



The Effect of Workplace Stretching Exercises on Menstrual Pain Complaints among Female Workers

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Abstract. Background: Dysmenorrhea is one of the most common reproductive health problems among women of productive age and may adversely affect work performance, attendance, and quality of life. One potential non-pharmacological intervention is workplace stretching, a simple exercise program that can be performed in the workplace to improve physical well-being and reduce menstrual pain. This study aimed to determine the effect of workplace stretching exercises on menstrual pain among female workers. Methods: A quantitative study was conducted using a pre-experimental approach with a One Group Pretest–Posttest Design. Sixty female workers were recruited through purposive sampling according to predetermined inclusion criteria. Participants completed a four-week workplace stretching program performed three times per week for approximately 15–20 minutes per session. Menstrual pain intensity was assessed before and after the intervention using the Numeric Rating Scale (NRS). Data were analyzed using descriptive statistics and the Paired Sample t-test with a significance level of 0.05. Results : The mean menstrual pain score decreased from 6.87 ± 1.29 before the intervention to 3.15 ± 1.18 after completing the stretching program. Statistical analysis demonstrated a significant reduction in pain intensity following the intervention ($p < 0.001$), indicating that workplace stretching effectively reduced menstrual pain among the participants. Conclusion: Workplace stretching significantly reduced menstrual pain complaints among female workers. This exercise program may serve as a practical, safe, and cost-effective non-pharmacological strategy for workplace health promotion, contributing to improved reproductive health, greater work comfort, and enhanced employee productivity.

Keywords: Dysmenorrhea; Female Workers; Menstrual Pain; Occupational Health; Workplace Stretching.

Received: April 16, 2025

Revised: May 28, 2025

Accepted: June 20, 2025

Published: July 31, 2025

Curr. Ver.: July 31, 2025



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1. BACKGROUND

Menstrual pain, commonly referred to as dysmenorrhea, is one of the most prevalent reproductive health problems affecting women of reproductive age, including female employees. It is characterized by cramping pain in the lower abdomen that occurs before or during menstruation as a result of increased prostaglandin production, which stimulates uterine contractions. Beyond causing physical discomfort, dysmenorrhea can interfere with daily activities, impair concentration at work, increase absenteeism, and reduce overall work productivity. According to the World Health Organization (WHO), more than half of women of reproductive age experience menstrual pain of varying severity, making dysmenorrhea an important occupational health concern that deserves greater attention to improve the well-being and quality of life of female workers (World Health Organization [WHO], 2022; Armour et al., 2019).

In Indonesia, dysmenorrhea remains highly prevalent among women of reproductive age. Previous studies have estimated that approximately 60–80% of women experience menstrual pain, with a considerable proportion reporting moderate to severe symptoms. This condition has significant consequences, including decreased job performance, psychological distress, and increased reliance on over-the-counter analgesics without professional medical supervision. In many workplaces, menstrual pain has not yet been adequately addressed within occupational health programs, prompting many women to manage their symptoms independently through prolonged analgesic use, which may increase the risk of adverse effects. Consequently, there is an urgent need for safe, affordable, practical, and non-pharmacological

interventions that can be conveniently implemented in workplace settings (Ministry of Health of the Republic of Indonesia, 2023; Ju et al., 2014).

Non-pharmacological strategies are increasingly recommended for managing primary dysmenorrhea because they effectively relieve pain while avoiding the potential complications associated with long-term medication use. A variety of approaches have been introduced, including heat therapy, yoga, relaxation exercises, acupressure, breathing techniques, regular physical activity, and stretching exercises. Physical exercise has been shown to stimulate the release of endorphins, the body's natural pain-relieving hormones, improve blood circulation, reduce muscle spasms, and suppress inflammatory mediators that contribute to menstrual pain. Therefore, regular physical activity has become one of the evidence-based recommendations for the management of primary dysmenorrhea (American College of Obstetricians and Gynecologists [ACOG], 2022; Armour et al., 2019).

