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Metabolic Syndrome Screening as a Prevention of Sudden Death among the Catholic Church Community

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Abstract

The elderly population is often associated with various comorbidities, including metabolic syndrome, which significantly increases the risk of sudden death. The Catholic Church, through its Elderly Commission, plays a vital role in fostering the well-being of elderly congregants by promoting Christian values and enhancing their physical, mental, and spiritual health as individuals, family members, and community contributors. This community service at St. John Paul II Chapel was executed on September 1, 2024, employing a participatory action research methodology to improve the quality of life within the community and support government health programs, particularly in preventive medicine related to metabolic syndrome. Key activities included anthropometric measurements (height, weight, waist-to-hip ratio, and body fat percentage) and screenings for blood pressure, blood glucose, and cholesterol levels using standardized medical equipment. Additionally, personalized prevention education and consultations with medical professionals were provided following the health assessments. 68 participants were involved, with a mean age of 41.96 years. Women comprised 57.4% of the group. The prevalence of obesity, hypertension, hyperglycemia, and dyslipidemia was 45.6 %.1%, 1.5%, and 73.5%, respectively. The participants' knowledge of metabolic syndrome scored an average of 86.47 points, with the highest awareness in risk factors (97 points). These findings highlight the need for improved health management to mitigate the risks and complications of metabolic syndrome. Strengthening preventive measures and promoting community-based health interventions are essential in addressing this critical public health challenge.

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INTRODUCTION

The senior demographic in Indonesia reached 28 million (10% of the total population) out of 280 million in 2022, and this number is anticipated to exceed 40 million (13.8% of the

population) by 2030, as reported by Indonesia's Central Bureau of Statistics (BPS). Both developed and developing nations encounter analogous challenges due to the escalating number of elderly individuals (Kementerian Kesehatan, 2022). The aging process affects not only biological alterations but also the psychosocial and economic dimensions of an individual's existence. Public health initiatives must be perpetually enhanced to guarantee the productivity and well-being of the elderly population in Indonesia. This is consistent with the aims of the national health system, which seeks to promote healthy living for all citizens, facilitating their attainment of optimal health and the ability to lead productive lives (Sistem Kesehatan Nasional, 2012).

Metabolic syndrome refers to a collection of symptoms resulting from various cardiovascular risk factors, including hypertension, central obesity, dyslipidemia, and hyperglycemia. Individuals diagnosed with metabolic syndrome are more likely to develop type 2 diabetes mellitus and face a significantly elevated risk of mortality from cardiovascular diseases. According to the International Diabetes Federation (IDF), a diagnosis of metabolic syndrome is made if an individual exhibits central obesity (waist circumference > 90 cm for Asian men and > 80 cm for Asian women) along with at least two of the following four criteria: triglyceride levels > 150 mg/dL (1.7 mmol/L) or undergoing treatment for hypertriglyceridemia; HDL-C levels < 40 mg/dL (1.03 mmol/L) for men and < 50 mg/dL (1.3 mmol/L) for women; systolic blood pressure > 130 mmHg or diastolic blood pressure > 85 mmHg or receiving treatment for hypertension; fasting blood glucose (FBG) levels > 100 mg/dL (5.6 mmol/L) or a diagnosis of type 2 diabetes mellitus (Gotera & Nugraha, 2023).

Screening is vital for identifying high-risk groups for metabolic syndrome to enhance public health and curtail morbidity and mortality from sudden deaths due to cardiovascular diseases, thus enabling preventive interventions before the condition manifests. The Indonesian Society of Endocrinology (PERKENI) advocates for screening of individuals who satisfy the following criteria: men aged ≥ 40 years or women aged ≥ 50 years or postmenopausal, waist circumference > 90 cm for men and > 80 cm for women, obesity, active smoking, diabetes, hypertension, renal diseases, a family history of coronary heart disease and hyperlipidemia, erectile dysfunction and clinical indications of hyperlipidemia. Based on these criteria, a considerable segment of the population, especially the elderly, necessitates screening and prevention for metabolic syndrome. Nonetheless, numerous individuals encounter socioeconomic impediments to accessing healthcare services, rendering even basic screenings difficult, let alone the upkeep of routine treatments (Aman et al., 2021).

