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Improving knowledge of healthy lifestyle using social media and health screening of productive age population in Pajimatan Hamlet, Imogiri, Bantul

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ABSTRACT

Introduction: The prevalence of obesity continuously increases, as are associated comorbidities and healthcare expenses. Early detection, intervention, and effective treatment of obesity are important to improve the quality of life and reduce costs. This Community Practice Program aimed to evaluate health status and provide education about the healthy lifestyle of people at productive ages in Pajimatan Hamlet, Imogiri, Bantul, Yogyakarta.

Methods: Participants were 66 adults (26 men, 40 women) aged 19-64 years living in Pajimatan Hamlet. The program was held on November 2021. Education on a healthy lifestyle was done using social media via WhatsApp groups. Pre- and post-test were given to the participant before and after the education. Health screening measured height, weight, waist circumference (WC), blood pressure BP), and fasting blood glucose level. Obesity was determined using body mass index (BMI) and WC.

Results: There were significant increases in healthy lifestyle knowledge scores before and after education in men ($p = 0.017$) and women ($p < 0.001$). Health screening indicated that men were significantly taller ($p < 0.001$) and heavier ($p = 0.009$) than women; however, there was no difference in BMI, WC, BP, and fasting blood glucose level ($p > 0.05$). There were no differences in the distribution of BMI obesity between men and women; however, women with central obesity were higher than men (70% women, 30% women, $p = 0.021$). Men having prehypertension were higher than women (46.2 vs. 15%); on the other hand, women with hypertension I and II seemed to be higher than men ($p = 0.043$). Type-2 diabetes was slightly greater in women (12.5%) than 7.7% in men.

Conclusion: In conclusion, the Community Service Program found a high prevalence of obesity and hypertension in the population. Education on healthy lifestyle programs can help improve the target population's knowledge.

Keywords: education; healthy lifestyle; hypertension; obesity; productive age.
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INTRODUCTION

Productive age, according to the Ministry of Health Republic of Indonesia category is aged 15-64 years.[1] In 2020, the population census data indicated that Indonesia's population reached 270.2 million, with 133.54 million (49.42%) women and 136.61 million (50.58%) men.[2] The productive age population in Indonesia based on the 2020 Census was 70.72%, indicating that Indonesia is still in the era of the demographic bonus. Bantul Regency, with a population of about one million people, is one of the Yogyakarta Province regencies with a proportion of the productive age population of 69.45%, almost the same as the national prevalence.[3]

The high number of productive age is a great national asset because it is the largest contributor to family and national income. However, this group sometimes receives less attention in health studies than vulnerable age groups (children and the elderly). Meanwhile, the prevalence of health risk factors for cardiovascular diseases and metabolic syndrome in Indonesian populations tends to increase by year and individual age, including the productive age group. Bantul Regency statistical data shows that the morbidity rate, i.e., the percentage of the population experiencing health complaints and feeling disturbed in daily activities (unable to carry out normal activities such as work, school, and daily activities as they should), increased from 11.98% in 2019 to 18.29% in 2020.[3] The morbidity rate is one indicator to measure the level of public health in general.

Body mass index (BMI) is generally used to define individuals with obesity using cut-off 25 kg/m^2 for overweight and 30 kg/m^2 for obese (World Health Organization, 2004). In addition to BMI as a measure of general obesity, visceral obesity, which refers to excess intra-abdominal tissue accumulation, is also useful for evaluating fat storage closely related to several health risks.[4] Waist circumference (WC) is a proxy measure

of visceral adiposity used to evaluate central obesity. Complex associations of multiple genetics, socioeconomic, and cultural factors may lead to obesity.[5] While lifestyle, food patterns, and urban expansion may increase the prevalence of obesity. Many studies have found that obese individuals have a higher risk for dyslipidemia, type-2 diabetes, CHD, stroke, high blood pressure, hypertension, coronary heart disease, stroke, gallbladder and respiratory diseases, cancers, etc.[6] Recently, the prevalence of obesity continuously increases as well as the related comorbidities and health care expenses. Therefore, early detection and intervention, in addition to effective treatment of obesity, are important to improve individuals' quality of life and reduce costs.