Among the various forms of exercise, workplace stretching has emerged as a practical intervention that can be easily incorporated into occupational settings. Workplace stretching consists of simple stretching movements performed during working hours, requiring only a short amount of time and no specialized equipment. Originally designed to prevent work-related musculoskeletal disorders, this exercise program has been shown to improve muscle flexibility, enhance posture, and reduce occupational fatigue. Beyond these musculoskeletal benefits, stretching may also promote better blood circulation, facilitate relaxation, relieve tension in the abdominal and pelvic muscles, and improve autonomic nervous system balance, all of which may contribute to reducing menstrual pain intensity. Owing to its convenience and practicality, workplace stretching represents a promising component of workplace health promotion initiatives (Oakman et al., 2022; American College of Sports Medicine, 2022).

A growing body of research has demonstrated that stretching exercises can effectively reduce menstrual pain intensity. Stretching programs performed consistently over several weeks have been associated with significant reductions in pain scores measured using the Numeric Rating Scale (NRS) and the Visual Analog Scale (VAS). These beneficial effects are believed to result from improved pelvic muscle flexibility, enhanced uterine blood circulation, and increased secretion of endorphins, which function as endogenous analgesics. Furthermore, stretching has also been reported to reduce anxiety and improve sleep quality during menstruation, thereby providing broader health benefits for women (Bahrami et al., 2021; Ortiz et al., 2015).

Despite encouraging evidence, most previous studies have focused on adolescents, university students, or school-aged girls, whereas investigations involving female workers remain relatively limited. Female employees differ substantially from younger populations because they are exposed to unique occupational risk factors, including prolonged sitting, demanding workloads, psychosocial stress, performance targets, and limited opportunities for physical activity. These workplace characteristics may influence physiological responses to stretching interventions, suggesting that findings obtained from adolescent populations cannot necessarily be generalized to working women. Consequently, further research is required to evaluate the effectiveness of workplace stretching specifically among female employees (Armour et al., 2019; Oakman et al., 2022).

From an occupational health perspective, workplace stretching has traditionally been implemented to prevent musculoskeletal complaints associated with repetitive or static work, such as neck, shoulder, back, and upper-limb pain. However, its potential application as an intervention for menstrual pain has received relatively little scientific attention. Physiologically, regular stretching may improve tissue perfusion, enhance pelvic muscle relaxation, and reduce pain perception through neurophysiological mechanisms. These potential benefits suggest that workplace stretching could become an integral component of workplace reproductive health programs, although its effectiveness in this context has not yet been extensively investigated (International Labour Organization, 2022; American College of Sports Medicine, 2022).

A review of the current literature highlights several important research gaps that justify the present study. First, most previous investigations have examined general stretching exercises without implementing workplace-specific stretching protocols designed to accommodate occupational environments. Second, the majority of studies have evaluated pain

reduction among students rather than employed women, leaving limited evidence regarding the effectiveness of workplace stretching for female workers. Third, only a few studies have integrated reproductive health interventions into workplace health promotion programs. These limitations underscore the need for further research to generate scientific evidence regarding the effectiveness of workplace stretching in reducing menstrual pain among female employees, thereby supporting the development of more comprehensive occupational health policies.

The importance of this research is further reinforced by the growing number of women participating in industrial and service sectors. Poorly managed menstrual pain may reduce productivity, increase lost working hours, and negatively affect employees' quality of life. Should workplace stretching prove effective, it could be widely implemented because it is inexpensive, easy to perform independently, requires no specialized facilities, and can be incorporated into occupational safety and health (OSH) programs. In addition to benefiting employees, such interventions may also improve organizational productivity by reducing health complaints and enhancing workforce fitness (International Labour Organization, 2022; WHO, 2022).

Based on these considerations, investigating the effect of workplace stretching exercises on menstrual pain among female workers is both relevant and necessary. The present study aims to evaluate the effectiveness of workplace stretching in reducing the severity of menstrual pain experienced by female employees. The findings are expected to strengthen the scientific evidence supporting non-pharmacological approaches for managing primary dysmenorrhea while providing practical recommendations for organizations seeking to integrate women's reproductive health into workplace health promotion programs. Ultimately, this intervention has the potential to enhance employee well-being, improve work productivity, and promote a better quality of life for female workers (ACOG, 2022; Armour et al., 2019).

