J Health Sci Altern Med (2026)
DOI: 10.14456/jhsam.2026.2

Journal of
Health Science and Alternative Medicine

Original Article Open Access

Effects of Royal Thai Traditional Massage Combined with Thai Yoga Exercise among Thai Patients with Office Syndrome

Suwapat Boonruen[1], Sappaporn Wirattanapokin[1], and Sujitra Boonmak[2]

[1]Kanchanabhishek Institute of Medical and Public Health Technology, Faculty of Public Health and Allied Health Sciences, Praboromarajchanok Institute, Nonthaburi, 11150, Thailand
[2]Luangphopern Hospital, Nakhon Pathom, 73120, Thailand

Received January 4, 2026
Revise February 24, 2026
Accepted February 26 , 2026

***Corresponding author:**
Sappaporn Wirattanapokin1, Kanchanabhishek Institute of Medical and Public Health Technology, Faculty of Public Health and Allied Health Sciences, Praboromarajchanok Institute, Nonthaburi, 11150, Thailand

E-mail:
sappaporn@kmpht.ac.th

ABSTRACT

Introduction: Given the increasing prevalence of office syndrome and the concerns about medicinal treatments or innovative treatments that are accessible, cost-effective, and safe over the long-term are necessary. A combination therapy, such as the Royal Thai Traditional Massage combined with Thai Yoga Exercise (RTTM – TYE), is introduced to treat people suffering from office syndrome in this study, and that would fill this research gap. The study aimed to examine the effects of RTTM-TYE on pain levels and neck range of motion (NROM) by comparing two treatment methods: RTTM-TYE and RTTM alone.

Methods: A quasi-experimental, pretest-posttest research design was conducted on 60 participants diagnosed with office syndrome from the Thai traditional medicine clinic at *Luangphopern* Hospital in Nakhon Pathom province. Participants were assigned to two groups for a 2-week intervention period (3 sessions per week, totaling 6 sessions. While the control group of 30 received a 45-minute RTTM, the experimental group of 30 received RTTM the same as the control group and followed by a 30-minute TYE per session. Pain intensity was assessed using a Visual Analog Scale (VAS), and neck range of motion (NROM) was measured using a goniometer for precision in four directions: flexion, extension, and bilateral flexion. Data on pain levels and NROM were measured before and after treatments. Descriptive statistics and inferential statistics were used for data analysis.

Results: When comparing pre-post treatment, within the group of both the experimental and control groups, the findings indicated that pain levels and NROM of post-treatment were better than those of pre-treatment at the significant level of 0.05. The comparison between groups suggested that the experimental group demonstrated significantly lower pain levels and increased NROM for all positions than the control group at the significant level of 0.05.

Conclusions: Participants in the experimental group experienced better improvement in pain levels and neck mobility than those in the control group. This research suggests that using RTTM with TYE should be promoted as the combined treatment can reduce pain and increase neck movement more than RTTM alone.

Keywords: Office syndrome, Thai massage, *Ruesi Dad Ton,* Musculoskeletal disorders, Neck range of motion

Introduction

Office syndrome, which is a subset form of work-related musculoskeletal disorders (WMSD), also known as computer-related musculoskeletal disorders, has emerged as a significant public health concern in the digital era. Characterized by pain, tension, and stiffness primarily affecting the neck, shoulders, back, wrists, and hands, office syndrome results from prolonged static postures, repetitive movements, and ergonomic conditions associated with modern workplace environments [1]. According to Global Burden of Disease (GBD) 2019 data, approximately 1.7 billion people all over the world suffer from MSDs. People in high–income countries are most affected (441 million), followed by countries in the Western Pacific Region (427 million) and Southeast Asia Region (369 million) [2-5]. In Asian countries, the rapid digitalization of work environments has increased the prevalence of WMSDs among office workers, which ranges from 37.0 to 85.0% [6, 7]. A recent systematic review has reported the high prevalence of WMSDs (84.3%) among Asian

nurses and also mentioned the lower back, neck, and shoulders as the most affected areas [8]. Previous studies have shown similar trends of high incidences of WMSDs among healthcare professionals, affecting an estimated 91.2% in China [9], 74.7% in Vietnam [10], and 88.1% in Iran [11]. The most commonly affected areas involve the neck, shoulders, back, and upper limbs when exposed to computer work exceeding four hours daily without postural breaks [12]. A Thai study found that 83.6% of university office workers reported musculoskeletal disorders during the past 12 months, and pain was most frequently reported in the patients' right shoulder (65.7%), neck (62.1%), left shoulder (61.4%), and upper back (55.0%) [13].

