

Knowledge, Attitudes, and Motivation Associated with Hypertension Self-Care Adherence Among Older Adults: A Cross-Sectional Study

Suaib Suaib^{a*}, Dian Meiliani Yulis^b

^a Universitas Widya Nusantara, Central Sulawesi, Indonesia

^b Universita Megarezky, Sulawesi Selatan, Indonesia

*Correspondence: Suaib, Universitas Widya Nusantara, Central Sulawesi, Indonesia

Email: suaibners12@gmail.com

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ABSTRACT

Introduction: Hypertension remains one of the leading chronic conditions affecting older adults and requires sustained self-care adherence to prevent cardiovascular and renal complications. Multiple behavioral factors influence adherence, yet evidence regarding the contribution of knowledge, attitudes, and motivation among Indonesian older adults remains limited. This study aimed to examine the associations between knowledge, attitudes, motivation, and self-care adherence among older adults with hypertension in Palu, Indonesia.

Methods: A community-based cross-sectional study was conducted between May and June 2026 involving 72 older adults with hypertension selected through accidental sampling from a population of 250 eligible patients. Data were collected using structured questionnaires assessing knowledge, attitudes, motivation, and self-care adherence. Descriptive statistics summarized participant characteristics, while Chi-square tests and odds ratios (ORs) with 95% confidence intervals (CIs) were used to evaluate associations. Statistical significance was established at $p < 0.05$.

Results: Most participants demonstrated good knowledge (59.7%), positive attitudes (62.5%), high motivation (66.7%), and adherence to hypertension self-care (63.9%). Good knowledge was significantly associated with greater adherence (OR=9.77; 95% CI: 3.05–31.35; $p < 0.001$). Participants with positive attitudes were more likely to adhere to recommended self-care practices (OR=12.89; 95% CI: 3.85–43.17; $p < 0.001$). High motivation showed the strongest association with adherence (OR=35.00; 95% CI: 8.36–146.59; $p < 0.001$).

Conclusion: Knowledge, positive attitudes, and motivation were significantly associated with self-care adherence among older adults with hypertension. Strengthening patient education, motivational counseling, family engagement, and continuous follow-up may improve long-term adherence and contribute to better hypertension management in primary healthcare settings.

Keywords: Aged; Health Knowledge, Attitudes, Practice; Hypertension; Medication Adherence; Self Care.



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INTRODUCTION

Hypertension remains one of the most prevalent chronic non-communicable diseases among older adults and represents a major contributor to cardiovascular morbidity, disability, and premature mortality worldwide. Population ageing has substantially increased the number of older individuals living with hypertension, creating considerable challenges for health systems in maintaining long-term disease control (Alvarez *et al.*, 2022). Despite the availability of effective antihypertensive medications and evidence-based clinical guidelines, blood pressure control among older adults remains suboptimal because successful management depends not only on pharmacological treatment but also on sustained adherence to self-care behaviors (Andala *et al.*, 2024). These behaviors include medication adherence, regular blood pressure monitoring, dietary modification, physical activity, smoking cessation, stress management, and routine follow-up with healthcare providers (Booker, Herr and Tripp-Reimer, 2021). Poor adherence to these recommendations increases the risk of stroke, coronary heart disease, chronic kidney disease, cognitive decline, hospitalization, and reduced quality of life. Consequently, improving self-care adherence has become a priority for hypertension management, particularly within ageing populations (Dong, Zhang and Wang, 2024).

Previous studies have demonstrated that adherence to hypertension self-care is influenced by a complex interaction of cognitive, psychological, behavioral, and environmental factors. Among these determinants, knowledge, attitudes, and motivation consistently emerge as modifiable factors that shape health-related decision-making (Durukan *et al.*, 2024). Adequate knowledge enables older adults to understand disease progression, recognize the importance of lifelong treatment, and appreciate the consequences of uncontrolled blood pressure (Ferdinand *et al.*, 2023). Positive attitudes facilitate acceptance of recommended lifestyle modifications and increase willingness to engage in preventive behaviors. Likewise, motivation provides the internal and external drive necessary to maintain long-term adherence despite the asymptomatic nature of hypertension and the burden of continuous treatment (Green *et al.*, 2023). Systematic reviews have further suggested that educational interventions, motivational support, family involvement, and health literacy enhancement can improve medication adherence and self-management among hypertensive populations (He *et al.*, 2022). Nevertheless, improvements remain inconsistent across different healthcare settings, indicating that behavioral determinants may operate differently according to local social and healthcare contexts.

