 residents of Dukuh Gowongan attended *Gerai Tensi*. Most participants were female (53.3%), aged 46–55 (24.0%). There were 54.7% (41/75) of participants with hypertension, mainly classified as stage I hypertension (31/75; 41.3%), and 58.7% (44/75) of participants who were obese, mostly grade I obesity (28/75; 37.3%).

Conclusion: Hypertension and obesity are prevalent in the community, reaching more than half of the study participants. Coordination with the community health centre and village representatives is required to optimize the promotion and prevention activities, the treatment of diseases, and the sustainability of the *Gerai Tensi* program.

Keywords: *Gerai Tensi;* non-communicable diseases; hypertension; obesity.
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INTRODUCTION

Non-communicable diseases (NCDs) remain a serious health problem worldwide.[1] The latest WHO data for 2022 shows that NCDs kill 41 million people each year, accounting for 74% of global deaths.[2] NCDs are also the leading cause of death in Indonesia, with 59.5% of deaths in 2013 and increasing to 71% in 2018.[3,4] The NCDs with significant prevalence include cardiovascular diseases, cancer, diabetes, and chronic obstructive pulmonary disease.[5] Between 2013 and 2018, the prevalence of stroke rose from 7% to 10.9%, cancer from 1.4% to 1.8%, diabetes from 6.9% to 8.3%, hypertension from 25.8% to 34.1%, and obesity from 15.4% to 21.8%.[3,4] They are often considered minor problems because they cannot spread like infectious diseases.[6] In fact, NCDs can pose a huge health burden as they become chronic illnesses and lead to complications that can be fatal.[7] They also have severe social and economic impacts associated with poverty. Non-communicable diseases can significantly cause reduced productivity and earning capacity for individuals and families because they are characterized as chronic diseases that require long-term care at a considerable cost, which can negatively impact the economic and social resources of families and society.[8] The high cost of treatment and rehabilitation often coincides with the loss of employment due to illness, disability, or premature death. Metabolic factors that increase the risk of NCDs include elevated blood sugar levels, high blood pressure, obesity, or an increased body mass index (BMI).[9]

Hypertension and obesity are NCDs with a high prevalence. These health conditions often appear together in one individual.[10] An increase in blood pressure above the average level (≥140/90 mmHg) can damage organs, while being overweight or obese can trigger other health problems such as diabetes, heart disease, and stroke.[11] Obesity is also associated with an increased risk of developing hypertension.[12]

In the Ministry of Health of the Republic of Indonesia's Disease Prevention and Control Program for 2020–2024, the management of hypertension and obesity has been set as the national focus. To achieve this goal, the strategy implemented includes strengthening preventive and promotional efforts, especially early detection of hypertension and risk factors associated with cardiovascular diseases and other NCDs.[13] An initiative of a *Gerai Tensi* in the Pucangan Village area can facilitate the early detection of NCDs in the local community, especially hypertension and obesity. The *Gerai Tensi* is specially designed to be implemented in villages that are integrated with community health centres (*Puskesmas*) and managed by health workers. The program also aims to increase community knowledge and awareness of hypertension and obesity through blood pressure screening and anthropometric measurements. Our previous study found that the prevalence of hypertension and obesity is high, especially in the adult population in the city centre of Surakarta, reaching nearly half of the study participants.[14] This present study aimed to measure the prevalence of hypertension and obesity in a village on the city outskirts.

METHOD

The *Gerai Tensi* program was conducted on March 19, 2023, based on the institution's research/service permit No. 238/UN27.22/KP.06.00/2023 and followed ethical considerations (voluntary participation and respecting participants' confidentiality and privacy). This community service program involved the residents of Dukuh Gowongan RT003/RW002, Pucangan Village, Kartasura District, Sukoharjo Regency, Central Java Province, Indonesia (Figure 1).

Figure 1. Map showing the distance from the Universitas Sebelas Maret (UNS) campus to the community service location.

Table 1. Blood pressure categories[16]

Blood Pressure Category	Systolic (mmHg)	Diastolic (mmHg)
Optimal	<120	<80
Normal	120-129	80-84
High-normal	130-139	85-89
Stage1 hypertension	140-159	90-99
Stage 2 hypertension	160-179	100-109
Stage 3 hypertension	≥180	≥110
Isolated systolic hypertension	≥140	<90

The area comprised 54 families; most residents worked in the informal sector. All residents aged 15 years and over were invited to *Gerai Tensi,* and those who were available during the event were recruited as study participants (accidental sampling). Twelve students of the Nutrition and Midwifery program of Universitas Sebelas Maret (UNS) performed anthropometric measurements under a medical doctor's (TNS) supervision.