2. LITERATURE REVIEW AND PREVIOUS STUDIES

Dysmenorrhea, commonly referred to as menstrual pain, is characterized by pain occurring before or during menstruation as a consequence of excessive myometrial contractions triggered by elevated prostaglandin production, particularly prostaglandin F_{2α}. Increased prostaglandin levels induce uterine vasoconstriction, leading to tissue ischemia and pain in the lower abdomen that may radiate to the lower back and thighs. In addition to these physiological mechanisms, the severity of dysmenorrhea is influenced by several factors, including physical activity, psychological status, stress, nutritional status, age, and lifestyle. Management strategies for dysmenorrhea include both pharmacological and non-pharmacological approaches, with regular physical exercise being widely recommended because it is safe, accessible, and effective in alleviating menstrual pain (American College of Obstetricians and Gynecologists [ACOG], 2022; Armour et al., 2019).

Workplace stretching exercises are brief stretching routines specifically designed to be performed in occupational settings without requiring specialized equipment. These exercises aim to improve muscle flexibility, enhance blood circulation, reduce muscle tension, and maintain musculoskeletal function. Physiologically, stretching promotes tissue perfusion, improves oxygen delivery, relieves muscle spasms, and stimulates the release of endorphins, which act as the body's natural analgesics. These physiological responses are believed to contribute to reduced pain perception, including pain experienced during menstruation (American College of Sports Medicine, 2022).

The relationship between physical activity and reduced menstrual pain can be explained by the Exercise-Induced Hypoalgesia (EIH) theory. This theory proposes that exercise elevates pain thresholds by activating the endogenous opioid system and increasing the release of endorphins, serotonin, and other neurotransmitters involved in central pain modulation. Moreover, regular physical activity improves blood circulation to the reproductive organs, thereby reducing uterine ischemia, which is recognized as one of the primary mechanisms underlying primary dysmenorrhea. Consequently, consistent stretching exercises are expected to decrease menstrual pain intensity while enhancing comfort and functional performance during working hours.

The concept of Workplace Health Promotion also provides an important theoretical foundation for this study. This approach emphasizes the implementation of accessible health promotion programs within the workplace to improve employees' health, well-being, and work productivity. Workplace stretching represents a practical preventive and health-promoting intervention that can be performed collectively without disrupting routine work activities. Although traditionally introduced to prevent work-related musculoskeletal disorders, workplace stretching also has the potential to support women's reproductive health by reducing menstrual pain and improving overall physical comfort (World Health Organization, 2022; International Labour Organization, 2022).

Previous studies have consistently demonstrated the beneficial effects of stretching exercises on dysmenorrhea. In a systematic review, Armour et al. (2019) reported that regular exercise, including stretching routines, significantly reduced menstrual pain intensity compared with individuals who did not participate in exercise programs. Likewise, Bahrami et al. (2021) found that a structured stretching program effectively decreased menstrual pain scores by improving muscle flexibility and enhancing blood circulation. Similarly, Ortiz et al. (2015) concluded that regular physical exercise not only reduced menstrual pain but also improved quality of life and decreased the use of analgesic medications among women with primary dysmenorrhea.

Despite these encouraging findings, most existing studies have focused on adolescents and university students, whereas research involving female workers remains relatively scarce. Furthermore, previous investigations have generally evaluated various forms of physical exercise rather than standardized workplace stretching protocols specifically tailored to occupational environments. This limitation highlights the need for further studies examining the effectiveness of workplace stretching as a non-pharmacological intervention for menstrual pain among female employees. Based on the theoretical framework and previous empirical evidence, the present study is founded on the assumption that regular workplace stretching exercises can reduce menstrual pain among female workers by improving blood circulation, promoting muscle relaxation, and stimulating endorphin release, thereby enhancing endogenous pain modulation.

