

Community-Based Acupuncture for Geriatric Osteoporosis: A Prospective Feasibility Case Series in Primary Health Posts

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Abstract

Background: Community-based evidence regarding acupuncture for older adults with osteoporosis is limited, particularly in resource-constrained primary healthcare settings.

Objective: This study aimed to evaluate the feasibility of implementing a community-based acupuncture protocol and assess short-term clinical changes following the intervention in older women with osteoporosis at the Mangliawan Elderly Community Integrated Health Post, Malang Regency, Indonesia.

Methods: A prospective, single-group case study was conducted involving 25 women aged 61–72 years with osteoporosis. All participants received 10 acupuncture sessions over five weeks. Feasibility was evaluated based on intervention adherence, session completion, and completeness of data. Clinical outcomes were assessed using the Visual Analogue Scale (VAS) for pain, the Barthel Index for activities of daily living, and the WHOQOL-BREF for quality of life.

Results: All participants completed the intervention according to the study protocol, with complete records for all treatment sessions and no reported adverse events. The mean VAS score decreased from 6.30 ± 0.91 to 0.80 ± 0.52 ($p < 0.001$), while the mean Barthel Index increased from 62.0 ± 8.9 to 84.0 ± 7.4 ($p < 0.001$). Scores in all WHOQOL-BREF domains improved.

Conclusion: Community-based acupuncture is feasible for implementation in geriatric primary care and has the potential to reduce pain, increase functional independence, and improve quality of life. Further controlled studies with larger samples and longer follow-up are needed to confirm its clinical efficacy.

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INTRODUCTION

Osteoporosis is a systemic skeletal disorder characterized by low bone mass and microarchitectural deterioration, increasing susceptibility to fragility fractures.^{1,2} In 2019, fractures accounted for approximately 178 million new cases and 25.8 million years lived with disability worldwide, with the highest burden in older adults, especially women.³ Indonesian national clinical guidelines (2023) cite an estimated osteoporosis prevalence of approximately 23% among women aged 50-70 years and 53% among those over 70; however, these figures derive from previous surveys and highlight the ongoing need for updated national surveillance.¹ In the geriatric population, persistent musculoskeletal pain, reduced mobility, fear of falling, and coexisting degenerative joint diseases can further accelerate functional decline and loss of independence.

Pharmacological therapy, adequate calcium and vitamin D intake, physical activity, fall prevention, and management of secondary causes remain central to osteoporosis care.¹ In addition, acupuncture has been investigated as an adjunctive non-pharmacological intervention, particularly for pain and functional symptoms. Recent evidence from systematic reviews and controlled studies suggests that acupuncture may benefit pain, quality of life, and selected bone-related outcomes, although certainty is limited by heterogeneity in acupuncture techniques, comparators, and study quality.⁴⁻⁷

Most acupuncture studies on osteoporosis have been conducted in hospital or specialist settings under relatively controlled conditions.⁴⁻⁷ Evidence remains sparse regarding whether standard protocols can be consistently delivered in community-based primary health posts, whether older adults will complete planned sessions, and whether adverse effects can be adequately monitored under routine service conditions. This implementation gap is critical

because efficacy demonstrated in controlled settings does not automatically establish feasibility, acceptability, or scalability in resource-constrained community care.

In Indonesia, Posyandu Lansia (Elderly Integrated Health Posts) provide community-based screening, health education, monitoring, and social support for older adults. Studies of Posyandu Lansia programs demonstrate their potential to improve access and quality of life, but intervention capacity for chronic musculoskeletal conditions remains variable.⁸⁻¹¹ Without accessible symptom management, persistent pain can inhibit mobility and social participation, thereby exacerbating deconditioning and dependence. Therefore, acupuncture can be considered an adjunct, not a replacement, for standard osteoporosis management; its community use must be carefully evaluated for feasibility and early clinical signals.