Lifestyle is an important factor associated with obesity and the associated comorbidities. Forman and colleagues[7] found that adjusted lifestyle issues include maintaining a normal BMI range, high fruit diets, low-fat dairy products, low sodium, and high physical activity. Practicing a healthier lifestyle will improve life expectancy irrespective of morbidity as reported by Chudasama *et al.*[8] from a large data of the UK Biobank.

Health promotion about lifestyle behaviors is important in preventing and controlling non-communicable diseases (NCDs). Joseph-Shehu and colleagues[9] in a systematic scoping review, reported that using information and communication technology (ITC) for health-promoting lifestyle behaviors effectively improved healthy behaviors, including physical and mental health. The growing social media use in populations recently may have implications for health promotion. The Instagram platform, for example, has been found as an acceptable and feasible platform for sharing nutrition information, and video formats were the most preferred post style among young Australian samples.[10] During the COVID-19 pandemic, a sedentary lifestyle during lockdown makes populations with chronic diseases more vulnerable to the effects of physical inactivity. Dixit & Nandakumar[11] found that technology and social media-based intervention was promising for promoting health and the only effective method for delivering an intervention during a pandemic. Recently, many social media applications, such as Facebook, Instagram, WhatsApp, and Twitter, are available and widely used. In the present study, WhatsApp is used to deliver knowledge because this application is the most popular social media used in the target population. In this population, WhatsApp groups have been used to communicate among group members (e.g. in a Rukun Tetangga/RT, a Rukun Warga/RW, or a village).

Given the important role of the productive age population in supporting the life of the family and the nation, it is important to carry out programs to monitor and ensure that their health condition is good to work optimally. Therefore, this Community Service Program aimed to evaluate health status and provide education about the healthy lifestyle of people at productive age in Pajimatan Hamlet, Girirejo Village, Imogiri District, Bantul Regency. The program will provide health conditions and knowledge data and educate the productive age population about the healthy lifestyle of people in Pajimatan Hamlet, Girirejo Village, Imogiri District, Bantul Regency.

METHOD

This Community Service Program participants were 66 adults (26 men and 40 women) aged 19-64 years in Pajimatan Hamlet, Girirejo Village, Imogiri District, Bantul Regency. The program was held in November 2021. The methods used in implementing the program in detail included technical preparation (materials, tools, administrative), pre-test, education about healthy lifestyle, post-test, and health screening by the measurements of body height, weight, BMI, WC, BP (systolic and diastolic), and fasting glucose level. All participants were given information regarding the benefits and risks of the program before participation and *signed an informed consent*.

Because of the COVID-19 pandemic condition that still exists, the Village Government has not allowed offline public meetings to be held. Therefore, implementing the Community Service Program, especially the education section, used an online platform, i.e., Whatsapp media. Several materials and equipment were used in this program, including pre- and post-test questions using the Google application form. The tests consisted of 8 multiple-choice questions, scoring one for the correct answer. Therefore, the total scores for each test ranged from 0 to 8 at maximum. The questions included three education materials, i.e., physical activity, nutritional status, and healthy diets. Validity of the instruments was done using simple content validity by consultation and discussion with experts in physical activity, nutritional status, and nutrition. The applicability of the instrument was tested on 5 random participants. The questions were evaluated and adjusted until sample participants understood the sentences. Education materials including physical activity, nutritional status, and healthy diet presentations converted into videos and uploaded on Youtube and in PDF files. The links were shared with the participants via WAGs.

Five WAGs were included in the study, consisting of one "*Rukun Warga* (RW)" WAG (57 members) and 4 RT WAGs (each WAG has about 20 members). The socialization began by displaying flyers, introductions, and explanations about the Community Service Program and how to implement it. Program socialization and pre-test started in early November 2021, while education was held on November 8-12, 2021 and ended with post-test on 12 November, 2021. Education was done in 5 days using a shared video presentation uploaded on YouTube and PowerPoint presentation in PDF format files. Members of the WAGs were reminded to watch the shared material links every day during November 8-12, 2021 and also chances and triggers to discuss the materials of the education.