The screening methods for hypertension and obesity were blood pressure and anthropometric examinations (measurements of height, weight, and waist circumference). An Omron brand digital blood pressure monitor with an accuracy of ±5% of the pulse reading was used to measure blood pressure. The diagnosis of hypertension was established if the results of blood pressure measurements showed a systolic pressure >140 mmHg or a diastolic pressure >90 mmHg, or according to the categories shown in Table 1.[15,16]

The anthropometric examination included measuring body height with a microtoise with an accuracy of 0.1 cm, measuring waist circumference with a medline or measuring tape, and measuring body weight with a digital scale (brand: Perfect Health) with an accuracy of 0.1 kg. Using the formula BB (kg) / TB (m2), one may calculate their BMI. Asian adults' Body Mass Index (BMI) is shown in Table 2 and is used to diagnose obesity.[17] Furthermore, central obesity is diagnosed if the waist circumference is >90 cm in men and >80 cm in women.[18]

RESULTS

Seventy-five participants attended *Gerai Tensi,* and data were collected on five tables designated for registration and measuring height, blood pressure, weight, and waist circumference (Figure 2–a-e).

Table 3 shows the demographic characteristics of 75 residents with an almost equal gender distribution (male 46.7%, female 53.3%). Most subjects were in the early elderly age category, i.e., 46–55 years (18/75; 24.0%). Among 41 hypertension cases, the majority of them had blood pressure classified as stage I hypertension (31/75; 41.3%), and among 44 participants who had a BMI

indicating obesity, the majority of them were classified as grade I obesity (28/75; 37.3%). This present study showed a higher prevalence of hypertension and obesity in the city outskirts than in the city centre of Surakarta, i.e., 54.7% vs. 41% for hypertension and 58.7% vs. 47.6% for obesity.[14]

Table 4 shows the age range, measurement results, and mean and standard deviation. On average, the characteristics of the participants were late adulthood with a high BMI, waist circumference, and blood pressure.

Figure 3 shows the distribution of hypertension based on age range. Of the 75 people attending the *Gerai Tensi*, 41 of them had hypertension. The majority of those with stage I hypertension are early elderly (40–55 years old). This may be due to natural changes in the heart, blood vessels, and hormone levels that can increase blood pressure as the patient ages.[19]

Table 2. Diagnosis of obesity based on Body Mass Index (BMI)[17]

Classification	BMI (kg/m²)
Underweight	<18.5
Normal	18.5 – 22.9
Overweight	23 – 24.9
Obese	≥25

Figure 4 shows the distribution of obesity by age range. Out of 75 people attending the *Gerai Tensi*, 11 were overweight and 44 were obese. Most of them had obesity category I and were within the early elderly category (40–55 years old). This phenomenon needs attention because obesity is one of the leading causes of high blood pressure. The combination of obesity and hypertension increases the risk of developing cardiovascular diseases.[20] A previous study reported (2022) that people with a BMI classified as obese are twice as likely to suffer from hypertension compared to those who are non-obese.[21] This is because fat accumulation increases blood vessel resistance, eventually increasing the heart's ability to pump blood throughout the body.[22]

The number of people with hypertension was almost balanced in all genders, i.e., 21 females vs. 20 males. However, in the elderly and geriatric population, hypertension is often found in women. This is because middle-aged women experience menopause. Menopause is associated with increased blood pressure and decreased estrogen, which protects blood vessels from damage.[23]

Figure 2. a. Registration, b. Height measurement, c. Blood pressure measurement, d. Weight measurement, e. Waist circumference measurement.

Based on BMI calculations, more males were overweight or obese (35/55; 63.6%) than females. A person's age affects nutritional needs. In the elderly, the need for carbohydrate and fat nutrients is generally less due to decreased basal metabolism. Decreased metabolic processes and decreased physical activity in old age can lead to obesity. The peak of weight gain for women and men is in a different time range, i.e., 55–65 years old for women and 34–54 years old for men.[22]

The diagnosis of central obesity was determined by measuring the waist circumference. There were 57% (20/35) of males and 65% (26/40) of females with central obesity. Excess fat accumulation in the abdominal area or central obesity leads to fatty acid accumulation in cells and decreased adiponectin levels, which triggers insulin resistance.[24] Central obesity is also called apple-type obesity, which is more at risk of hypertension than pear-type obesity.