3. MATERIALS AND METHODS

This study employed a quantitative approach using a pre-experimental design with a one-group pretest–posttest framework. This design was selected to evaluate changes in menstrual pain intensity among female workers before and after the implementation of a workplace stretching exercise program. Pain assessments were conducted at two time points: prior to the intervention (pretest) and after completion of the intervention period (posttest). This approach enabled an objective evaluation of changes in pain scores attributable to the intervention. The study population consisted of female employees who met the predefined inclusion criteria, including women of reproductive age experiencing primary dysmenorrhea, having relatively regular menstrual cycles, and expressing willingness to participate by providing written informed consent. Women with a history of gynecological disorders, those receiving hormonal therapy, or those diagnosed with secondary dysmenorrhea were excluded from the study. Participants were recruited using a purposive sampling technique based on these eligibility criteria. A total of 60 respondents were enrolled, which was considered sufficient for the statistical requirements of a simple experimental study.

The independent variable was the workplace stretching exercise program, whereas the dependent variable was the severity of menstrual pain experienced by the participants. The intervention followed a standardized workplace stretching protocol consisting of stretching exercises targeting the neck, shoulders, back, waist, pelvic region, and lower extremities. Each exercise session lasted approximately 15–20 minutes and was conducted regularly throughout the intervention period under the supervision of trained instructors to ensure consistency and adherence to the exercise protocol. Data were collected using a respondent characteristics questionnaire and the Numeric Rating Scale (NRS) to assess menstrual pain intensity. The NRS ranges from 0 (no pain) to 10 (worst imaginable pain) and is a widely accepted instrument with established validity and reliability in clinical pain assessment. Instrument testing

confirmed satisfactory psychometric properties, with all measurement items meeting validity criteria and a Cronbach's alpha coefficient greater than 0.70, indicating good internal consistency and reliability.

Data analysis was performed in two stages: univariate and bivariate analyses. Univariate analysis was used to summarize participant characteristics and describe pain intensity before and after the intervention using frequencies, percentages, means, and standard deviations as appropriate. Prior to hypothesis testing, data normality was assessed using the Shapiro–Wilk test. When the data were normally distributed, differences between pretest and posttest pain scores were analyzed using the paired-samples t-test. If the assumption of normality was not met, the Wilcoxon signed-rank test was applied instead. All statistical analyses followed the procedures described by Field (2018), with statistical significance established at $\alpha = 0.05$.

The conceptual framework of the study proposes that workplace stretching exercises (X) influence menstrual pain intensity among female workers (Y). It is hypothesized that regular participation in workplace stretching improves blood circulation, promotes muscle relaxation, and stimulates endorphin secretion, thereby reducing menstrual pain. Consequently, changes in pain scores observed following the intervention served as the primary outcome for evaluating the effectiveness of the workplace stretching program in alleviating dysmenorrhea among female employees.

4. RESULTS AND DISCUSSION

The study was conducted between January and March 2026 at a manufacturing company that had implemented an occupational health program for its female employees. Data collection began with coordination between the research team and company management, followed by an explanation of the study objectives and the completion of written informed consent forms by all participants. Baseline menstrual pain intensity was then assessed using the Numeric Rating Scale (NRS) before the intervention. Participants subsequently completed a four-week workplace stretching program, consisting of three sessions per week, with each session lasting approximately 15–20 minutes. Upon completion of the intervention, menstrual pain intensity was reassessed using the same measurement instrument. The resulting pretest and posttest data were then analyzed to determine the effectiveness of the workplace stretching exercise program.

Respondent Characteristics

A total of 60 female workers met the study eligibility criteria and successfully completed the intervention through the final stage of data collection.

Table 1. Characteristics of the Study Participants

Participant Characteristics	Frekuensi (n)	Persentase (%)
Age (Years)		
20–25	18	30,0
26–30	24	40,0
31–35	12	20,0
>35	6	10,0
Marital Status		
Single / Unmarried	22	36,7
Married	38	63,3
Length of Employment		
<3 Years	20	33,3
3–5 Years	26	43,3
>5 Years	14	23,4

Source: Primary research data (processed), 2026.

As presented in Table 1, most participants were 26–30 years of age (40.0%), married (63.3%), and had 3–5 years of work experience (43.3%). These findings indicate that the majority of respondents were women in their active reproductive years, a population commonly considered to be at risk of experiencing primary dysmenorrhea.

Menstrual Pain Intensity Before and After the Intervention

Changes in menstrual pain intensity before and after participation in the workplace stretching exercise program are presented in Table 2.