Office syndrome is caused by multiple factors involving anatomical, psychosocial, and personal risk factors. The prolonged sitting, repetitive upper limb movements, and static neck flexion during computer usage result in muscle imbalances and fatigue, leading to chronic muscle pain, neural tension [14], and tendonitis [15]. High to severe stress and insufficient sleep duration have also been identified as risk factors associated with the development of musculoskeletal symptoms [6]. Current treatment for WMSDs, or office syndrome, typically involves medicinal and non-medicinal approaches, such as physical therapy and ergonomic or lifestyle modifications, as well as traditional Thai massage and Thai yoga exercise, which become more concerning among office syndrome patients due to their concerns regarding long-term side effects from taking medication for years [16]. Clinical research has demonstrated the effectiveness of Royal Thai Traditional Massage (RTTM) in reducing pain intensity, improving range of motion, and enhancing functional ability in various musculoskeletal conditions [17, 18].

Thai yoga Exercise (TYE), known locally as "Ruesi Dad Ton," represents an ancient therapeutic movement that integrates physical postures, breathing techniques, and meditation principles. Previous studies have suggested that TYE practice improves flexibility [19, 20] and reduces muscle pain [21] and stress [19]. Recently, TYE has been applied as a combined therapy with Thai massage for the purpose of increasing treatment efficiency to improve flexibility, facilitate blood circulation, and promote breathing through meditation practice [22]. While comparative studies on the effects of using Thai massage and Thai yoga or other non-medicinal treatments for WMSDs are available [22-24], the investigation of their use in combination therapy for various disorders has been limited [25, 26]. The rationale for combining RTTM with TYE results from their complementary therapeutic mechanisms operating synergistically across neuromuscular, biomechanical, and neurophysiological outcomes [27]. RTTM generates immediate neurophysiological changes, including enhanced blood flow, reduced muscle tone, fascial remodeling, and pain perception through peripheral and central nervous system pathways, consequently creating an optimal physiological environment for subsequent active movement such as TYE intervention [28].

Given the increasing prevalence of office syndrome and the concerns about medicinal treatments, innovative treatments that are accessible, cost-effective, and safe over the long-term are necessary. The present study addresses this research gap by comparing the effectiveness of combined RTTM and TYE intervention to RTTM alone in Thai patients with office syndrome. Conducted at Luangphopern Hospital, a well-known center for traditional Thai medicine in Nakhon Pathom Province, this research aims to provide evidence-based support for integrative treatment approaches that may be implemented in both clinical and community settings. The findings of this study have significant implications for clinical practice and public health promotion in Thailand and similar developing countries, which are facing the increasing prevalence of work-related musculoskeletal disorders.

Methods

Study design and samples

This quasi-experimental research adopted a two-group, pretest-posttest design to investigate the effects of RTTM - TYE on pain levels and neck range of motion among patients with office syndrome, and to compare two different treatment methods: RTTM-TYE (integrative method) and RTTM alone. There were 218 who had been patients clinically diagnosed with office syndrome, or "Roak Lom Plai Pattakhat Sanyaan Sii", according to the Thai traditional medicine practitioners at the Thai Traditional and Alternative Medicine Clinic of Luangphopern Hospital in Nakhon Pathom Province. A sample size of 60 for the study was arrived at using G*power software with given parameters (effect size = 0.5, significance level = 0.05, power = 95%). The 60 participants were selected into experimental and control groups of 30 individuals.