The last activity of this Community Service Program was health screening including measurements of nutritional status (body height and weight, WC, BMI), blood pressure, fasting blood glucose levels of all invited participants (the productive age people at the community) on November 13-14, 2021. Health screening was carried out offline at the home of one of the residents by implementing adequate health protocols; the team members and

participants were using masks, and hand sanitizer and keeping a distance with an allocated time of 5 hours each day (06.00–11.00 WIB) to avoid crowding.

Health screening examined the nutritional status, including height and weight, WC, BMI measurement, blood pressure (systolic and diastolic), and fasting glucose level. Height was measured using a microtoise (General Care Products Co. Ltd., Thailand) in the nearest 0.1 cm. Weight was measured using a weight scale (ADE BM 708, Germany) in the nearest 0.5 kg. Waist circumference was measured using a non-elastic measuring tape (General Care Products Co. Ltd., Thailand) in the nearest 0.1 cm. Height, weight, and WC were taken following the International Standards for Anthropometric Assessment procedures by the International Society for the Advancement of Kinanthropometry.[12] BMI (kg/m^2 unit) was defined from body weight (kg) divided by height (m) squared and categorized into underweight, normal, overweight and obese as recommended by WHO for Asian populations.[13] Waist circumference was categorized into normal and obese using cut-offs for obesity of >90 cm for men and >80 cm for women using the recommendation of the International Diabetes Federation (IDF). Blood pressure was measured using a digital tensimeter (OMRON HEM 7120, OMRON Healthcare, Singapore) and classified into normal, pre-hypertension, hypertension I, and hypertension II following the recommendation of the Joint National Committee on Prevention Detection, Evaluation, and Treatment Joint Nation or High-Pressure VII (JNC-VII, 2003). Fasting blood glucose level was measured using a digital blood glucose meter (EasyTouch GCU ET 301, Taiwan) after overnight fasting or at least 8 hours fasting and determined as normal and diabetes following the recommendation of WHO and the American Diabetes Association, i.e., normal (80-100 mg/dl), pre-diabetes (101-125 mg/dl), and diabetes (>125 mg/dl).

Data were presented in tables using descriptive analytics. Statistical analyses used were paired test, chi-square test, correlation, and binary logistic regression. BMI was further classified into normal (underweight and normal weight) and obese (overweight and obese); blood pressure was classified into normal and hypertension (including prehypertension, Hypertension I and hypertension II) for binary logistic regression analysis. The data were analyzed using the SPSS package (SPSS Inc. Version 25). A statistically significant was determined at a p-value <0.05.

RESULT

A total of 66 participants (20 men, 46 women) aged 19 – 64 years from three *Rukun Tetangga* contributed in this Community Service Program. Among 50 residents who participated in the pre-test, only 31 people (10 men, 21 women) completed the post-test (Table 1).

Paired test analyses indicated that there were significant increases in scores between the pre-and post-test of men (p=0.017) as well as women (p<0.001), as shown in Table 2.

Table 3 presents the mean differences between age, nutritional status parameters including body height and weight, BMI, and WC, systole and diastole blood pressure, and fasting blood glucose level. In comparison to women, men were taller (p<0.001) and weightier (p=0.009); however, there was no difference in BMI (p=0.975) and waist circumference (p=0.718). Blood pressure (systole and diastole) and fasting blood glucose levels were also not significantly different between men and women (p> 0.05), even though men seemed to have greater values.