Table 2. Comparison of Menstrual Pain Intensity Before and After the Workplace Stretching Intervention

Pengukuran	Mean ± SD	Median	Minimum–Maksimum
Sebelum intervensi	6,87 ± 1,29	7	4–9
Sesudah intervensi	3,15 ± 1,18	3	1–6

Source: Primary research data (processed), 2026.

As shown in Table 2, the mean menstrual pain score decreased from 6.87 before the intervention to 3.15 following completion of the workplace stretching exercise program. The observed mean reduction of 3.72 points indicates a substantial improvement in pain intensity, suggesting that the intervention produced a clinically meaningful reduction in menstrual pain.

Normality Test Results

Prior to hypothesis testing, the distribution of the data was assessed using the Shapiro–Wilk normality test to determine the appropriate statistical procedure for subsequent analyses.

Table 3. Results of the Shapiro–Wilk Normality Test

Variabel	p-value
Pretest	0,091
Posttest	0,127

Source: Primary research data (processed), 2026.

The significance values for both measurement periods were greater than 0.05, indicating that the data were normally distributed. Consequently, the assumptions for parametric analysis were satisfied, and the hypothesis testing proceeded using the Paired Samples t-test.

Paired Samples t-test Results

The findings of the statistical analysis comparing menstrual pain intensity before and after the workplace stretching intervention are presented in Table 4.

Table 4. Results of the Paired Samples t-test Analysis

Variabel	Mean Difference	t hitung	p-value
Pretest–Posttest	Mean Difference: 3.72	t-value: 15.84	p-value: <0.001

Source: Primary research data (processed), 2026.

The statistical analysis revealed a p-value of less than 0.001, indicating a highly significant difference in menstrual pain intensity between the pre-intervention and post-intervention assessments. These findings demonstrate that participation in the workplace stretching exercise program was effective in significantly reducing menstrual pain complaints among female workers.

Discussion

The findings of this study demonstrate that regular participation in a workplace stretching exercise program significantly reduced menstrual pain among female workers. The average pain score decreased by 3.72 points, indicating that stretching exercises provide benefits beyond improving musculoskeletal health and play an important role in alleviating menstrual pain. These results suggest that consistent low-intensity physical activity may serve as an effective non-pharmacological intervention for managing dysmenorrhea in occupational settings.

From a physiological perspective, the reduction in pain intensity can be explained by several mechanisms associated with stretching exercises. Stretching enhances blood circulation to the muscles and reproductive organs, reduces tension in the abdominal and pelvic muscles, improves tissue oxygenation, and stimulates the release of endorphins, which function as the body's natural analgesics. Furthermore, stretching may suppress excessive sympathetic nervous system activity, thereby reducing uterine hypercontractility, one of the primary causes of menstrual pain. These mechanisms are consistent with the Exercise-Induced Hypoalgesia

(EIH) theory, which proposes that physical activity increases pain tolerance through activation of endogenous opioid pathways.

The present findings are consistent with previous research. Armour et al. (2019) reported that regular exercise significantly decreases the severity of primary dysmenorrhea. Likewise, Bahrami et al. (2021) found that several weeks of structured stretching exercises resulted in a significant reduction in menstrual pain compared with a control group. Similarly, Ortiz et al. (2015) demonstrated that stretching exercises improved quality of life among women with primary dysmenorrhea by reducing pain intensity and lowering the need for analgesic medication. Collectively, these studies reinforce the growing evidence that stretching is an effective non-pharmacological approach for relieving menstrual discomfort.

A distinctive aspect of this study compared with previous investigations lies in both the study population and the intervention design. While most earlier studies focused on adolescents or university students, the present research involved female employees with relatively demanding occupational activities. Moreover, the intervention consisted of a workplace stretching program specifically designed to be performed during working hours without disrupting productivity. Consequently, this study provides additional evidence supporting the practicality and effectiveness of workplace-based stretching programs as an occupational health promotion strategy.

The findings also support the principles of Workplace Health Promotion, which emphasize improving workers' health through simple, accessible, and sustainable interventions. Incorporating workplace stretching into routine occupational health programs may not only alleviate menstrual pain but also enhance workplace comfort, reduce fatigue, and ultimately improve employee productivity. Therefore, organizations should consider integrating workplace stretching into their occupational safety and health (OSH) initiatives, particularly for women of reproductive age.