Recent evidence has increasingly emphasized that knowledge alone is insufficient to produce sustainable behavioral change (Kgasi, Chimbo and Motsi, 2023). Individuals with adequate knowledge may still demonstrate poor adherence when they possess unfavorable attitudes, limited confidence in disease management, or insufficient motivation to maintain recommended behaviors. Similarly, motivational factors are often influenced by family support, communication with healthcare professionals, accessibility of primary healthcare services, and cultural beliefs regarding chronic illness (Kwakye *et al.*, 2024). These findings suggest that hypertension self-care should be understood through a multidimensional behavioral framework rather than as a consequence of knowledge acquisition alone (Lawless *et al.*, 2021). Therefore, identifying the relative contribution of these behavioral determinants is essential for developing effective patient-centered interventions that extend beyond conventional health education.

Although numerous international studies have investigated factors associated with medication adherence among patients with hypertension, several important knowledge gaps remain. First, many studies have primarily focused on medication adherence without comprehensively examining broader self-care behaviors that encompass lifestyle modification, routine monitoring, and continuous disease management. Second, evidence specifically targeting community-dwelling older adults remains limited, despite the unique physiological, cognitive, and psychosocial challenges associated with ageing. Third, findings from high-income countries may not be directly applicable to Indonesia because differences in healthcare accessibility, family caregiving traditions, health literacy, and cultural beliefs substantially influence adherence behaviors. Furthermore, relatively few studies have simultaneously examined knowledge,

attitudes, and motivation within the same analytical framework among Indonesian older adults receiving community-based hypertension care.

The present study addresses these gaps by examining the relationships between knowledge, attitudes, motivation, and self-care adherence among older adults with hypertension in Palu City, Indonesia. Unlike previous studies that frequently focused on a single behavioral determinant or medication adherence alone, this research integrates three key behavioral constructs that are theoretically interconnected and potentially modifiable through nursing and public health interventions. By adopting a community-based perspective, the study provides empirical evidence reflecting routine hypertension management within primary healthcare services and community settings where most older adults receive continuous care.

The novelty of this study lies in its comprehensive evaluation of cognitive and motivational determinants of hypertension self-care adherence among Indonesian older adults using a unified behavioral framework. The findings are expected to generate context-specific evidence that supports the development of targeted health education, motivational counseling, family-centered care, and community-based hypertension management programs. Such evidence may contribute to improving adherence, strengthening primary healthcare services, and reducing the burden of hypertension-related complications among ageing populations in Indonesia. Therefore, this study aimed to examine the associations between knowledge, attitudes, motivation, and self-care adherence among older adults with hypertension in Palu City, Indonesia. The findings are expected to provide evidence-based recommendations for healthcare professionals and policymakers in designing behavioral interventions that improve long-term hypertension management among older adults.

RESEARCH METHODOLOGY

Study Design

This study employed an analytical cross-sectional design to examine the associations between knowledge, attitudes, motivation, and self-care adherence among older adults with hypertension. A cross-sectional approach was considered appropriate because it enables the simultaneous measurement of exposure and outcome variables, allowing the identification of behavioral factors associated with self-care adherence within a defined population. The study followed the recommendations of the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines for reporting observational research.

Setting and Participants

The study was conducted in community-based primary healthcare services in Palu City, Central Sulawesi, Indonesia, between May and June 2025. The target population consisted of older adults diagnosed with hypertension who were registered at participating primary healthcare facilities. Participants were eligible if they met the following inclusion criteria: (1) aged ≥ 60 years; (2) had a physician-confirmed diagnosis of hypertension for at least six months; (3) were receiving antihypertensive treatment or routine follow-up; (4) were able to communicate effectively in Indonesian; and (5) voluntarily agreed to participate by providing written informed consent. Individuals were excluded if they had severe cognitive impairment, serious hearing or speech disorders that prevented questionnaire completion, acute medical conditions requiring hospitalization, or incomplete questionnaire responses. A non-probability accidental sampling technique was employed by recruiting eligible participants attending healthcare services during the study period. The minimum sample size was estimated using the single population proportion formula for cross-sectional studies with a 95% confidence level, 5% margin of error, and finite population correction based on 250 registered older adults with hypertension. The calculation indicated a minimum sample requirement of approximately 70 participants. To compensate for potential incomplete responses, 72 participants were ultimately enrolled.

