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Integrated assisted post (*Posbindu*) to lowering high prevalence of hypertension and diabetes mellitus

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ABSTRACT

Background: Non-communicable diseases (NCDs) contribute to 74% of global mortality and are responsible for 73% of national casualties. It had been predicted that in 2024, the number of patients with NCDs in Indonesia will be around 92 million people, and among others, hypertension and diabetes mellitus (DM) are significant health burdens in this country. This paper presents a community service activity aimed at screening for NCDs in Sana Village, Sragen Regency, Central Java Province, Indonesia.

Methods: An integrated assisted post (*Posbindu*) was held for early detection and to monitor the main risk factors of NCDs, particularly hypertension and DM. Fifty working-age adults from the Sana village were targeted to attend the *Posbindu*. Blood pressure and blood glucose levels were measured, followed by treatment and health counseling by the medical students, Mondokan health center officers, and local midwives.

Results: The activity was well appreciated by the local community, with a participation rate of 226% (113 attendees out of 50 people targeted), consisting of 22 men and 91 women aged 22–93 years old. Hypertension and DM were detected in 61.9% (70/113) and 5.3% (6/113) participants.

Conclusion: The high prevalence of NCDs, particularly hypertension, highlights the importance of maintaining physical fitness and carrying out health checks regularly. Thus, NCD screening through *Posbindu* is expected to be sustainable.

Keywords: non-communicable diseases; integrated assisted post; *posbindu*; hypertension; diabetes mellitus.
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INTRODUCTION

Non-communicable diseases (NCDs) are common in society and are the leading cause of death among both old and young adults. The World Health Organization (WHO) reported that NCDs, including cardiovascular diseases, non-infectious diseases, hypertension, diabetes, and chronic lung diseases, are responsible for 74% of deaths worldwide.[1] According to data from Indonesian Basic Health Research, NCDs are responsible for 73% of national casualties in 2018.[2] Based on The Consolidated Report on Indonesia Health Sector Review 2018, the number of patients with NCDs in Indonesia is estimated to be around 92 million people in 2024.[3] Hypertension and diabetes mellitus (DM) are the most common types of NCDs. In 2018, 63,309,620 hypertension cases in Indonesia caused 427,218 fatalities.[2] With 10.7 million cases, the country is among the top 10 countries with the highest prevalence of DM worldwide.[2] Hypertension and DM certainly pose a threat to society, considering the high number of complications that can occur, which can ultimately lead to death.

Hypertension is defined as a condition where systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg.[4] The most reported symptoms of hypertension are dizziness, headaches, facial flushing, and mood disorders. Other symptoms include chest pain, palpitations, back pain, constipation, and visual disturbances.[5] Recently, WHO stated that around 46% of adults were not aware that they had hypertension.[6] Uncontrolled hypertension and an unhealthy lifestyle can increase morbidity and mortality due to complications from cardiovascular diseases such as stroke, heart diseases, and kidney diseases.[7]

Diabetes mellitus is a metabolic disease characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. More than 90-95% of cases are type 2 DM, and most patients are adults.[8] Common symptoms and signs of diabetes include the need to urinate more often than usual, feeling very thirsty, feeling hungry even though the patients have eaten before, fatigue, blurred vision, frequent infections and wounds that are difficult to heal, weight loss, and tingling and numbness in the hands or feet, and unexpected weight loss.[9,10] Uncontrolled diabetes could cause many complications, such as microvascular complications (nephropathy, peripheral neuropathy, retinopathy), macrovascular complications

(peripheral artery disease, diabetic foot ulcers), miscellaneous complications (risk of cardiovascular diseases), and vulnerability to infections.[11,12]

Hypertension and DM can be detected by early screening. The objective of screening is to alleviate the impact of a disease on the population, encompassing factors such as disease occurrence, illness, or death. This goal is accomplished by implementing timely interventions to diminish the individual risk of developing the disease.[13] Considering the benefits of screening for NCDs, we conducted community service for detecting and monitoring hypertension and DM in Sana Village, Sragen Regency, Central Java Province, Indonesia.

METHOD

An integrated assisted post (*Posbindu*) was held as part of the Students' Community Service Program (*KKN*) of the senior year of medical students of Universitas Sebelas Maret, Surakarta, Indonesia. The activity was conducted at Sana Village Hall, Mondokan District, Sragen Regency, Central Java province, Indonesia. Most residents in the area were farmers and laborers.

This program was performed in three stages. First, an assessment was conducted through interviews with midwives to determine if the existing *Posbindu* could be a forum for NCD prevention in Sana Village. The midwives reported that the *Posbindu* meetings held every month were attended only by *Posbindu* cadres. In addition, the village did not have facilities to accommodate health check-ups, so the community of Sana village had to check their health status independently through the midwife or the community health center, which was quite far from the village. Moreover, there is still a lack of public awareness about conducting independent health checks, so there is a need for regular health checks for village communities.