Targeted participants were recruited by using purposive sampling based on inclusion criteria as follow. The participants were male or female patients, aged 20-50 years, clinically diagnosed with office syndromes or "Roak Lom Plai Pattakhat Sanyaan Sii", experiencing pain for less than two weeks (considered as non-chronic), having a moderate pain score (4 – 6), not having contraindications for massage (such as a fever exceeding 38.5°C, infectious skin conditions, infectious diseases, acute appendicitis, unhealed fractures, or abnormal blood conditions), and who were willing to participate permit follow-up assessments. Participants taking pain relievers during the experiment, experiencing unexpected events (such as injuries from accidents, broken bones, or shoulder injury), or not adhering to the study agreement were excluded.

Research tools

A general information questionnaire, Visual Analogue Pain Scale (VAPS), and a goniometer were used as research instruments. The VAPS is a 10-cm scale used for a pain level assessment by self-rating the level of pain ranging from "0" (no pain) to "10" (unbearable pain) [29]. Self-assessments of pain level ranging from "1 – 3" were considered mild pain, "4 – 6" as moderate pain, and "7–10" as severe pain. This tool is simple and easy to use, as it contains emotional face pictures indicating six pain levels relevant to the numbers 0–10 (Fig 1).

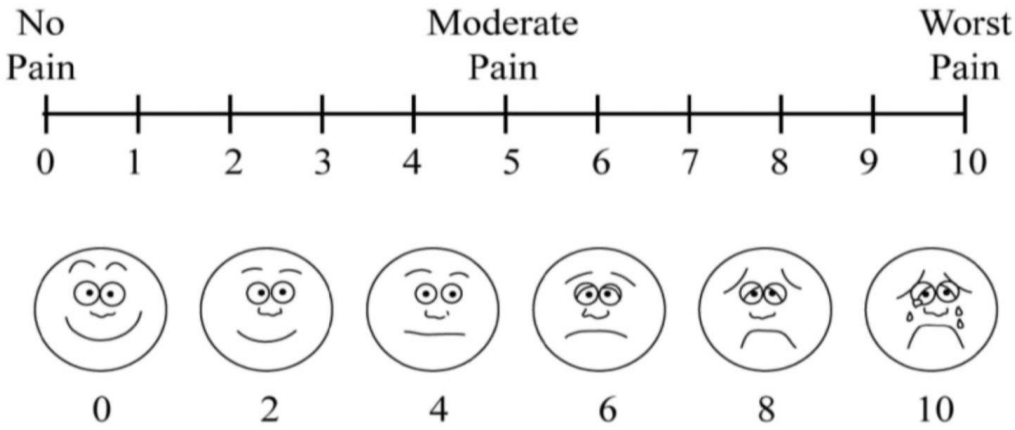

Figure 1 Visual Analogue Pain Scale (VAPS)

A goniometer – an angle measurement tool – was used to measure the participants' neck range of motion (NROM) while moving through different positions: 1) bending the neck forward to touch the chin to the chest (flexion) and tilting the head backward to look at the ceiling (extension) and 2) tilting the neck to the left (left lateral flexion) and to the right (right lateral flexion). The NROM and pain measurement were categorized into four levels based on physical assessment [30] (Table 1).

Quality assessment of research tools involved content validity, yielding an item objective congruence (IOC) of ≥ 0.5 for each question, goniometer reliability with test-retest, Pearson's correlation=0.93, and VAPS reliability with test-retest, Pearson's correlation = 0.92.

Table 1 Details of physical assessment on NROM and pain measurement

Physical assessment	Level 1	Level 2	Level 3	Level 4
Flexion and extension	No pain; maximum flexion (bending forward) at 31-40 degrees	Slight discomfort; flexion at 21-30 degrees	Moderate pain; flexion at 11 - 20 degrees	Significant pain; limited flexion at 0 - 10 degrees
Bilateral flexion (left and right)	No pain; lateral flexion (tilting head to the side) over 45 degrees	Slight discomfort; lateral flexion at 31-45 degrees	Moderate pain; lateral flexion at 16-30 degrees	Significant pain; limited lateral flexion at 0-15 degrees

Study intervention

This study was conducted from May to July 2022. Data on medical histories, physical examinations, pain levels, and degrees of NROM were collected from both experimental and control groups by one of the researchers, a certified TTM practitioner who had completed standardized training, ensuring adherence to the National TTM Clinical Practice Guidelines

Participants were allocated into two groups for a 2-week intervention period (3 sessions per week, totaling 6 sessions, with 1-day intervals between sessions). The control group (n = 30) received 45 minutes of RTTM per session.