Variables and Measurement

The dependent variable was hypertension self-care adherence, defined as the extent to which participants complied with recommended hypertension management practices, including medication adherence, blood pressure monitoring, dietary modification, physical activity, and

routine healthcare visits. Self-care adherence was categorized as adherent and non-adherent according to predetermined questionnaire cut-off scores. The independent variables included: Knowledge, referring to participants' understanding of hypertension, its complications, treatment, and preventive strategies. Attitudes, representing participants' beliefs, perceptions, and acceptance of recommended hypertension management. Motivation refers to the intrinsic and extrinsic factors encouraging participants to maintain recommended self-care behaviors.

Data were collected using structured questionnaires adapted from previously validated hypertension self-management instruments. Content validity was evaluated by three experts in community nursing and chronic disease management. Construct validity was assessed through item-total correlation analysis, with correlation coefficients exceeding 0.30 considered acceptable. Internal consistency reliability was evaluated using Cronbach's alpha, with coefficients ≥ 0.70 indicating satisfactory reliability for all study variables. Primary data were obtained directly from participants through interviewer-assisted questionnaires, while secondary data, including patient registration records and hypertension diagnosis, were obtained from participating primary healthcare facilities.

Data Collection

Data collection was performed by trained research assistants who received standardized instruction regarding participant recruitment, informed consent procedures, interview techniques, and questionnaire administration. Eligible participants were approached during routine healthcare visits and screened according to the predefined eligibility criteria. Following informed consent, participants completed the structured questionnaire through face-to-face interviews to minimize missing responses and accommodate older adults with limited literacy. Quality control procedures included interviewer training, pilot testing of the questionnaire before data collection, daily review of completed questionnaires, double-checking data completeness, standardized coding procedures, and independent verification of electronic data entry to reduce transcription errors.

Data Analysis

Data were analyzed using IBM SPSS Statistics version 29.0 (IBM Corp., Armonk, NY, USA). Prior to analysis, all questionnaires were checked for completeness, coded, and entered into the database. Data cleaning was performed to identify missing values, inconsistencies, and entry errors before statistical analysis. Descriptive statistics were used to summarize participants' demographic characteristics and study variables. Categorical variables were presented as frequencies and percentages. Bivariate analysis was conducted using the Pearson Chi-square test to examine the associations between knowledge, attitudes, motivation, and hypertension self-care adherence. Crude odds ratios (ORs) with 95% confidence intervals (95% CIs) were calculated to estimate the strength of the associations between each independent variable and self-care adherence. Statistical significance was determined using a two-tailed p-value < 0.05 . All statistical tests were performed at a 95% confidence level ($\alpha = 0.05$).

Ethical Approval

All participants received verbal and written explanations regarding the study objectives, procedures, potential benefits, confidentiality, voluntary participation, and their right to withdraw at any stage without consequences. Written informed consent was obtained from every participant before data collection. Participant anonymity was maintained by assigning unique identification codes, and all research data were securely stored and accessed only by the research team in accordance with the principles of the Declaration of Helsinki.

RESULTS

Participant Characteristics

A total of 72 older adults with hypertension participated in this study. Most participants were aged 56–65 years (47.2%), followed by those aged > 65 years (31.9%) and 46–55 years (20.8%). Female participants constituted 56.9% of the sample. Regarding occupation, homemakers represented the largest group (30.6%), followed by retirees (26.4%), self-employed individuals (23.6%), and unemployed participants (19.4%). Regarding the study variables, 59.7% of participants demonstrated good knowledge about hypertension, 62.5% had positive attitudes

toward hypertension management, and 66.7% reported high motivation for self-care. Overall, 63.9% of participants adhered to recommended hypertension self-care practices, whereas 36.1% were categorized as non-adherent.