Following the assessment, we conducted coordination among team members of *KKN* students, including distributing tasks, preparing tools and materials, and setting up meetings with external parties (village officials, village midwives, and staff from the Mondokan community health center). This coordination concluded the schedule of the *Posbindu*, the number of targeted residents who would participate, and the support of facilities and infrastructure in the area so that the activities could run smoothly. We targeted 50 working-aged adults as participants in *Posbindu*.

In addition, *Posbindu* was implemented on 9 August 2023, at 09.30 a.m. at the Sana Village Hall, Mondokan District, Sragen Regency. There were three tables representing three distinct tasks of the students. The first table had two students who were responsible for participant registration; the second table consisted of six students who measured blood sugar and blood pressure; and the students at the third table were responsible for providing education and medicine, assisted by Mondokan community health center officers and village midwives. The blood pressure was measured with a stethoscope and an ABN™ aneroid sphygmomanometer on the left arm while the participants were sitting, with 86.7% sensitivity and 98.7% specificity. The blood sugar level was measured using an Easy Touch device with 98.3% sensitivity and 91.9% specificity. The results of measurements were categorized by age and gender and presented as descriptive statistics (numbers and percentages).

RESULTS

The *Posbindu* activities were started with an opening speech by the representative of the medical students. The activity continued with registering residents of Sana Village who attended the *Posbindu*. Participants registered at the provided registration table and were invited to fill in their identification details (full name, age, and home address) and sign the registration form as proof of attendance (Figure 1). After registration, the participants were asked to sit on mats and chairs while waiting their turn for a health check at the following table (Figure 2). During the health examination, participants provided information about any ailments they had in order to receive health education and appropriate treatment. Free medication and consultation were provided for those who needed it (Figure 3).

The *Posbindu* was attended by 113 people consisting of 91 women and 22 men, aged 22–93 years old. There were 61.9% (70/113) of participants with hypertension, and the increasing number of cases aligned with the increasing age group. Only 5.3% (6/113) of participants had DM, most of whom were women (Table 1).

DISCUSSION

Table 1 shows a significant disparity between the prevalence of hypertension and DM in Sana Village, i.e., 61.9% vs 5.3%, respectively. This discrepancy aligns with the global prevalence of hypertension, which stands at 1.39 billion cases compared to only 415 million DM cases.[14] Additionally, it is crucial to consider the potential impact of a busy and noisy environment, as well as the close proximity of the examiners, which could

Figure 1. Biodata check of a participant.

Figure 2. Health examination for *Posbindu* participants.

Figure 3. Medication administration and education for *Posbindu* participants.

lead to inaccuracies in blood pressure measurements.

The distribution of hypertensive patients based on gender is 14.3% (10/70) males and 85.7% (60/70) females, while for DM cases, it is 16.7% (1/6) males and 83.3% (5/6) females. The very different prevalence gap between genders in hypertension and diabetes patients is likely because most (90/113; 79.6%) participants were women, in addition to the nature of gender disparities. Gender disparities refer to the biological distinctions between females and males. These variances stem from differences in the genetic information found in sex chromosomes, the unique expression of genes located on autosomes associated with sex, variations in the quantity and quality of sex hormones, and their distinct impacts on bodily systems and organs. It's important to acknowledge that each gender has specific target organs influenced by these hormones.[15]

The incidence of hypertension is higher in women, i.e., 65.9% (60/91) in women compared to only 45.4% (10/22) in men. This follows a previous study that reported a more significant increase in blood pressure in women than men in early middle age.[16] In addition, the body mass index (BMI) and the levels of serum lipids tend to increase in women, especially those in middle age, which can contribute to increasing blood pressure.[15,17] The same thing also applies to type 2 DM, which is more likely to occur in women due to an increase in adipose viscera tissue, which can increase insulin resistance in women.[18]

Sexual dimorphism is evident in blood pressure, and although there are significant differences in the occurrence, causes, and effects of hypertension between males and females, insufficient data supports specific blood pressure targets tailored to each sex. While hypertension is typically more common in males, females experience a sharper rise in blood pressure beginning in their thirties, resulting in a more rapid increase in hypertension rates as they age. While both sexes are susceptible to hypertension, there are gender-specific variations in its prevalence and severity, with men having a higher risk of hypertension compared to women of the same age until around the age of sixty.[19] Hypertension in women appears to be more responsive to salt loading, and it is more frequently associated with the metabolic syndrome than in men. In postmenopausal hypertension, estrogen deficiency, alterations in the structure and function of the heart, and arterial blood vessel defects have all been identified and documented as causing a greater risk for developing diastolic dysfunction and a higher incidence of left ventricular hypertrophy than those in young adult women.[20]

However, we found that in cases of DM, the correlation between disease and age is negligible as the numbers of diabetes patients were almost equal between groups. In women who have not yet reached menopause, estrogen provides protection