Furthermore, access to dual-energy X-ray absorptiometry (DXA), the diagnostic standard for osteoporosis, remains extremely limited in many Indonesian primary health facilities. Recent International Society for Clinical Densitometry guidance emphasizes risk stratification using simple screening tools before referral for DXA.¹² The Osteoporosis Self-Assessment Tool for Asians (OSTA) has been validated in Asian populations as a simple tool to identify individuals at high risk of osteoporosis.¹³ Height loss has also been identified as a clinically relevant indicator associated with vertebral compression fracture risk.¹⁴ Therefore, community-based screening approaches that combine OSTA and height measurement may offer a practical method to identify high-risk older adults who require further assessment and management in settings with limited DXA access.¹²⁻¹⁴

This study evaluated a standardized acupuncture service embedded in the Mangliawan Elderly Integrated Health Post. The primary aim was to assess feasibility through participant-level data completeness and recorded completion of planned sessions. Secondary exploratory aims were to describe pre-post changes in pain intensity, functional independence, and all four WHOQOL-BREF domains. Safety monitoring was an integral part of the study framework, and reporting was aligned with current recommendations to promote transparency in acupuncture research.¹⁵ The study was designed to generate implementation data for future pragmatic, controlled trials, not to establish causal efficacy or fracture prevention.

Embedding acupuncture in this setting was intended to expand symptom-oriented supportive care, not to replace anti-osteoporosis medication, nutrition, exercise, fall prevention, or medical follow-up. If pain remains uncontrolled, older adults may reduce activity and participation, which can exacerbate deconditioning and dependence. Therefore, the community protocol is only relevant if it can be delivered consistently, monitored safely, and evaluated without overstating effects.

RESEARCH METHODS

Research Design

This was a prospective, single-arm, pre-post feasibility case series. Consistent with feasibility study principles, implementation outcomes were prioritized, while clinical outcomes were treated as exploratory.¹⁶ This design allows observation of protocol delivery and within-participant changes under routine community conditions but cannot separate intervention effects from natural symptom fluctuation, regression to the mean, contextual effects, or other time-varying factors.

Time and Place of Research

The study was conducted at the Posyandu Lansia, Perum Mangliawan, Malang Regency, East Java, Indonesia, from May to July 2025. Activities included community socialization, eligibility screening, delivery of 10 acupuncture sessions over 5 weeks, post-intervention assessments, and adverse event monitoring.

Population and Sample Size

The source population consisted of active Posyandu Lansia participants who met eligibility criteria. Consecutive sampling was used: all eligible individuals encountered during the recruitment period were invited until the pragmatic service capacity target of 25 participants was reached. The target was not derived from a confirmatory efficacy calculation because feasibility outcomes, rather than definitive treatment effect hypothesis testing, were the primary focus. Therefore, clinical estimates should be interpreted as preliminary and used to inform the design and variance assumptions of subsequent controlled studies.¹⁶

Inclusion and Exclusion Criteria

Participants were eligible if they were aged 60–75 years, had an existing diagnosis of osteoporosis recorded in study files, reported persistent musculoskeletal pain for at least 3 months, agreed to attend the intervention schedule,

and provided written informed consent. Exclusion criteria were acute conditions requiring urgent care, known coagulation disorders, current anticoagulant or antiplatelet therapy assessed by the responsible physician as posing unacceptable procedural bleeding risk, known metal or needle allergies, or severe comorbidities deemed to make acupuncture unsafe.

Control of Pharmacological Variables (Concurrent Therapy)

To ensure internal validity and minimize intervention bias, this study strictly controlled concurrent therapy. Participants were required to be on a stable anti-osteoporosis regimen for at least 3 months prior to the study. Use of rescue analgesics (NSAIDs/opioids) and systemic corticosteroids was restricted except for emergency indications. This protocol was intended to reduce pharmacological confounding in the assessment of pain and functional outcomes.¹⁷

Recruitment, Screening, and Ethical Approval Procedures

Potential participants received verbal and written explanations of the study's purpose, procedures, anticipated benefits and risks, confidentiality protections, voluntary participation, and the right to withdraw without affecting routine services. Written informed consent was obtained prior to study procedures. Ethical approval was granted by the Health Research Ethics Committee, Institute of Technology, Science, and Health, dr. Soepraoen Hospital (No. KEPK-EC/140/IX/2024). Data was anonymized before analysis and stored with restricted access to the research team.