Table 1. Characteristics of Participants (n = 72)

Variable	Category	n	%
Age (years)	46–55	15	20.8
	56–65	34	47.2
	>65	23	31.9
Sex	Male	31	43.1
	Female	41	56.9
Occupation	Housewife	22	30.6
	Retired	19	26.4
	Self-employed	17	23.6
	Unemployed	14	19.4
Knowledge	Good	43	59.7
	Fair	29	40.3
Attitude	Positive	45	62.5
	Less positive	27	37.5
Motivation	High	48	66.7
	Low	24	33.3
Self-care adherence	Adherent	46	63.9
	Non-adherent	26	36.1

The study population was predominantly composed of female older adults aged 56–65 years. More than half of the participants demonstrated favorable behavioral characteristics, including good knowledge, positive attitudes, and high motivation regarding hypertension management. Nearly two-thirds of respondents adhered to recommended self-care practices, suggesting a relatively satisfactory level of adherence within the study population while still indicating room for improvement.

Table 2. Association Between Knowledge, Attitudes, Motivation, and Self-Care Adherence

Variable	Adherent n (%)	Non-adherent n (%)	OR	95% CI	p-value
Knowledge					
Good	36 (83.7)	7 (16.3)	9.77	3.05–31.35	<0.001
Fair	10 (34.5)	19 (65.5)	Reference	—	
Attitude					
Positive	38 (84.4)	7 (15.6)	12.89	3.85–43.17	<0.001
Less positive	8 (29.6)	19 (70.4)	Reference	—	
Motivation					
High	42 (87.5)	6 (12.5)	35.00	8.36–146.59	<0.001
Low	4 (16.7)	20 (83.3)	Reference	—	

Chi-square analysis demonstrated statistically significant associations between all behavioral variables and hypertension self-care adherence. Participants with good knowledge were almost ten times more likely to adhere to hypertension self-care than those with fair knowledge (OR = 9.77; 95% CI: 3.05–31.35; $p < 0.001$). Likewise, individuals with positive attitudes exhibited significantly greater adherence than those with less positive attitudes (OR = 12.89; 95% CI: 3.85–43.17; $p < 0.001$). High motivation showed the strongest association with adherence, indicating that highly motivated participants were 35 times more likely to comply with recommended hypertension self-care practices than participants with low motivation (OR = 35.00; 95% CI: 8.36–146.59; $p < 0.001$).

The findings indicate that adherence to hypertension self-care among older adults is strongly associated with cognitive and psychological factors. Although most participants demonstrated adequate knowledge and favorable attitudes, motivation emerged as the behavioral factor most strongly associated with adherence. This pattern suggests that understanding hypertension alone may not be sufficient to sustain long-term self-care unless accompanied by positive attitudes and strong personal motivation. The observed relationships underscore the

importance of integrating behavioral strategies into routine hypertension management. Health education should extend beyond information delivery by fostering positive beliefs, reinforcing motivation, and encouraging active patient participation in disease management. Family involvement and continuous support from healthcare professionals may further strengthen adherence through regular counseling, monitoring, and individualized care planning. From a public health perspective, these findings emphasize that community-based hypertension programs should address behavioral determinants alongside clinical management. Strengthening health literacy, promoting motivational interventions, and improving patient engagement within primary healthcare settings may contribute to better treatment adherence, improved blood pressure control, and reduced risks of cardiovascular complications. These findings provide valuable evidence for healthcare providers and policymakers to develop comprehensive interventions that support healthy ageing and sustainable chronic disease management among older adults with hypertension.

DISCUSSION

The present study provides evidence that knowledge, attitudes, and motivation are significantly associated with hypertension self-care adherence among older adults in Palu, Indonesia. Rather than functioning as isolated determinants, these behavioral factors appear to interact in shaping an individual's willingness and capacity to maintain long-term disease management. Although hypertension is widely recognized as a chronic condition requiring lifelong treatment, sustained adherence remains difficult because effective management depends on repeated daily decisions involving medication use, dietary regulation, physical activity, and routine health monitoring. The findings suggest that successful self-care is not determined solely by access to healthcare or availability of medication but also by cognitive understanding, psychological readiness, and personal commitment to disease management. Consequently, improving adherence requires a broader behavioral approach that integrates educational, motivational, and psychosocial components into routine hypertension services.