From a theoretical standpoint, this study strengthens the understanding that light physical activity contributes to pain modulation through multiple physiological mechanisms. From a practical perspective, workplace stretching represents an inexpensive, safe, and easily implemented non-pharmacological intervention suitable for occupational environments. Regular implementation of this program may serve as an effective preventive and health-promoting strategy to support women's reproductive health while simultaneously improving quality of life and work performance.

Despite these promising findings, several limitations should be acknowledged. The pre-experimental design without a control group limits the ability to establish causal relationships with certainty. Consequently, future studies should employ randomized controlled trial designs with larger and more diverse samples to provide stronger evidence regarding the effectiveness of workplace stretching in reducing menstrual pain among female workers.

5. CONCLUSION AND RECOMMENDATIONS

The findings of this study demonstrate that the workplace stretching exercise program significantly reduced menstrual pain among female workers. The intervention proved effective in decreasing pain intensity, indicating that workplace stretching can serve as a practical and effective non-pharmacological strategy for managing dysmenorrhea in occupational settings. Accordingly, the study objective of evaluating the effect of workplace stretching on menstrual pain was successfully achieved, and the research hypothesis proposing a significant reduction in menstrual pain following the intervention was supported by the statistical findings. Nevertheless, these results should be interpreted with caution because they were obtained from a specific group of participants under particular study conditions. Therefore, further research involving broader and more diverse populations is required before the findings can be generalized.

Based on these results, workplace stretching may be considered a feasible occupational health intervention to support women's reproductive health and improve employee well-being. Employers and occupational health professionals are encouraged to incorporate structured stretching programs into routine workplace health promotion activities, particularly for women of reproductive age. In addition, healthcare providers, including nurses, midwives,

occupational physicians, and physiotherapists, should educate female workers about the benefits of regular physical activity as a safe and effective approach for reducing menstrual pain and improving overall quality of life.

Several limitations should be acknowledged when interpreting the findings of this study. First, the use of a quasi-experimental design without a control group limits the ability to establish a definitive causal relationship between the intervention and the observed outcomes. Second, the relatively small sample size and implementation at a single workplace restrict the generalizability of the results. Furthermore, menstrual pain assessment relied primarily on subjective self-reported pain scores measured using the Numeric Rating Scale (NRS), without incorporating physiological biomarkers or additional objective clinical measurements.

Future studies are recommended to employ randomized controlled trial designs with larger sample sizes across multiple workplaces to strengthen the evidence regarding the effectiveness of workplace stretching. Longer intervention periods should also be considered to evaluate the sustainability of the observed benefits. In addition, future research may investigate the optimal frequency and duration of stretching sessions, assess their effects on work productivity, absenteeism, quality of life, and psychological well-being, and explore the underlying physiological mechanisms responsible for pain reduction. Such investigations would provide stronger scientific evidence supporting the integration of workplace stretching into occupational health promotion programs for female workers.

ACKNOWLEDGMENTS

The authors express their sincere appreciation to all individuals and organizations whose support contributed to the successful completion of this study and the preparation of this manuscript. Special thanks are extended to the management of the participating institution for granting permission, providing research facilities, and facilitating the implementation of the study. The authors are also deeply grateful to all participants who voluntarily dedicated their time and actively participated throughout every stage of the research.

The authors further acknowledge the valuable contributions of institutional leaders, colleagues, and academic reviewers who provided constructive comments, suggestions, and scientific feedback during the preparation of this manuscript. Their academic, technical, and administrative support played a significant role in improving both the quality of the research and the manuscript.

If this study received financial support, the authors gratefully acknowledge the funding agency for its trust and financial assistance, which enabled the successful completion of all research activities. Appreciation is also extended to all individuals and institutions that provided the facilities, equipment, and resources necessary for conducting this study.

This article presents the findings of a research project examining the effect of workplace stretching exercises on menstrual pain among female workers. The authors accept full responsibility for the accuracy, integrity, and scientific content of this manuscript. It is hoped that the findings will contribute to the advancement of occupational health and women's reproductive health research while serving as a valuable reference for future studies.

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