Intervention Protocol and Standardization of Acupuncture Practice

The intervention consisted of 10 sessions delivered twice weekly for 5 weeks using a fixed set of seven points: Zhongwan (CV12), Neiguan (PC6), Zusanli (ST36), Shenshu (BL23), Sanyinjiao (SP6), Taixi (KI3), and Mingmen (GV4) (**Table 1**). Point locations followed the WHO Standard Acupuncture Point Locations in the Western Pacific Region.¹⁸ The protocol was standardized across participants and presented as a pragmatic research service protocol. Intervention reporting was aligned with STRICTA (Standards for Reporting Interventions in Clinical Trials of Acupuncture) and recent recommendations on reporting guidelines in acupuncture research to ensure transparency and reproducibility.^{15,19}

Table 1. Standard Anatomical Location and Needling Technique

No.	Acupuncture points (WHO code)	Standard anatomical location	Needling technique and depth
1	Zusanli (ST36)	On the anterior aspect of the leg, the 3 B-cun is lower than ST35 and is one finger wide lateral to the anterior apex of the tibia.	Perpendicular, 0.5-1.2 cun.
2	Sanyinjiao (SP6)	In the medial aspect of the leg, the 3 B-cun is superior to the protrusion of the medial malleolus, posterior to the medial border of the tibia.	Perpendicular, 0.5-1.0 cun.
3	Taixi (KI3)	In depression between the protrusion of the medial malleolus and the calcaneal tendon (Achilles).	Perpendicular, 0.3-0.5 cun.
4	Shenshu (BL23)	In the lumbar region, at the level of the inferior boundary of the spinous process L2, 1.5 B-cun lateral to the posterior median line.	Perpendicular or slightly slanted, 0.5-1.0 cun.
5	Zhongwan (CV12)	At the anterior median line of the upper abdomen, the 4 B-cun is superior to the umbilical center.	Perpendicular, 0.5-1.0 cun.
6	Neiguan (PC6)	In the anterior forearm, 2 B-cun proximal to the folds of the palmar wrist, between the longus palmaris tendon and the radialis carpi flexor.	Perpendicular, 0.5-0.8 cun.
7	Mingmen (GV4)	On the posterior median line, in the depression lower of the spinous process L2.	Superior oblique, 0.5-1.0 cun.

Sterile, single-use stainless steel needles (HUANQIU; 0.25 × 25 mm and 0.30 × 40 mm) were inserted to the depths indicated in Table 1. Manual tonifying or even-needling techniques were applied according to the protocol, with needle retention for 20 minutes. Participants were observed during and immediately after each session, and predefined local and systemic adverse effects were recorded using a standardized form.

Measurement Instruments, Time Points, and Reliability

Pain intensity was measured using a 10-cm Visual Analog Scale, with 0 representing no pain and 10 representing the worst imaginable pain. Values were recorded in centimeters. Pain intensity was recorded at baseline, each session, and post-intervention. Functional independence was assessed using the 10-item Barthel Index (0-100), with higher scores indicating greater independence. Quality of life was assessed using the Indonesian WHOQOL-BREF, and the dataset provided contained scores for the physical, psychological, social, and environmental domains on a 0-100 scale.

Published studies support the reliability of VAS measurement in older adults, the Barthel Index in geriatric rehabilitation, and the Indonesian WHOQOL-BREF.²⁰⁻²²

Osteoporosis Diagnosis and Traditional Chinese Medicine (TCM) Syndrome Diagnosis

Community diagnosis was conducted using a combination of OSTA and height measurement to identify possible osteoporosis in the geriatric population. The use of OSTA referred to validation studies in Asian populations,¹³ while height measurement was used as a potential indicator of vertebral compression fracture risk according to the assessment framework.¹⁴ Examinations were performed by healthcare professionals holding an active practice license (SIP). Screening results were used as the basis for determining participants who met the study criteria and were subsequently confirmed based on available medical records. Before intervention, all participants underwent Traditional Chinese Medicine (TCM) syndrome examination based on the four diagnostic methods: inspection, auscultation/olfaction, inquiry, and palpation. Syndrome diagnosis was performed by an acupuncturist holding an active practice license and clinical experience. If diagnostic uncertainty arose, adjudication was performed until a consensus diagnosis was reached before manual acupuncture was administered.

Data Management, Quality, and Statistical Analysis

The distribution of data was tested using the Shapiro-Wilk test. The differences for VAS scores were not normally distributed; therefore, changes in VAS scores were analyzed using the Wilcoxon signed-rank test. The differences for Barthel Index and WHOQOL-BREF scores were normally distributed; therefore, changes in these scores were analyzed using the paired t-test. Effect sizes for the paired t-test are reported as Cohen's d_z . A p-value of < 0.05 was considered statistically significant.