The observed relationship between knowledge and self-care adherence highlights the importance of health literacy in chronic disease management. Older adults who understand the nature of hypertension, its long-term complications, and the rationale behind treatment recommendations are more likely to perceive self-care as a necessary preventive strategy rather than a temporary response to symptoms (Lee and Choi, 2024). Hypertension frequently progresses without noticeable clinical manifestations, leading many patients to underestimate its severity once symptoms subside (Liska *et al.*, 2024). Adequate knowledge reduces this misconception by reinforcing the understanding that blood pressure control requires continuous adherence regardless of symptom status (Lu *et al.*, 2024). However, the present findings also indicate that knowledge alone is unlikely to produce sustained behavioral change. Some individuals possessing adequate knowledge may still fail to adhere consistently because emotional responses, personal beliefs, treatment fatigue, and competing priorities in daily life simultaneously influence behavioral decisions (Morrow and Chin, 2022). Therefore, knowledge should be viewed as an essential but insufficient prerequisite for effective self-management.

Attitudes demonstrated an equally important contribution to self-care adherence. Positive attitudes toward hypertension management reflect greater acceptance of chronic disease, stronger confidence in recommended treatment, and higher willingness to adopt lifestyle modifications. Older adults who believe that self-care behaviors provide meaningful health benefits are more likely to integrate these behaviors into their daily routines (Papus *et al.*, 2022). Conversely, negative attitudes may reduce perceived treatment value, increase resistance toward lifestyle changes, and weaken adherence despite adequate clinical advice (Siette *et al.*, 2024). These findings support behavioral theories suggesting that health-related actions are strongly influenced by individual beliefs regarding disease severity, perceived benefits of treatment, and expectations of future health outcomes (Spitz *et al.*, 2024). Consequently, interventions that merely provide

factual information without addressing patients' beliefs and perceptions may have limited effectiveness in producing lasting behavioral change.

Among all variables examined, motivation demonstrated the strongest association with hypertension self-care adherence. This finding reinforces the growing recognition that motivation serves as the primary mechanism translating knowledge and positive attitudes into consistent health behaviors (Srisodsakul *et al.*, 2023). Motivation enables individuals to overcome practical barriers such as treatment burden, medication fatigue, dietary restrictions, transportation difficulties, and competing family responsibilities (Tyson *et al.*, 2023). For older adults, intrinsic motivation often develops from the desire to preserve independence, maintain functional ability, and avoid disability (Unni, Han and Dillon, 2022). In contrast, extrinsic motivation is frequently strengthened through encouragement from family members, healthcare professionals, and community support networks (Wong *et al.*, 2024). The strong association identified in this study suggests that interventions focusing exclusively on education may achieve only modest improvements unless accompanied by strategies designed to strengthen patient motivation and sustain behavioral commitment over time.

These findings are consistent with previous international research reporting that behavioral determinants play a central role in hypertension management among older adults. Systematic reviews have consistently shown that higher health literacy is associated with better medication adherence and improved blood pressure control because informed patients are better equipped to understand treatment recommendations and recognize the consequences of poor adherence (Yang, Lee and Chair, 2023). Likewise, studies conducted in Asia and other regions have demonstrated that positive attitudes toward hypertension treatment are associated with healthier lifestyle practices and greater compliance with medical advice (Yang *et al.*, 2022). Similar observations have also been reported in community-based studies conducted in Indonesia, where patient beliefs and perceptions substantially influenced adherence to long-term hypertension management.

The prominent role of motivation observed in this study is also supported by emerging evidence emphasizing motivational factors as critical determinants of successful chronic disease management. Previous investigations have demonstrated that self-efficacy, perceived benefits of treatment, social support, and motivational counseling significantly improve adherence among patients with hypertension (Zhou *et al.*, 2024). Family-centered interventions, peer education, and individualized counseling have been shown to strengthen motivation by providing continuous emotional reinforcement and practical assistance. These findings collectively suggest that sustainable behavioral change is most likely to occur when educational interventions are combined with strategies that enhance personal confidence, strengthen intrinsic motivation, and create supportive social environments.

Beyond confirming previous evidence, the present study contributes conceptually by demonstrating that knowledge, attitudes, and motivation should not be interpreted as competing determinants but rather as complementary components within an integrated behavioral framework. Knowledge provides the cognitive foundation for informed decision-making, attitudes determine how individuals evaluate recommended behaviors, and motivation sustains behavioral implementation despite long-term treatment demands. This integrated perspective offers a more comprehensive understanding of hypertension self-care than approaches focusing exclusively on medication adherence or isolated behavioral constructs. Consequently, healthcare systems should shift from information-centered education toward comprehensive behavioral interventions that simultaneously strengthen cognitive understanding, positive attitudes, and sustained motivation.