The Catholic Church has played an active role in supporting its congregation, particularly adults and the elderly to achieve these health objectives. This effort is marked by the establishment of the diocesan elderly commission in Surabaya. The commission aims to foster Christian character and improve the quality of life for members aged 60 and above. Its mission includes promoting physical, mental, and spiritual health, helping individuals thrive as members of their families and communities (Anonim, 2025). Providing such health services requires skilled and qualified resources capable of effectively carrying out their responsibilities in healthcare. Among the most critical professionals for this mission are doctors, whose roles are diverse and challenging. Efforts have been made to enhance medical education to prepare competent physicians in accordance with Indonesia's Medical Competency Standards. One of the key areas of expertise is managing metabolic syndrome, where physicians are expected to achieve full competency (Level 4A), enabling them to independently and comprehensively diagnose and treat cases. Strong clinical skills are essential for holistic care in addressing metabolic health issues (Standar Kompetensi Dokter Indonesia, n.d.).

A community service initiative by Siregar et al., conducted during a public seminar on metabolic syndrome in Riau, demonstrated a statistically significant improvement in participants' knowledge after the seminar. This indicated increased awareness of the dangers of metabolic syndrome and its prevention methods (Siregar et al., 2021). Similarly, a community service project by Susilawati et al., in Talang Petai Village, South Sumatra, yielded comparable results. The self-detection guidance for metabolic syndrome enhanced public understanding of the risks and preventive measures for the condition, emphasizing the need for sustained community engagement efforts (Susilawati et al., 2020). Through such community service activities, individuals gain insights into their physical health concerning metabolic syndrome and risk levels for associated comorbidities based on stratified examination results. This fosters awareness and enhances public knowledge about the condition and how to prevent it effectively.

METHODS

The health promotion initiative for screening metabolic syndrome, which sought to enhance awareness regarding metabolic syndrome and prevent sudden death among the elderly, was executed on September 1, 2024, employing a Participatory Action Research methodology. The participants included adults, both male and female, aged 18 years and older, affiliated with the congregation of St. John Paul II Chapel situated within Pakuwon Mall, Surabaya.

The Role of Students

This community service initiative involved six medical students and two dental students from Ciputra University, Surabaya. Their duties included aiding in collecting anthropometric measurements and documenting the medical data of the congregation's participating members.

Role of the Church

The St. John Paul II Chapel played a vital role in facilitating the program's implementation by partnering to recruit participants from its congregation and providing assistance as event facilitators during the promotional and metabolic syndrome screening activities. The church additionally contributed to the program's promotion by distributing information to its congregation through verbal announcements, brochures, and digital media. This collaboration ensured adequate participant turnout for the screenings conducted by the School of Medicine and Dental Medicine at Ciputra University, Surabaya.

Activity Format

This community service initiative comprised health promotion, education, and metabolic syndrome screening for the church congregation. The program was carried out through a series of structured steps, including:

a. **Recruitment of Congregation Members**
   The program commenced by disseminating online registration links via digital media to identify congregation members who required the services. Several months before the event, the community service team from the Faculty of Medicine, Ciputra University, collaborated with the church to consolidate a list of qualified participants. This facilitated the program's effective targeting of the appropriate audience.
b. **Health Promotion and Education**
   At the commencement of the program, a health promotion session was conducted utilizing an educational video concerning metabolic syndrome. Developed by students from the School of Medicine at Ciputra University, the two-minute video encompassed

the definition, risk factors, symptoms, complications, and preventive measures related to metabolic syndrome.

c. **Assessment of Knowledge**
The congregation's understanding of metabolic syndrome was assessed using a straightforward, validated questionnaire. The questionnaire comprised 10 questions that focused on knowledge and behavioral attitudes connected to the participants' dietary practices and physical activity levels.

d. **Screening and Health Consultations**
The health screening and consultations were carried out by medical professionals, specifically doctors and dentists, and organized into three distinct stations: Station 1: Anthropometric measurements were taken, which included height, weight, waist circumference, and body fat and calorie composition using a digital scale. Station 2: Blood pressure, blood sugar, and cholesterol levels were assessed utilizing point-of-care testing (POCT) devices, accompanied by oral and dental health examinations conducted by dentists. Station 3: Physicians evaluated the examination results, offered consultations, and informed participants regarding tailored strategies to avert metabolic syndrome.

e. **Activity Monitoring**
Monitoring was performed to assess the program's effectiveness, directed by faculty members and students. If practical, regular metabolic syndrome screenings may be instituted through a collaboration between the Faculty of Medicine, Ciputra University, and Catholic churches in the Surabaya area, specifically in West Surabaya.