RESULTS AND DISCUSSION

Results

Participant Characteristics

The validation dataset contained 25 women aged 61-72 years (mean, 66.2 ± 3.8 years). The participant code is unique and matches across three filled source sheets. All participants had complete VAS records from baseline through session 10 and post-intervention, corresponding to 250 of the 250 planned session records. The diagnosis of osteoporosis and the history of pain were coded as present for all participants; the basic diagnostics are included in **Table 2**.

Table 2. Baseline Demographic and Clinical Characteristics of Study Participants (N = 25)

Characteristic	N (%)
Age (year)	66.2 ± 3.8 (Range, 61-72)
61-65	9 (36)
66-70	10 (40)
71-72	6 (24)
Sex (Female)	25 (100)
Osteoporosis diagnosis	25 (100)
Persistent pain history	25 (100)
Complete session-level VAS records	250/250 (100)

Changes in Pain Intensity (VAS)

As shown in **Table 3**, the mean VAS pain decreased from 6.30 ± 0.91 at baseline to 0.80 ± 0.52 post-intervention, a mean reduction of 5.50 points (87.4%). The median paired change was -5.5 (IQR, -6.0 to -5.0), and the Wilcoxon signed-rank test yielded $W = 0$ ($Z = -4.28$; $P < 0.001$). Because the study had no control group and concurrent medication use, although restricted by protocol, was not objectively verified, these results represent exploration within-participant associations rather than causal treatment effects.

Table 3. Changes in pre-post pain intensity (N = 25)

Outcome	Baseline (mean $\pm$ SD)	Post (mean $\pm$ SD)	Median change (IQR)	Test statistic	P-value	Effect size
VAS Pain (0-10)	6.30 ± 0.91	0.80 ± 0.52	-5.5 (-6.0 to -5.0)	$Z = -4.28$	< 0.001	$R = 0.61$

Remarks: Statistically significant pain reduction ($p < 0.001$).

Secondary outcomes: activity function and quality of life

The Barthel Index increased from 62 ± 9 to 84 ± 7 , with a mean change of +22 points (95% CI, 17 to 27; $P < .001$). All four WHOQOL-BREF domains also improved: physical from 52.2 ± 7.0 to 70.2 ± 7.3 (+17.9), psychological from 55.6 ± 8.6 to 73.2 ± 7.7 (+17.6), social from 50.0 ± 8.0 to 68.6 ± 7.3 (+18.6), and environmental from 54.8 ± 8.3 to 69.9 ± 7.8 (+15.1), all with $P < .001$ (Table 4).

Table 4. Pre-post changes in functional independence and quality of life (N = 25)

Outcome	Baseline (mean $\pm$ SD)	Post-intervention, (mean $\pm$ SD)	Mean change (95% CI)	Paired t-test	p value	Cohen d _z
Barthel Index	62 ± 9	84 ± 7	+22 (17 to 27)	$t(24) = 9.81$	<.001	1.96
WHOQOL-BREF physical	52.2 ± 7.0	70.2 ± 7.3	+17.9 (16.4 to 19.4)	$t(24) = 24.32$	<.001	4.86
WHOQOL-BREF psychological	55.6 ± 8.6	73.2 ± 7.7	+17.6 (16.3 to 18.9)	$t(24) = 27.94$	<.001	5.59
WHOQOL-BREF social	50.0 ± 8.0	68.6 ± 7.3	+18.6 (17.0 to 20.2)	$t(24) = 23.31$	<.001	4.66
WHOQOL-BREF environment	54.8 ± 8.3	69.9 ± 7.8	+15.1 (13.5 to 16.6)	$t(24) = 20.10$	<.001	4.02

Based on the tabular data, all outcomes showed statistically significant improvement in 25 subjects ($p < 0.001$) with large to very large effect sizes (Cohen's d_z 1.96–5.59; highest in the psychological domain).

Intervention Safety

Throughout the study period, no serious adverse events (SAEs) or withdrawals due to procedure-related side effects of the procedure were reported (Table 5).