The protocol focused on the 4th line of the posterior signal point (Sanyarn 4 Lang), specifically targeting neck and shoulder tension through systematic compression and stretching techniques along the upper

trapezius muscle regions. The experimental Group (n=30) received 45 minutes of RTTM (same as the control group) followed by 30 minutes of TYE, including 15 standardized Ruesi Dad Ton poses specifically selected for the therapeutic effects on neck, shoulder, and upper back movement [31]. Each pose was performed in 3 repetitions with a 5-second hold per repetition, totaling approximately 2 minutes per pose. All participants completed the intervention program of six sessions. Measurement of pain levels and NROM was performed for both groups before and after receiving the treatments. All data were collected and organized for further analysis and interpretation.

Ethical approval

This study received ethical approval from the Ethics Committee of the Kanchanabhishek Institute of Medical and Public Health Technology, Nonthaburi, Thailand (No. KMPH-65010014).

Data analysis

Data were analyzed using statistical software. Descriptive statistics were used to summarize participants' characteristics, with categorical variables presented as frequencies and percentages. Pain levels and neck range of motion were presented as means ± standard deviations. Comparative analyses were conducted using paired-sample t-tests for within-group comparisons and independent-sample t-tests for between-group comparisons, as appropriate. A p-value < 0.05 was considered statistically significant.

Results

Personal information

Both experimental and control groups were provided with similar personal data: participants were predominantly female, aged between 31 and 40 years. Participants employed in government/state enterprises made up 63.3% of the control group and 53.3% of the experimental group. Incorrect posture was the main cause of shoulder pain in both control and experimental groups, accounting for 33.3% and 36.7%, respectively, and the duration of shoulder pain was one day for 56.7% and 70.0% of the participants, respectively (Table 2).

Approximately more than 50.0% of participants in both groups reported moderate pain levels (5-6). Most of the participants were treated with Thai traditional medicine, accounting for 70.0% of the control and 66.6% of the experimental group. A majority of both groups had prior experience with RTTM treatment, accounting for 76.7% and 80.0%, respectively (Table 2).

Table 2 Number and percentage of control and experiment classified by general information

General information	**Control** (n=30)		**Experiment** (n=30)	
	n	%	n	%
Gender				
Male	5	16.7	6	20.0
Female	25	83.3	24	80.0
Age (years)				
31- 40	17	56.7	17	56.7
41- 50	13	43.3	13	43.3
Current career				
Worker	5	16.7	5	16.7
Government/state enterprises	19	63.3	16	53.3
Private business	6	20.0	9	30.0
Cause of shoulder pain				
Incorrect posture	10	33.3	11	36.7
Stress	4	13.4	5	16.6
Working hard	7	23.3	8	26.7
Inadequate sleep	9	30.0	**6**	20.0
Treatment sought				
Thai traditional medicine/ Alternative medicine	21	70.0	20	66.6
Modern medicine	9	30.0	10	33.4
Duration of shoulder pain (day)				
1	17	56.7	21	70.0
2 - 5	13	43.3	9	30.0
Pain levels (score)				
5 – 6	16	53.3	17	56.7
7 – 8	14	46.7	13	43.3
Prior experience with RTTM				
Yes	23	76.7	24	80.0
No	7	23.3	6	20.0

Comparison of pain levels and the neck range of motion (NROM) during the treatment

Pain levels and NROM were presented in different tables before the 1st treatment and after the 6th treatment. Participants did not receive other treatment from the time baseline until the last treatment. Comparison of before and after treatment pain levels between the control and experimental groups revealed no statistically significant difference (p-value=1.00). However, the findings showed significantly different mean pain levels between the two groups (p-value 0.001) after the 6th treatment (Table 3).