Evaluation Design

The evaluation design is essential to assess the success of the community service program. The evaluation process included the following steps:

1. Needs Assessment for the Target Location
This step was executed during the program's preliminary planning stage. The School of Medicine, Ciputra University community service team, partnered with church leaders to deliberate on the medical conditions affecting the congregation, especially among adults and the elderly. The dialogue centers on recognizing the common indicators and risk factors of metabolic syndrome frequently seen within the church community.
2. Pre and In-Program Evaluation
This phase entailed evaluating the congregation's understanding, dietary practices, and physical activity patterns pertinent to metabolic syndrome. Individuals were given a questionnaire followed by an informational session covering these subjects. Any challenges faced during the program's execution were swiftly resolved to guarantee the seamless implementation of activities.
3. Post-Program Evaluation
After the program, an assessment was carried out in conjunction with the church. This procedure examined all facets of the program to evaluate its overall success and efficacy.

Data Analysis

All subjects who have registered for this program were included in the data analysis. Subjects who were absent during the program were excluded from the analysis. Descriptive statistical analysis was used to describe the characteristics of the research subject. Normally distributed data was displayed in the mean ± SD, whereas non-normally distributed data was shown in the median (range). Statistical analysis using an unpaired T test if the data was normally distributed or using the Mann-Whitney test if the data was not normally

distributed was used to determine whether there is a significant association between knowledge about metabolic syndrome and the comorbidities. The analysis results were statistically significant if the p-value was < 0.05. The entire statistical analysis of this study uses Microsoft Excel and SPSS version 26 (IBM®).

RESULTS AND DISCUSSION

This community service activity took place on September 1, 2024, and engaged 68 members of the church congregation: 29 men and 39 women, with an average age of 41.96 ± 18.82 years, ranging from 18 to 83 years old. The educational backgrounds predominantly consisted of bachelor's degrees, although some individuals possessed only an elementary level of education. Nearly half of the participants were either homemakers or students. In general, the program proceeded seamlessly. Demographic characteristics of participants are shown in Table 1.

Table 1 Demographic characteristics of participants

Characteristic	Result (n=68)
Age (y.o)	41.96 ± 18.82
Sex	
Male	29 (42.6)
Female	39 (57.4)
Education	
Masters	3 (4.4)
Bachelors	40 (58.8)
Senior High	18 (26.5)
Junior High	2 (2.9)
Elementary	5 (7.4)
Occupation	
Housewife	16 (25.53)
Students	14 (20.59)
Entrepreneur	9 (13.24)
Private sector employee	7 (10.29)
Lecturer	5 (7.35)
Government Employee	5 (7.35)
Retired	3 (4.41)
Teacher	2 (2.94)
Architect	1 (1.47)
Cleaning service	1 (1.47)
Florist	1 (1.47)
Photographer	1 (1.47)
Sales	1 (1.47)
Security	1 (1.47)
Unemployed	1 (1.47)
Weight (kg)	64.30 ± 14.81
Height (cm)	160.38 ± 8.82
Body Mass Index (kg/m^2)	24.84 ± 4.34
Obese 2	5 (7.4)
Obese 1	26 (38.2)
Overweight	12 (17.6)
Normal	23 (33.8)
Underweight	2 (2.9)
Waist to Hip Ratio	0.914 ± 0.068
High Risk	50 (73.5)
Low Risk	18 (26.5)
Fat (%)	30.52 ± 7.88
Basal Metabolic Rate (Cal)	1341.6 ± 289.4

Characteristic	Result (n=68)
Systolic Blood Pressure (mmHg)	126.35 ± 17.17
Diastolic Blood Pressure (mmHg)	75.51 ± 9.68
Hypertension	30 (44.1)
Heart Rate (x/m)	77.78 ± 12.23
Blood Glucose (mg/dL)	113.22 ± 30.27
Hyperglycemia	1 (1.5)
Blood Cholesterol (mg/dL)	215.68 ± 28.77
Dyslipidemia	50 (73.5)
Blood Uric Acid (mg/dL)	6.66 ± 2.94
Hyperuricemia	27 (39.7)
Knowledge Score	86.47 ± 15.24