Distributions of obesity using BMI and WC, blood pressure and glucose levels of participants were presented in Table 4. There were no differences between men and women (p=0.324) in the distribution of BMI category; however, women with central obesity were more than twice that men, i.e., 70 and 30%, respectively (p=0.021). Men having prehypertension were higher than women (46.2 vs. 15%); on the other hand, women with hypertension I and II seemed to be higher than men (p=0.043). The fasting blood glucose category did not differ significantly between men and women

Table 1. Distribution of participants involved in the Community Service Program

	Number of Participants			
	Pre-test	Post-test	Pre- & post-tests	Health status
Men	20	10	10	26
Women	30	21	31	40
Total	50	31	31	66

Table 2. The increase paired test analysis of pre-and post-test scores of participants

	Pre-test Mean ± SD (min-max)	Post-test Mean ± SD (min-max)	*p*
Men (N= 10)	4.40 ± 1.35 (2 – 6)	5.50 ± 1.27 (3 – 7)	0.017*
Women (N= 21)	4.41 ± 1.18 (2 – 6)	5.95 ± 0.92 (4 – 7)	<0.001**
Total (N= 31)	4.19 ± 1.22 (2 – 6)	5.81 ± 1.05 (3 – 7)	<0.001**

*p< 0.05; **p< 0.001; N: number of participants; p: significance (paired-test)

Table 3. Means of nutritional status, blood pressure, and fasting blood glucose level of participants

Parameter	Men (N= 26)	Women (N= 40)	*p*
Age	44.85 (12.30)	43.13 (14.29)	0.604
Height (cm)	162.58 (8.26)	151.51 (5.41)	<0.001**
Weight (kg)	68.50 (16.91)	59.11 (11.61)	0.009**
BMI (kg/m^2)	25.67 (4.75)	25.70 (4.66)	0.975
WC (cm)	86.11 (12.56)	85.01 (10.94)	0.718
Systole	134.92 (15.80)	133.65 (22.03)	0.800
Diastole	90.12 (12.80)	85.13 (10.74)	0.092
Fasting blood glucose	104.29 (29.55)	99.54 (20.53)	0.496

*p< 0.05; **p< 0.001; N: number of participants; p: independent sample t-test

Figure 1. Health screening activities (measuring fasting blood glucose levels) in the Community Service Program in Pajimatan Hamlet.

Table 4. Obesity prevalence based on BMI and WC, blood pressure and glucose levels of participants

Parameter	Men (%) N=26	Women (%) N= 40	*p*
BMI			
Underweight	1 (3.8)	5 (12.5)	0.324
Normal	11 (42.3)	10 (25.0)	
Overweight	4 (15.4)	10 (25.0)	
Obese	10 (38.5)	15 (37.5)	
Waist circumference			
Normal	16 (61.5)	12 (30.0)	0.021*
Obese	10 (38.5)	28 (70.0)	
Blood pressure			
Normal	6 (23.1)	18 (45.0)	0.043*
Prehypertension	12 (46.2)	6 (15.0)	
Hypertension I	6 (23.1)	11 (27.5)	
Hypertension II	2 (7.7)	5 (12.5)	
Glucose level			
Normal	24 (92.3)	37 (92.5)	0.695
Diabetes	2 (7.7)	3 (7.5)	

Percentages were in the same gender; *p< 0.05; N: number of participants; p: significance (Chi-square test)

(p=0.695). Type-2 diabetes was slightly greater in women, i.e., 12.5%, compared to 7.7 % in men. Figure 1 shows health screening activities in the Community Service Program in Pajimatan Hamlet.

Correlation analyses indicated that only WC in men was significantly associated with systole blood pressure, while in women, BMI and WC were significantly associated with fasting blood glucose level (Table 5). Risk analysis was done using binary logistic regression on the probability of hypertension only and not diabetes since the prevalence is low in the population (Table 6). The odds ratio (OR) values ranged between 2.67 and 3 in BMI and were higher in WC (from 4.09 to 12.50). Nonetheless, significance was only observed on the risk of hypertension and WC in women with OR= 12.50.