Table 1. Data of Blood Pressure and Blood Glucose Levels

	Blood Pressure		Total (%)	Random Blood Sugar		Total (%)
	Hypertension (%)	Normal (%)		Diabetes (%)	Normal (%)	
Age						
<45	7 (6.2)	11 (9.7)	18 (15.9)	1 (0.9)	17 (15)	18 (15.9)
45-54	11 (9.7)	7 (6.2)	18 (15.9)	1 (0.9)	17 (15)	18 (15.9)
55-65	25 (22.1)	14 (12.4)	39 (34.5)	2 (1.8)	37 (32.7)	39 (34.5)
>65	27 (23.9)	11 (9.7)	38 (33.6)	2 (1.8)	36 (31.9)	38 (33.6)
Total	**70 (61.9)**	**43 (38.1)**	**113 (100)**	**6 (5.3)**	**107 (94.7)**	**113 (100)**
Gender						
Men	10 (8.8)	12 (10.6)	22 (19.5)	1 (0.9)	21 (18.6)	22 (19.5)
Women	60 (53.1)	31 (27.4)	91 (80.5)	5 (4.4)	86 (76.1)	91 (80.5)
Total	**70 (61.9)**	**43 (38)**	**113 (100)**	**6 (5.3)**	**107 (94.7)**	**113 (100)**

against type 2 DM by improving insulin sensitivity, promoting insulin secretion in response to glucose, and preventing the death of pancreatic beta cells. The aging process and the shift from reproductive years to menopause, marked by diminished estrogen production, lead to alterations in body structure. This transition is linked to a specific tendency for heightened abdominal fat and perivisceral adiposity. Disparities in body composition and fat distribution based on gender significantly contribute to the divergence in diabetes susceptibility. It has been reported that having an early menopause (before 40 years old) is linked to an elevated risk of developing type 2 DM, but this risk may be reduced or postponed through hormone replacement therapy.[15]

The impact of estrogen deficiency during menopause in women can be viewed as a distinctive gender-related factor. For men, testosterone naturally boosts insulin secretion triggered by glucose, thus enhancing the action of the glucagon-like-peptide-1 (GLP-1) hormone and reducing inflammation, contributing to the overall health of pancreatic beta cells. Notably, lower levels of free testosterone and higher concentrations of sex hormone-binding globulin (SHBG) were independently associated with increased mortality in men diagnosed with type 2 diabetes.[21]

There are several limitations in this study. First, the constrained sample size restricts the generalizability of the findings. With a limited number of participants, the study may not accurately reflect the characteristics and dynamics of a larger, more diverse population. Consequently, the conclusions drawn from this study may not be applicable beyond the specific group of individuals included in the sample. Second, the data were collected at a single time point. By capturing information at only one moment, the study may overlook essential nuances in the progression and trajectory of the disease or phenomenon being investigated. Diseases often unfold over time, exhibiting fluctuations, patterns, and responses to various factors that cannot be fully captured through a snapshot approach to data collection. As a result, the comprehensive understanding of the development and course of the condition may be hindered, potentially leading to incomplete or inaccurate interpretations of the findings.

CONCLUSION

An integrated assisted post (*Posbindu*) was held in Sana Village Hall, Mondokan District, Sragen Regency, Central Java, to raise awareness among the village community about the burden of NCDs, particularly hypertension and diabetes. This activity provided an overview of the prevalence of hypertension and diabetes in Sana Village, and it is hoped that the local government can consider the data provided in developing sustainable *Posbindu* activities. The impact of this community service activity is to increase public awareness and knowledge in maintaining physical health to avoid or overcome NCDs. In addition, this activity serves as an early detection of hypertension and diabetes, as well as the identification of residents with uncontrolled hypertension and/or diabetes. Residents who have been diagnosed with hypertension and/or diabetes, as well as those who previously had uncontrolled hypertension and/or diabetes, were referred to Mondokan Community Health Center for further evaluation, treatment, and follow-up.

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ETHICAL CONSIDERATION

We have ensured the security of data and the identity of respondents who are not released or known to anyone except us as researchers. In collecting data, there is no coercion on respondents, and we have received permission from the local government to carry out research activities.

AUTHOR CONTRIBUTION

TNS supervised the activities (study concept and design, data collection and report), edited, and submitted the manuscript. NU and YTN outlined the concepts and study design. ZAA helped design the study and searched for literature. ADI, CCB, KB, FH, and FFN collected the data. MHN and SZ analyzed the data. All authors contributed to the manuscript preparation.

CONFLICT OF INTEREST

We declare that we have no conflict of interest related to the content presented in this journal about community health. We confirm that we have not received any financial or non-financial benefits that could influence the impartiality and objectivity of our contributions to this work. If a potential conflict arises in the future, we commit to promptly disclosing such conflicts to the editorial team. This declaration is made in the interest of transparency and upholding the integrity of the research and information presented in this journal.

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