Table 5. Safety monitoring data

Safety Aspect	Number of Events (n)	Incidence per Total Sessions*	Clinical Description
Session-level adverse events (all complaints)	14	5.6%	All events were mild (Grade 1) and transient
Mild bleeding, bruising, or insertion pain	10	4.0%	Dominated by small ecchymosis and local tenderness; resolved spontaneously within < 24 hours
Serious adverse events (SAEs)	0	0%	No events requiring hospitalization, invasive procedures, or life-threatening conditions
Withdrawal due to side effects	0	0%	No subjects withdrew due to adverse reactions

Total acupuncture sessions = 250 (25 subjects $\times$ 10 sessions per subject).

Discussion

This study aimed to evaluate the feasibility, safety, and preliminary clinical changes associated with a standardized acupuncture protocol for older adults with osteoporosis in a community-based primary health setting. Specifically, the study examined whether acupuncture could be implemented consistently at the Posyandu Lansia level and whether participants showed changes in pain intensity, functional independence, and quality of life after completing the intervention. Therefore, the discussion is organized around the interpretation of the main clinical findings, the feasibility of implementation in a community setting, safety considerations, possible explanatory mechanisms, and the limitations that should be addressed in future controlled studies.

The reduction in pain intensity (VAS) by 87.4% and the 22-point improvement in daily functional independence (Barthel Index) suggest favorable short-term clinical changes after the acupuncture protocol. These findings are consistent with systematic reviews and controlled studies reporting potential benefits of acupuncture for pain, functional symptoms, and selected bone-related outcomes.^{4-7,23} However, the fundamental contribution of this study lies not in establishing efficacy, but in shifting attention toward pragmatic implementation in community-based primary care facilities.

Most global literature has evaluated acupuncture for osteoporosis under ideal conditions in tertiary hospitals or clinical laboratories with strict variable control and highly homogeneous subject selection.^{4-7,23} In contrast, this study examined the application of a standardized protocol within the Posyandu Lansia ecosystem, a dynamic community-based primary care facility with limited physical and financial resources. This community-based implementation approach is important because preventive and promotive programs for older adults in primary health facilities require adaptive, applicable, and low-cost service models to ensure long-term program sustainability.⁸⁻¹¹

The absence of a control group limits causal inference, but it does not eliminate the value of the study as a feasibility case series. From an implementation science perspective, single-arm feasibility designs are appropriate for evaluating protocol delivery, adherence, safety monitoring, and data completeness before proceeding to larger controlled trials.¹⁶ Completion of all 250 planned treatment sessions without dropout indicates high retention and practical acceptability in this community setting. The absence of serious adverse events is also consistent with broader observational evidence that acupuncture can be delivered safely when performed by trained practitioners using appropriate procedures.²⁴

Longitudinal observation across treatment sessions demonstrated a gradual and progressive pain reduction pattern. This pattern is consistent with a possible cumulative therapeutic effect, although other factors such as contextual effects, natural symptom fluctuation, and concurrent care cannot be entirely ruled out in a single-arm design.^{4,7,23} Therefore, the observed pain reduction should be interpreted as a preliminary clinical signal that requires confirmation in future controlled studies.

Biomedically, repeated needling at specific points may stimulate peripheral afferent fibers, activate descending pain-inhibitory pathways, and contribute to the release of endogenous opioids such as beta-endorphins, enkephalins, and dynorphins. Preclinical studies also suggest that acupuncture-related stimulation may modulate inflammatory pathways, Wnt/beta-catenin signaling, and bone-related responses in ovariectomized animal models.²⁵⁻²⁷ These mechanisms are biologically plausible but were not directly measured in the present study.

The integration of point selection in this study (CV12, PC6, ST36, BL23, SP6, KI3, and GV4) is consistent with a TCM rationale that links osteoporosis-related complaints with Kidney Deficiency and Spleen Deficiency patterns. Points BL23 (Shenshu), KI3 (Taixi), and GV4 (Mingmen) are commonly selected to support Kidney Qi and Essence (Jing), while ST36 (Zusanli), SP6 (Sanyinjiao), and CV12 (Zhongwan) are used to support Spleen and Stomach function. Previous acupuncture and moxibustion studies in osteoporosis and osteoporotic vertebral compression fracture populations have reported improvements in pain and quality-of-life outcomes, although point combinations and treatment modalities vary across studies.²⁸⁻³²