Table 3 Comparison of pre- and post-treatment mean pain levels (VAPS) between the control and experiment

Pain level (score)	**Control** (n = 30)		**Experiment** (n = 30)		***t***	**p-value**
	Mean	SD	Mean	SD		
Pre-treatment	6.53	1.31	5.27	0.33	0.00	1.000
Post-treatment	2.51	0.53	1.57	0.62	1.98	0.001*

**Significant level at p-value < 0.050; Degree of neck range of motion (NROM)*

Similar to the measurement of the pain levels before the first treatment, all the NROM parameters of the control and experimental groups were not significantly different (p-value > 0.050). Additionally, after the last treatment, all the NROM parameters (neck flexion, neck extension, lateral flexion to the right and to the left) of the experimental group were significantly higher than those of the control group (p-value=0.001) (Table 4). Within-group analyses showed a significant reduction in mean pain scores and an improvement in neck range of motion after treatment in both the control and experimental groups (p-value 0.001) (Table 5).

Table 4 Comparison of pre- and post-treatment NROM between the control and experiment

Degree of NROM	**Control** (n = 30)		**Experiment** (n = 30)		***t***	**p-value**
	Mean	SD	Mean	SD		
Neck flexion						
Pre-treatment	22.30	6.08	23.10	5.08	-0.108	0.733
Post-treatment	35.82	7.02	41.13	1.84	-2.125	0.001*
Neck extension						
Pre-treatment	23.77	4.74	22.77	5.00	0.186	0.806
Post-treatment	39.28	5.14	41.94	2.58	-2.543	0.001*
Lateral flexion to right						
Pre-treatment	21.13	8.55	21.23	8.46	- 0.491	0.626
Post-treatment	38.13	5.09	42.85	2.82	-2.153	0.001*
Lateral flexion to left						
Pre-treatment	22.71	6.93	23.23	7.00	- 0.190	0.850
Post-treatment	37.98	4.98	43.03	6.00	-2.128	0.001*

**Significant level at p-value < 0.050; NROM = neck range of motion*

Table 5: Comparison of pre- and post-treatment mean pain levels (VAPS) and neck range of motion within the control and experiment

Assessments	**Before the 1st treatment**		**After the 6th treatment**		***t***	**p-value**
	Mean	SD	Mean	SD		
Control						
Pain levels	6.53	1.31	2.51	0.532	23.05	<0.001*
NROM parameters						
Neck flexion	22.30	6.08	35.82	7.021	-18.62	<0.001*
Neck extension	23.77	4.94	39.28	5.142	-23.15	<0.001*
Lateral flexion to right	21.13	8.55	38.13	5.093	-31.86	<0.001*
Lateral flexion to left	22.71	6.93	37.98	4.987	-23.00	<0.001*
Experiment						
Pain levels	5.27	0.33	1.57	0.62	24.25	<0.001*
NROM parameters						
Neck flexion	23.10	5.08	41.13	1.84	-32.75	<0.001*
Neck extension	22.77	5.00	41.94	2.58	-28.95	<0.001*
Lateral flexion to right	21.23	8.76	42.85	2.82	-26.94	<0.001*
Lateral flexion to left	23.23	7.00	43.03	6.00	-27.93	<0.001*

** Significant level at p-value < 0.05*

Discussion

The comparison of pain levels and neck range of motion (NROM) before and after treatment among patients with office syndromes in this study revealed that the control and experimental groups both showed significantly decreased pain levels and increased NROM.

Our findings align with previous research demonstrating the effectiveness of Royal Thai Traditional Massage (RTTM) for patients with upper back muscle pain [16, 17,28]. A systematic review found that traditional Thai massage provided significant pain reduction, ranging from 25.0% to 80.0%, and was associated with improvements in disability, perceived muscle tension, flexibility, and anxiety, which were maintained for up to 15 weeks [32]. Similarly, research on myofascial pain syndrome focused on the upper trapezius muscle has demonstrated that traditional Thai massage resulted in significantly lower pain scores and significantly better cervical range of motion (p-value < 0.05) [22]. The therapeutic mechanisms underlying the effectiveness of RTTM have been related to addressing pressure trigger points in muscles, which affect blood circulation and elimination of metabolic waste products, as well as enhancing muscle flexibility [28].