The findings also have important implications for primary healthcare practice. Hypertension management among older adults should incorporate routine behavioral assessment alongside clinical monitoring. Healthcare professionals should evaluate patients' understanding of hypertension, explore misconceptions regarding treatment, assess motivational readiness, and identify barriers that interfere with adherence. Educational programs should employ interactive communication rather than one-way information delivery, while motivational interviewing

techniques may enhance patient engagement and encourage long-term commitment. Furthermore, involving family caregivers in hypertension management may strengthen adherence because older adults often rely on family support for medication management, transportation, dietary preparation, and emotional encouragement. Such patient-centered strategies align with contemporary models of integrated chronic disease management, emphasizing collaboration between patients, families, and healthcare providers.

Several limitations should be considered when interpreting the present findings. First, the cross-sectional design precludes conclusions regarding causal relationships because exposure variables and outcomes were measured simultaneously. Longitudinal studies are therefore required to determine temporal relationships between behavioral determinants and adherence. Second, the relatively small sample size and use of accidental sampling may limit external validity and reduce the generalizability of findings to broader populations of older adults. Third, self-reported questionnaires may be susceptible to recall bias and social desirability bias, potentially resulting in overestimation of adherence behaviors. Fourth, this study focused primarily on behavioral factors and did not evaluate other potentially important determinants, including socioeconomic status, cognitive function, multimorbidity, medication complexity, depression, health system characteristics, and family caregiving intensity. These variables may interact with behavioral determinants and should be considered in future investigations.

Future research should adopt prospective cohort or longitudinal study designs to clarify causal pathways linking behavioral factors with hypertension self-care over time. Larger multicenter studies involving diverse geographical regions would improve external validity and provide broader evidence for national hypertension programs. Future investigations should also employ multivariable analytical approaches capable of simultaneously evaluating demographic, clinical, psychosocial, and health system determinants. Incorporating validated measures of health literacy, self-efficacy, social support, frailty, and quality of life may further strengthen theoretical understanding of behavioral mechanisms underlying treatment adherence. Finally, intervention studies evaluating motivational interviewing, digital health education, family-centered care, and community-based behavioral support are needed to determine effective strategies for improving long-term hypertension management among older adults. Such evidence would support the development of sustainable, evidence-based policies that integrate behavioral science into primary healthcare and healthy ageing initiatives.

CONCLUSIONS

This study demonstrated that knowledge, attitudes, and motivation were significantly associated with hypertension self-care adherence among older adults in Palu, Indonesia. Older adults with better knowledge, more positive attitudes, and higher motivation were substantially more likely to adhere to recommended self-care practices, including medication adherence, blood pressure monitoring, healthy dietary behaviors, physical activity, and routine healthcare visits. Among the behavioral factors examined, motivation showed the strongest association with adherence, emphasizing that sustainable hypertension management depends not only on patients' understanding of the disease but also on their willingness and commitment to maintain long-term self-care behaviors. These findings highlight the importance of integrating behavioral interventions into routine hypertension management within primary healthcare settings. Health policies should strengthen patient-centered education, motivational counseling, family engagement, and continuous follow-up to improve long-term adherence among older adults. Community-based hypertension programs that combine health literacy improvement with motivational support may contribute to better blood pressure control and reduce hypertension-related complications. Future studies employing longitudinal designs and multicenter settings are recommended to confirm causal relationships and guide the development of evidence-based interventions for healthy ageing and chronic disease management.

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Conflict of Interest

The authors declare that there are no financial, professional, institutional, or personal conflicts of interest that could have influenced the design, conduct, analysis, interpretation, or reporting of this study.

Authors' Contributions

Suaib: Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Writing – Original Draft, Visualization. Dian Meiliani Yulis: Supervision, Validation, Methodology, Writing – Review & Editing, Interpretation of Findings, Project Administration.

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Declaration of Generative AI Use

During the preparation of this manuscript, the authors used generative artificial intelligence solely to improve language quality, grammar, readability, and manuscript organization. All scientific content, study design, data collection, statistical analysis, interpretation of findings, and final editorial decisions were performed independently by the authors. The authors carefully reviewed, verified, and accepted full responsibility for the accuracy, originality, and integrity of the final manuscript in accordance with the journal's publication ethics.

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