DISCUSSION

Based on the analysis of the data indicated that the healthy lifestyle education program in productive age people in Pajimatan Hamlet, Girirejo, Imogiri, Bantul, Yogyakarta can significantly increase the knowledge of the community participating in the Community Service Program, as indicated by the significant value of the pre-post tests for both men (p=0.017) and women participants (p<0.001). In the present study, social media via WhatsApp is used to deliver the knowledge because this application is widely used social media in the sample population. WhatsApp groups have been used to communicate with members in groups, therefore, they can effectively deliver knowledge of a healthy lifestyle. This continuously supported the studies of Dixit & Nandakumar[14] and Joseph-Shehu et al.[9] that social media-based intervention was a promising technique for promoting health and effective for delivering health intervention. The education materials were delivered in video format, uploaded to YouTube, and then distributed to the WAGs to help reduce the participants' internet data load.

Examination of nutritional status indicated that obesity prevalence based on BMI and WC was very high in participants. The prevalence of BMI obesity in men participants was 16.7 and 33.3%, while in women, it was 23.3 and 39.5%, respectively. Based on WC, the prevalence of obesity was 40% (men) and 69.8% (women). Blood pressure examination showed that only 20% of male participants had normal blood pressure, 43.3% prehypertension and the rest were stage 1 and 2 hypertension (27.9%) and stage 2 hypertension as much as 16.3%. Examination of blood glucose levels in participants showed that 7.7% of men and 7.5% of women were detected as having high blood sugar (diabetes). In general, the health screening results found that the prevalence of overweight and obesity was very high in both men and women. In addition, the prevalence of pre- and hypertension is also very high, i.e., 80% in men and almost 60% in women.

Table 5. Correlations of nutritional status, blood pressure, and fasting blood glucose level of participants

Variable	Men (*r, p*)			Women (*r, p*)		
	Systole	Diastole	Glucose	Systole	Diastole	Glucose
Height	-0.34 (0.086)	-0.27 (0.186)	0.03 (0.886)	0.01 (0.939)	0.12(0.473)	0.24 (0.159)
Weight	-0.04 (0.862)	-0.01 (0.955)	0.34 (0.100)	0.14 (0.376)	0.24 (0.140)	0.37(0.057)
BMI	0.13 (0.539	0.08 (0.689)	0.39 (0.059)	0.15 (0.351)	0.19 (0.257)	0.33 (0.046)*
WC	0.13 (0.537)	-0.04 (0.846)	0.34 (0.101)	0.36 (0.022)*	0.29 (0.068)	0.35 (0.034)*

*p< 0.05; BMI: body mass index; WC: waist circumference; Spearman's rho correlation analysis

Table 6. The prevalence and odds ratio using binary logistic regression analysis of hypertension and nutritional status (obesity) in men and women

		Blood Pressure, N (%)		B	Constant	OR	*p*
		Normal	Hypertension				
BMI							
Men	Normal	6 (50)	6 (50)				
	Obese	1 (7.1)	13 (92.9)	1.099	-405	3.00	0.262
Women	Normal	8 (53.3)	7 (46.7)				
	Obese	4 (16)	21 (84)	0.981	-1.386	2.67	0.144
WC							
Men	Normal	7 (43.8)	9 (56.3)				
	Obese	0	10 (100)	1.409	-0.620	4.09	0.234
Women	Normal	12 (100)	0				
	Obese	0	28 (100)	2.526	-4.135	12.50	0.004

Percentages were within category in each gender; BMI: body mass index; WC: waist circumference; OR: Binary logistic regression

The frequency of BMI obesity (including overweight), i.e., 50% in men and 62.8% in women, was an alarming rate and needed great attention for public health interventions since the rates were greater than the national rate for adults aged > 18 years, i.e., 26.6 and 44.4% (BMI > 25 kg/m2).[14] World Health Organization[15] indicated that increased BMI was a main risk factor for noncommunicable diseases, including CVD, metabolic syndrome, musculoskeletal disorders, and some cancers. Obesity was also linked to more death worldwide compared with underweight. The rising central obesity, as measured with WC in this community, needs a deep concern. Several studies found that WC was a good predictor for metabolic disorders[16,17] and CVD.[18,19] High rate of abdominal obesity was also reported in adults of Dilla, South Africa, and related to nutritional problems. Several factors include being in the middle- and high-income levels, less physical activity, a less varied diet, and being female.[20] Among urban Bangladeshi women, high socioeconomic status and low education level were also related to the rise in occurrences of general and central obesity, which become a health concern and need public awareness and effective health intervention strategies.[21]