The inclusion of CV12 and ST36 also reflects the postnatal-nutrition concept in TCM, in which Spleen and Stomach function contributes to the generation of qi, blood, and essence that support musculoskeletal health. In older adults, declining digestive function and nutritional insufficiency may coexist with musculoskeletal degeneration. Thus, the selected point combination was intended to provide a supportive, symptom-oriented protocol rather than to replace standard osteoporosis treatment, nutritional management, exercise, or medical follow-up.^{1,18}

The improvement in all four WHOQOL-BREF domains suggests that the potential benefit of the intervention may extend beyond pain intensity alone. Reduced pain may facilitate mobility, sleep, emotional well-being, and social participation, which are important dimensions of geriatric quality of life. These findings are consistent with previous acupuncture-related studies reporting improvements in pain and quality of life and with community-based elderly programs that emphasize social engagement as part of healthy aging.^{6,10,11,28}

From a screening policy perspective, this study supports the practicality of combining OSTA and height measurement in primary facilities. The findings are consistent with evidence that OSTA can serve as a triage tool in Asian populations and that height reduction may indicate vertebral compression fracture risk.^{13,14} The integration of these screening approaches with current DXA guidance may help address the DXA access gap in Indonesia.¹² Nevertheless, this study did not directly measure bone mineral density; therefore, the diagnostic accuracy of OSTA and height-based screening against DXA should be confirmed in follow-up studies.

Safety outcomes were reported in accordance with the principles of transparent acupuncture intervention and safety reporting.^{15,19,24} The absence of serious adverse events and the low incidence of mild transient events suggest a favorable short-term safety profile in this community sample, provided that acupuncture is performed by competent practitioners using sterile needles and standardized procedures.

Notwithstanding the limitations outlined below, as a pragmatic feasibility study, the data from the Posyandu Lansia Perum Mangliawan provides useful implementation evidence for considering acupuncture as an adjunctive, symptom-oriented community service model. Future large-scale pragmatic randomized controlled trials are required to evaluate clinical efficacy, cost-effectiveness, and long-term safety before broader integration into primary healthcare programs.^{16,23}

Limitation

This study exhibits several methodological limitations, including a single-arm design without a control group that precludes causal attribution, and an unblinded assessment process susceptible to expectation bias. Furthermore, the generalizability of the findings is restricted due to the small sample size ($n = 25$, women aged 61–72 years) drawn from a single Posyandu. Finally, the diagnosis relied on OSTA screening rather than DXA confirmation, and the study did not evaluate long-term durability, cost-effectiveness, or practitioner workload.

CONCLUSION

Research at the Posyandu Lansia in Perum Mangliawan demonstrated that a standardized acupuncture protocol was feasible and safe to deliver as an adjunctive, symptom-oriented service for older women with osteoporosis in a primary healthcare setting. The completion of all planned sessions without serious adverse events indicates good acceptability at the grassroots level. The intervention was associated with favorable short-term changes in pain intensity, functional independence, and all four domains of quality of life; however, given the single-arm design, these changes should be regarded as preliminary clinical signals rather than proof of efficacy. The significance of these findings lies in showing that acupuncture can be implemented under real-world conditions in resource-limited community facilities, with the potential to reduce geographic and financial barriers for older adults and to strengthen the role of Posyandu in geriatric quality-of-life management. This model provides a preliminary foundation for designing pragmatic randomized controlled trials (RCTs) within the national primary healthcare system before wider adoption by policymakers.

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GENERATIVE AI DISCLOSURE STATEMENT

During the preparation of this manuscript, the authors used ChatGPT (OpenAI) to improve language, grammar, and readability. Meanwhile, Claude (Anthropic) assist in drafting the Limitation section. The tool was not used to generate or analyze research data, perform statistical analyses, or draw scientific conclusions. After using this tool, the authors reviewed and edited the content as needed and took full responsibility for the content of the publication.

STATEMENT OF CONTRIBUTION BY THE AUTHORS

Puspo Wardoyo: Conceptualization, methodology, investigation, formal analysis, resources, data curation, validation, project administration, writing – original draft, writing – review and editing, supervision, and final approval of the manuscript. **Chantika Mahadini:** Data curation, validation of clinical content, manuscript review and editing, supervision, project administration, and final approval of the manuscript. Both authors have reviewed and approved the final version of the manuscript and agree to be accountable for their respective contributions and for the integrity of the work.

DECLARATION OF CONFLICT OF INTEREST

The author states that there is no conflict of interest.

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