At the commencement of the program, participants filled out a questionnaire evaluating their knowledge, dietary habits, and exercise routines. This was succeeded by a health education session centered on metabolic syndrome. The educational materials addressed the definition, diagnostic criteria, causes and risk factors, symptoms, complications, and the significance of treatment and prevention of metabolic syndrome, as well as preventing sudden cardiac death. The congregation members participated in physical examinations, which included measurements of height, weight, waist circumference, and hip circumference, in addition to body fat and calorie content assessed utilizing a digital scale. Blood pressure, blood sugar, cholesterol, and uric acid levels were similarly evaluated through point-of-care testing (POCT) devices. This is possible because the several cardiovascular risk factors that make up metabolic syndrome interact and harm multiple organs, including the heart. Similar to how many patients do not know they had metabolic syndrome, many sudden cardiac death patients did not know they had cardiovascular diseases at the time of their heart attack. Metabolic syndrome is a significant risk factor for coronary artery disease, which is thought to be the primary cause of sudden cardiac death in people over 35 years old. Accordingly, it is said that every element of the metabolic syndrome contributes to the atherosclerotic process; hence, screening for the metabolic syndrome using POCT will also prevent the risk of sudden cardiac death (Tirandi et al., 2022). Measurements of blood pressure, blood sugar, cholesterol and uric acid levels are shown in Figure 1.

Figure 1 Measurement of blood pressure, blood sugar, cholesterol, and uric acid levels

The findings indicated that the participants' mean weight was 64.30 ± 14.81 kg, and the mean height was 160.38 ± 8.82 cm, resulting in a Body Mass Index (BMI) of 24.84 ± 4.34 kg/m². The BMI varied from 18.36 to 39.74 kg/m², with 31 (45.6%) participants identified as obese and 12 (17.6%) participants identified as overweight.

The waist-to-hip ratio (WHR) recorded was 0.914 ± 0.068, with the proportion of participants exhibiting excessive waist circumference amounting to 50 (73.5%) individuals.

Body composition assessments revealed an average body fat percentage of 30.52 ± 7.88% and a Basal Metabolic Rate (BMR) of 1341.6 ± 289.4 calories. Additional results from the physical examination included an average systolic blood pressure of 126.35 ± 17.17 mmHg and a diastolic blood pressure of 75.51 ± 9.68 mmHg, with 30 participants (44.1%) being diagnosed with hypertension. The average blood glucose concentration was 113.22 ± 30.27 mg/dL, with 1 (1.5%) participant being identified as hyperglycemic. The average cholesterol level was 215.68 ± 28.77 mg/dL, and 50 (73.5%) participants received a diagnosis of dyslipidemia. The average uric acid level recorded was 6.66 ± 2.94 mg/dL, with 27 (39.7%) participants being diagnosed with hyperuricemia. This study found that people with greater blood urate levels were older, more likely to be Black or male, and had lower HDL-C, higher BMI, CKD, diabetes, and higher SBP or CRP. Higher serum urate levels were also associated with a higher likelihood of taking statins, diuretics, or antihypertensive drugs. In basic models, higher blood urate levels were linked to a higher risk of incident CHD and sudden cardiac death, and these relationships seemed to be linear. For every 1 mg/dL increase in serum urate, the crude HR for sudden cardiac death was 1.26 (95% CI 1.14, 1.40)(Colantonio et al., 2021). Consultation and education on preventing metabolic syndrome are shown in Figure 2.

Figure 2 Consultation and education on metabolic syndrome prevention

Educational videos on metabolic syndrome and its prevention are shown in Figure 3.

Figure 3 Educational video about metabolic syndrome and its prevention

The findings from the physical examinations of the church congregation were analogous to those noted in a community service initiative conducted by Parisa et al., wherein the participants exhibited an average body mass index (BMI) of 25.1 kg/m². The prevalence of individuals with hypertension was 45.71%, dyslipidemia was 77.14%, and hyperglycemia was 10%. In light of these assessments, it is imperative to implement strategies aimed at managing the risk factors associated with metabolic syndrome to avert further complications. Furthermore, the community service project executed by Fikri et

al. produced comparable outcomes, with 59.1% of participants categorized as obese and 72.6% exhibiting indications of central obesity (Fikri et al., 2023).

Another community service by Darmo et al. found that around 24% of participants in Jeneponto Regency of South Sulawesi have hypertension with blood pressure over 157/93 mmHg. This number seems a bit lower compared to hypertensive participants in this result, which is 44%. High blood pressure (hypertension) is a significant risk factor for cardiovascular diseases, including heart attacks and strokes. Individuals with metabolic syndrome are more likely to experience elevated blood pressure compared to those without the condition (Darmo & Betol, 2023). Wikandari et al. found the prevalence of obesity in Semarang, Central Java, was 73.2%, with overweight of 14.3% (Wikandari & Purlinda, 2023). This number seems to be higher compared to this study with 45.6% participants being obese and 17.6% being overweight. These differing results may be attributed to variations in location and sociodemographic factors, which can influence dietary patterns and occupations. Consequently, the prominent risk factors for metabolic syndrome may also vary. The level of congregational knowledge about metabolic syndrome is shown in Table 2.