DISCUSSION

In the modern world, NCDs are a threat to humanity. According to the World Health Organization (WHO), out of the 57 million deaths in the world in 2014, 36 million were caused by NCDs. Actual actions are needed to prevent these NCDs, including lifestyle changes and early detection of diseases. Behaviors that cause people to have hypertension and obesity health problems include a lack of fruit and vegetable consumption, smoking, drinking alcohol, eating high sugar, salt, and fat, a lack of physical activity, stress, and a lack of attention to the importance of utilizing health facilities. Public understanding of NCDs needs to be improved so that people can modify their lifestyles to prevent and manage hypertension and obesity.

Strategies to control NCDs require a robust health system and improved essential health services that enable people to access NCDs treatment services. Indonesia has a double burden of diseases, i.e., the large number of infections that must be treated immediately and the increase in NCDs. The Indonesian government has adopted a prevention strategy for NCDs based on the *Pos Pembinaan Terpadu* (*Posbindu*).[23] Posbindu involves community participation in

Table 3. Demographic characteristics

Category	n	Percentage (%)
Gender		
Male	35	46.7
Female	40	53.3
Age		
Early adolescence (15-16 yrs)	3	4.0
Adolescence (17 - 25 yrs)	13	17.3
Early adult (26 - 35 yrs)	12	16.0
Adult (36 - 45 yrs)	9	12.0
Early elderly (46 - 55 yrs)	18	24.0
Elderly (56 - 65 yrs)	14	18.7
Geriatric (>65 yrs)	6	8.0
Blood Pressure		
Optimal	13	17.3
Normal	9	12.0
Normal high	12	16.0
Stage I hypertension	31	41.3
Stage II hypertension	8	10.7
Stage III hypertension	2	2.7
Body Mass Index (BMI)		
Underweight	4	5.3
Normal	16	21.3
Overweight	11	14.7
Obesity I	28	37.3
Obesity II	16	21.3
Waist Circumference		
Central obesity	46	61.3
Normal	29	38.6

Table 4. Results of measurement (n=75)

Category	Min	Max	Mean	SD
Age	15.00	91.00	43.44	17.76
Weight	42.40	98.60	65.09	13.40
Height	142.00	176.00	157.21	7.74
BMI	17.00	40.52	26.37	5.31
Waist circumference	61.50	117.00	88.85	13.40
Systolic Blood Pressure	90.00	195.00	132.8	20.16
Diastolic Blood Pressure	64.00	108.00	85.13	9.41

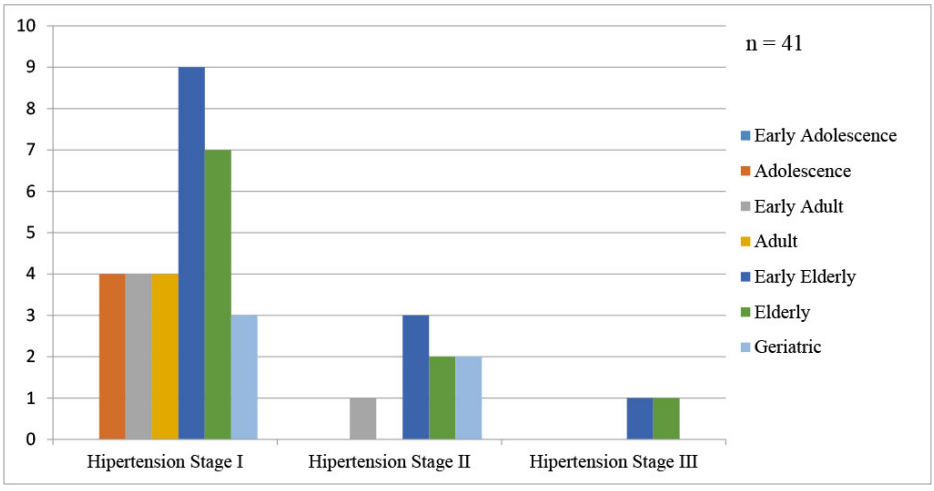

Figure 3. Distribution of hypertension by age range.

controlling risk factors independently and continuously. The development of *Posbindu* can also be accompanied by existing community efforts to accelerate the decrease of NCDs in Indonesia. The *Posbindu* is a joint activity that aims to invite the whole community to adopt healthy behaviors and lifestyles as well as implement *CERDIK* behaviors that include (1) periodic health checks, (2) getting rid of cigarette smoke, (3) physical activity, (4) a healthy and balanced diet, (5) getting enough rest, and (6) managing stress. The Indonesian government has also mobilized *GERMAS* (*Gerakan Masyarakat Hidup Sehat*) to encourage people to live healthy living behaviors that must be instilled in individuals, families, neighborhoods, and the environment.