Among the health screening done in the community service program, hypertension was another highest health risk in the population. Moreover, the prevalence was almost twice in women and 2.5 times in men, greater than the national prevalence of hypertension in 2018, i.e., 34.1%.[22] The same issue has been reported by Zhaki *et al.*[23] that hypertension was also high among Malaysian adults. Individuals with older age, higher BMI, and diabetes were more likely to have hypertension. Moreover, Zhaki and colleagues[23] recommended that lifestyle modification and education are important in managing and preventing hypertension.

Considering a healthy lifestyle may include dietary patterns and physical activity. A healthy lifestyle is one way to prevent obesity and reduce the health risk consequences. Engaging in a healthier lifestyle was associated with up to 6.3 years of life longer for men and 7.6 years for women regardless of morbidities, as suggested by a UK Biobank study.[8] While Shi *et al.*[24] indicated that modern hypertension and dietary pattern among Thai people were associated and significantly affected by BMI. Therefore, a strategy to reduce modern diets would be useful to prevent and control hypertension. A high rate of hypertension in Eastern Sudan has also been reported, especially among older and obese individuals, suggesting implementing a preventive tool, such as dietary measures.[25] Among Korean adults, fruit consumption was negatively associated with obesity and metabolic syndrome in men, and hypertension in women, suggesting that the amount and sources of fiber need to be considered in dietary quality.[26]

Physical activity has been acknowledged associated with quality of life. Research suggested that high physical activity was useful to prevent premature death,[27] conversely, low physical activity predisposes individuals to develop metabolic disease.[28] Otang-Mbeng *et al.*[29] found that low physical activity was a significant risk factor for obesity, some eating habit factors, and several diseases such as arthritis, hypertension and tuberculosis of Nkonkobe people, South Africa.

Considering the complex interaction of obesity factors including genetic, socioeconomic, and cultural, and the continuing increase prevalence as well as the correlated comorbidities and health costs, suggests a need for early intervention

and effective treatment.[5] Since the findings of health screening, including nutritional status, blood pressure, and blood glucose levels, indicated that the prevalence of overweight and obesity, prehypertension, and hypertension was very high in the sample community, attention should be paid to this community. Education about healthy lifestyles may help people adopt a healthy life, therefore, may prevent and reduce the prevalence of obesity and health-related problems. Given that this Community Practice Program can significantly improve the knowledge of healthy lifestyles of the population, this program can be used as a pilot model to educate people in the community. Future design should include more detailed knowledge of healthy lifestyles and cover wider community targets. Education may also include knowledge about obesity and the health risk factors to improve the community's quality of life.

Limitations of the study include the small sample size. The limited number of participants resulted from the age range of participants to the productive age, limited sample area, and the cross-sectional case-study design. Although most people in this community use WhatsApp media daily, the intensity and quality with which each participant interacts with the media may vary depending on the occupation, daily activity, passion, and economic level, which may influence internet data purchase. In addition, the wide range of academic backgrounds and knowledge might contribute to each participant's different enhancement rates. Education has been followed up via WAGs regularly each weekend for one month to accommodate this issue.

CONCLUSION

We conclude that people at productive age in Pajimatan Hamlet who participated in this Community Service Program posed a high risk of obesity and the associated health problem, especially high blood pressure. This needs to get serious attention from the community, especially the participants of the Community Service Program, as well as the local government to pay more attention to the health of the population in their area and design public health programs and policies to prevent poorer health consequences related to obesity and hypertension. Education intervention in this Community Service Program can improve the knowledge about the community's healthy lifestyle.

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CONFLICT OF INTEREST

The authors declare there is no conflict of interest.

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