The comparison of pain levels and NROM after treatment between the control and experimental groups demonstrated that the experimental group receiving RTTM-TYE combined treatment showed better improvement in pain levels and NROM than the control group receiving only RTTM. This suggests that the combined treatment approach contributes additional benefits through muscle stretching, relaxation, and increased blood flow resulting from including TYE. The enhanced effectiveness can be explained by TYE's function, which promotes the balance of the body's structure by realigning the skeletal structure and allowing it to return to its normal position, thereby alleviating muscle tension and pain. The benefits of combined therapy are supported by research demonstrating that integrative approaches often provide better results than singular interventions. A study investigating the effectiveness of Maneevej exercise integrated with traditional massage for treating various disorders found that the combined interventions were more effective than standardized approaches alone [25, 33].

The improvement in NROM, including flexion, extension, and lateral flexion to both sides, may contribute to the enhancement of flexibility and mobility. Research measuring range of motion before and after treatment has consistently shown that massage therapy targeting affected muscle groups yields significant improvements [32]. The increased enhancement of neck mobility observed in our study supports the use of combined RTTM-TYE as an effective intervention for office syndrome-related issues arising from computer use. The findings align with previous studies on combined treatment approaches, such as RTTM plus herbal compresses with Thai yoga postures, which resulted in significant decreases in migraine symptoms and increased neck mobility among patients [30].

From the perspective of Thai traditional medicine and complementary health approaches, the improvement in cervical range of motion observed in this study may be explained by the combined effects of muscle relaxation, improved energy flow, and enhanced movement awareness. While RTTM aims to reduce muscle tension and stiffness by applying rhythmic pressure along specific muscle groups and energy pathways, TYE or *Ruesi Dad Ton* further supports mobility improvement by encouraging gentle, controlled movements and stretching of the cervical region [22]. These exercises are traditionally designed to promote balance between the body's structure and function, helping to relieve stagnation and restore normal movement patterns. By alleviating localized tightness in the neck and shoulder region, massage helps restore tissue softness and flexibility, allowing the neck to move more freely. This integrated approach addresses both physical restrictions and functional movement patterns, offering a holistic explanation for the observed increases in cervical flexion, extension, and lateral flexion following the combined RTTM-TYE intervention.

This study has several limitations that should be mentioned. First, the relatively small sample size and homogeneous study populations may limit the generalizability of the findings to broader populations with office syndrome. Second, this study employed a non-RCT design, which may introduce selection bias and confounding factors that could affect the outcomes. Future research using an RCT design would strengthen the evidence base. Third, the gender imbalance with 80.0% female participants in our study reflects the typical demographic pattern of patients with office syndrome at Thai traditional medicine clinics; however, this may limit the generalizability of findings to male office workers. Finally, our study evaluated treatment outcomes after completing the full six-session intervention protocol, consistent with standard clinical trial methodology focusing on final therapeutic endpoints. While session-by-session monitoring was not conducted, our study appropriately addresses the primary research question regarding the comparative effectiveness of combined RTTM-TYE versus RTTM alone. Future research using repeated measures designs could provide additional understanding into the changes in treatment response and help determine the optimal treatment duration.

Conclusions

Overall, the findings suggest that combining Thai traditional massage with Thai yoga exercises provides a complementary and holistic intervention for office syndrome, targeting muscle tension, movement restriction, and postural imbalance simultaneously. Such an approach aligns well with the principles of alternative and integrative medicine, which emphasize restoring balance, promoting self-regulation, and supporting the body's natural capacity for movement and recovery. Integrative treatment with RTTM-TYE provides a comprehensive treatment approach, including both immediate symptom relief through massage therapy and long-term functional improvement through corrective exercise.

The clinical implications of our findings may contribute to healthcare practitioners treating office syndrome in that they should consider implementing combined therapeutic approaches, rather than relying on single treatments. The patients' ability to continue Thai yoga exercises independently also promotes self-management and long-term maintenance of therapeutic gains, which is particularly important for computer work-related conditions, like office syndrome, that require continuous self-care.

Despite these limitations, the study provides valuable preliminary evidence supporting the potential benefits of the combined RTTM-TYE for managing office syndrome-related pain and improving neck mobility.