Table 2 The congregation's level of knowledge regarding metabolic syndrome

Domain of metabolic syndrome	Score (%)
Definition	70.59
Risk factors	97.06
Sign and symptoms	95.59
Complication	88.24
Prevention	80.88
Overall average score	86.47 ± 15.24

The congregation's level of knowledge regarding metabolic syndrome achieved an average score of 86.47 ± 15.24 points out of a possible 100. According to the question domains, the results indicated that the accuracy of responses in the respective domains was as follows: 70.59% for the definition of metabolic syndrome, 97.06% for risk factors, 95.59% for symptoms, 88.24% for complications, and 80.88% for prevention. There exists no significant association between the knowledge score and the participants' sex (p=0.606), hypertension (p=0.390), dyslipidemia (p=0.674), hyperuricemia (p=0.377), and obesity (p=0.323). A cross-sectional study by Asrizal et al. conducted among students at Universitas Syiah Kuala used a validated knowledge questionnaire and physical activity data collected through the Global Physical Activity Questionnaire (GPAQ). The results showed that 57.1% of respondents had low physical activity levels, while 89.7% demonstrated high knowledge levels. However, no significant correlation was found between knowledge levels and physical activity levels (p = 0.795) (Asrizal & Farrastama, 2021) possibly because knowledge alone may not be sufficient to drive behavioral changes. Other factors, such as personal motivation, environmental influences, social support, and access to facilities for physical activity, could play a more critical role in determining activity levels. This suggests that while individuals may understand the importance of physical activity, practical barriers or competing priorities might hinder their ability to act on this knowledge.

Concerning exercise habits, 36 participants (52.9%) engaged in physical activity 0-2 times per week, 23 participants (33.8%) engaged in physical activity 3-5 times per week, and 9 participants (13.2%) engaged in physical activity more than 5 times per week. The length of each exercise session was less than 10 minutes for 21 participants (30.9%), 10-30 minutes for 22 participants (32.4%), and 30-60 minutes for 25 participants (36.8%). The majority of participants utilized cardiovascular types of exercise (77.9%) as opposed to weight-bearing or flexibility exercises. The exercise is needed to combat metabolic

syndrome, which is a significant risk factor for sudden death, because the components of the syndrome, such as hypertension, dyslipidemia, hyperglycemia, and central obesity, contribute to the progression of atherosclerosis, myocardial ischemia, and arrhythmogenic conditions (Hess et al., 2017).

The community was informed about the risks identified in their examinations, followed by presenting a treatment plan and the significance of multilevel preventive measures. For individuals with normal results, the objective was to sustain their good health, while for those with abnormalities, the emphasis was placed on averting complications and negative outcomes. Additionally, the community was advised on when to seek care at the nearest healthcare facility if they should experience symptoms commonly associated with metabolic syndrome. During the consultations, the medical team shared results and health information, allowing participants to review the information at home following the session. Several participants showed interest in receiving treatment; however, since medication was not dispensed during this community service event, those wishing for treatment were referred to their primary healthcare facility for follow-up. The community members received consultations and discussions regarding metabolic syndrome with significant enthusiasm. A study by Munawaroh et al. (2023) suggested that family awareness regarding the dangers of non-communicable diseases, including those associated with metabolic syndrome, should be further enhanced to help prevent the occurrence of such conditions. Follow-up assessments can be conducted periodically to evaluate whether the community is effectively applying the education provided (Munawaroh et al., 2023).

CONCLUSION

The community service activity organized by the School of Medicine and Dental Medicine at Ciputra University Surabaya was successfully carried out in collaboration with church representatives. The program assessed the community's knowledge of metabolic syndrome, with an average score of 86.47 ± 15.24 points. The most common risk factors for metabolic syndrome identified were dyslipidemia (73.5%), obesity (45.6%), and hypertension (44.1%).

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR CONTRIBUTION STATEMENT

Conceptualization, DPA and RDS; methodology, AIT and BDM; formal analysis, DPA and AIT; writing—preparation of the original draft, RDS and BDM; review and editing, DPA, RDS, AIT, and BDM. All authors have read and agreed to the published version of the manuscript.

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