Controlling NCDs requires independent initiative from the community and health workers. A comprehensive approach is essential in reducing the impact of NCDs, which involves many sectors, such as health, economy, education, agriculture, and others, to work together to reduce NCDs risk factors, which can be channelled through health promotion on prevention and control of NCDs. Risk factors for developing NCDs include tobacco use, an unhealthy diet, physical inactivity, and alcohol consumption, which should be emphasized in NCDs prevention promotion.[25] Another way to control NCDs is through a primary healthcare approach for early detection and timely treatment. This can be an alternative strategy to reduce the need for expensive maintenance of NCDs by creating public health policies, especially promoting NCDs control and reorientation.

The screening of NCDs in the present *Gerai Tensi* detected 41.3% of respondents fall into the category of stage I hypertension, which aligns with a study conducted by Kahar et al. in 2020, showing that 64% (20/33) of traders in a local market in Semarang were categorized as having prehypertension.[26] This study is also consistent with Riesty et al. 2023 findings, which indicates that as many as 73.3% of the elderly in a community health centre in Yogyakarta were detected to have hypertension stage I.[27]

The *Gerai Tensi* activity found that 61.3% of respondents experienced central obesity. This finding aligns with a study conducted in Serang, Banten that reported the prevalence of central obesity in adult

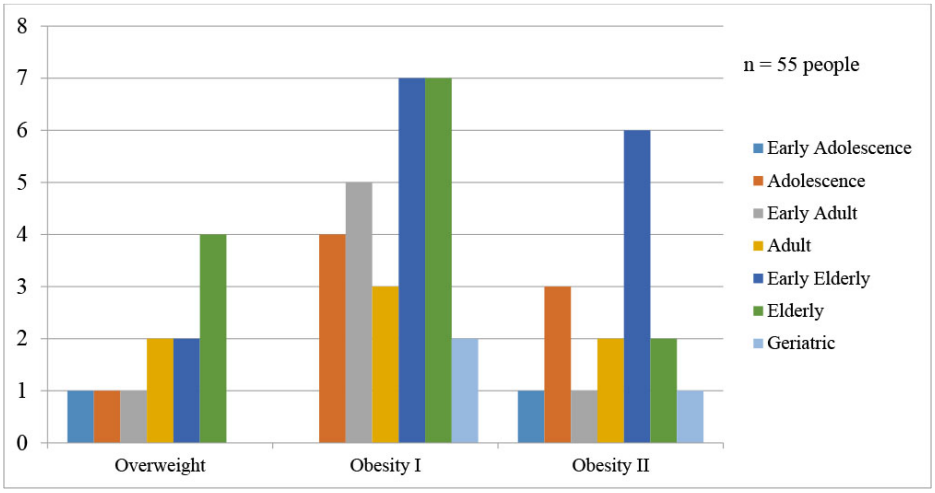

Figure 4. Distribution of overweight and obese patients by age range.

males aged ≥18 years was 44% compared to 60% in adult females of the same age group.[28] Additionally, Riesty et al. found that 42.9% of the elderly had above-normal waist circumferences.[27]

Our study limitations include a small number of participants and a limited area of study. However, community participation in this activity is relatively high, as indicated by more than 50% of the population in that area actively participating in *Gerai Tensi*. Nevertheless, given the high prevalence of hypertension and obesity in our study, it is essential to develop prevention efforts that are not only aimed at the elderly but also at productive ages. Efforts made by the primary health centres (*Puskesmas*) must receive full support from the community and individuals. Efforts that can be made include periodic health checks, nutrition education, socializing the importance of implementing healthy lifestyles, and consuming balanced nutritional food. The *Gerai Tensi* activity is expected to be sustainable and can be carried out regularly. In addition to conducting health checks, it can be combined with material exposure activities in more innovative forms (for example, nutrition counselling accompanied by games).

CONCLUSION

This present study in the city outskirts detected a higher prevalence of hypertension and obesity than that in the city centre. In particular, it was found that most cases of stage I hypertension and stage I obesity were in the early elderly age range (46–55 years old). This suggests the need for further activities that can help monitor and reduce the incidence of hypertension and obesity in the area, especially targeting people aged 40 years and older. In order to maintain public health, efforts to prevent and control NCDs need to be continued through effective and measurable programs.

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CONFLICT OF INTERESTS

None.

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AUTHOR CONTRIBUTION

TNS outlined the concepts and design of the activities, drafted, edited and reviewed the manuscript. MMB performed data analysis. DSY and SAW edited the manuscript. All authors contributed to the data acquisition and manuscript preparation.

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