Competing interests

The authors declare that there are no conflicts of interest.

Funding

This research received no external funding.

Acknowledgements

We appreciate all participants for contributing their time and joining our research activities. We would like to express our gratitude to the director of the Luangphopern Hospital and the staff of the Thai Traditional Medicine clinic in Nakhon Pathom province, Thailand for their consideration and assistance with this project.

Author contributions

A conceived and designed the study, conducted the intervention, analyzed and interpreted the data, and drafted the manuscript. B supervised the research process, contributed to the study design and data interpretation, and served as the corresponding author. C was responsible for data collection and assisted with data management. All authors read and approved the final manuscript.

References

[1] Demissie B, Bayih ET, Demmelash AA. A systematic review of work-related musculoskeletal disorders and risk factors among computer users. Heliyon. 2024; 10(3):e25075.

[2] World Health Organization (WHO). Musculoskeletal health. 2022. Available from: https://www.who.int/news-room/fact-sheets/detail/musculoskeletal-conditions

[3] The Rheumatologist. Global prevalence and burden of musculoskeletal disorders. Available from:https://www.the-rheumatologist.org/article/global-prevalence-burden-of-musculoskeletal-disorders/

[4] Gosain L, Ahmad I, Rizvi MR, Sharma A, Saxena S. Prevalence of musculoskeletal pain among computer users working from home during the COVID-19 pandemic: a cross-sectional survey. Bull Fac Phys Ther. 2022;27(1):51. DOI: 10.1186/s43161-022-00110-x.

[5] Okezue OC, Anamezie TH, Nene JJ, Okwudili JD. Work-related musculoskeletal disorders among office workers in higher education institutions: a cross-sectional study. Ethiop J Health Sci. 2020;30(5):715–24.

[6] Putsa B, Jalayondeja W, Mekhora K, Bhuanantanondh P, Jalayondeja C. Factors associated with reduced risk of musculoskeletal disorders among office workers: a cross-sectional study 2017 to 2020. BMC Public Health. 2022;22(1):1503. DOI: 10.1186/s12889=022=13940-0.

[7] AlOmar RS, AlShamlan NA, Alawashiz S, Badawood Y, Ghwoidi BA, Abugad H. Musculoskeletal symptoms and associated risk factors among Saudi office workers: a cross-sectional study. BMC Musculoskelet Disord. 2021;22 (1):763. DOI: 10.1186/s12891-021-04652-4.

[8] Jacquier-Bret J, Gorce P. Work-related musculoskeletal disorder prevalence by body area among nurses in Asia: a systematic review and meta-analysis. Int J Environ Res Public Health. 2025;22(4):652–74.

[9] Dong H, Zhang Q, Liu G, Shao T, Xu Y. Prevalence and associated factors of musculoskeletal disorders among Chinese healthcare professionals working in tertiary hospitals: a cross-sectional study. BMC Musculoskelet Disord. 2019;20 (1):175. DOI: 10.1186/s12891-01902557-5.

[10] Luan HD, Hai NT, Xanh PT, Giang HT, Thuc PV, Hong NM, et al. Musculoskeletal disorders: prevalence and associated factors among district hospital nurses in Haiphong, Vietnam. Biomed Res Int. 2018: 3162564. DOI: 10.1155/2018/3162564.

[11] Bosari SR, Sabet MS, Leyli EK, Sedighi-Chafjiri A. Prevalence of work-related musculoskeletal disorders and related factors among nurses: a cross-sectional study. J Nurs Rep Clin Pract. 2025;3(1):23–35.

[12] Putsa N. Prevalence of work-related musculoskeletal disorders, pain in different body areas, and stress level in office workers. Thai J Ergonomics. 2021;4(2):51–64.
[13] Mongkonkansai J, Madardam U. Factors related to musculoskeletal disorders among office workers at Walailak University. J Health Sci Thai. 2019; 28(1):37–44.
[14] Jalayondeja W, Mekhora K, Jalayondeja C, Samae H, Bhuanantanondh P. Upper and lower crossed syndromes among computer and manual material handling workers in an oil and gas company. Thai J Ergonomics. 2019;2(1):30–41.
[15] Waersted M, Hanvold TN, Veiersted KB. Computer work and musculoskeletal disorders of the neck and upper extremity: a systematic review. BMC Musculoskelet Disord. 2010;11(1):79. DOI: 10.1186/1471-2474-11-79.
[16] Leesiriwattanagul S, Charoenkit K, Pibanwong W. The effects of a Thai massage program on office syndrome among personnel. Nurs J Minist Public Health. 2019;29(2):129–41.
[17] Chaiyachit P, Chantachon P, Reveepong T, Nithikathkul C. Thai massage in patients with office syndrome in Khon Kaen Hospital, Thailand. NeuroQuantology. 2022;20(10):6888–902.
[18] Sucharit W, Roberts N, Eungpinichpong W, Hunsawong T, Chatchawan U. Standardised 25-step traditional Thai massage protocol for treating office syndrome. Int J Environ Res Public Health. 2023;20(12):6159.
[19] Nanbancha A, Tharawadeepimuk K, Limroongreungrat W, Leelawapa N, Wongsawat Y, Sroykham W. Impact of Reusi Dat Ton (Thai yoga) on office syndrome: a study utilizing IMU technology and stress management tools. 2024. Available from SSRN : https://ssrn.com/abstract=4912242 [Accessed 2025, Jun 15].
[20] Kongkaew C, Lertsinthai P, Jampachaisri K, Mongkhon P, Meesomperm P, Kornkaew K, et al. The effects of Thai yoga on physical fitness: a meta-analysis of randomized controlled trials. J Altern Complement Med. 2018;24(6):541–51.
[21] Thanasilungkoon B, Niempoog S, Sriyakul K, Tungsukruthai P, Kamalashiran C, Kietinun S. The efficacy of Ruesi Dadton and yoga on reducing neck and shoulder pain in office workers. Int J Exerc Sci. 2023;16(7):1113–30.
[22] Boonruab J, Poonsuk P, Damjuti W, Supamethangkura W. Myofascial pain syndromes focused on the upper trapezius muscle: a comparative randomized controlled trial of court-type traditional Thai massage versus Thai hermit exercise. J Evid Based Integr Med. 2021;26. DOI: 10.1177/2515690x211030852.
[23] Watcharasirikul N, Vannabhum M, Yamthed R, Srikhlo T, Akarasereenont P, Harnphadungkit K. Comparative effectiveness of court-type Thai traditional massage and ultrasound therapy in patients with neck pain: a randomized controlled trial. Siriraj Med J. 2023;75(1):29–37.
[24] Juntakarn C, Prasartritha T, Petrakard P. The effectiveness of Thai massage and joint mobilization. Int J Ther Massage Bodywork. 2017;10(2):1–8.
[25] Boonruen S, Wirattanapokin S, Sawangjit W. Comparison between royal Thai traditional massage with and without Maneeveda exercise among patients with frozen shoulder at Dontum Hospital, Nakhonpathom Province. J Health Sci Thailand. 2024;33(1):74–84.
[26] Fayrach K, Saendung P. Effects of Thai massage with Thai yoga exercise in office syndrome patients at Chonburi Hospital. Chonburi Hosp J. 2024;49(3):287–92.
[27] Wilhelm M, Cleland J, Carroll A, Marinch M, Imhoff M, Severini N, Donaldson M. The combined effects of manual therapy and exercise on pain and related disability for individuals with nonspecific neck pain: a systematic review with meta-analysis. J Man Manip Ther. 2023;31(6):393-407.
[28] Sucharit W, Eungpinichpong W, Hunsawong T, Pungsuwan P, Bennett S, Hojo E, et al. Pre-and post-treatment study of the application of a traditional Thai massage protocol for treating office syndrome. Asia Pac J Sci Technol. 2023;28(3):1–9.
[29] Rawal G, Kumar R, Yadav S, Sujana R. Pain management in intensive care unit: a brief review. Med Res Chronicles. 2019;6(6):302–309.
[30] Srisawat P. Effectiveness of Thai royal massage, herbal compression, and seven Thai yoga postures on migraine. Dissertation, Master's Degree of Higher Education. Rajamangala University of Technology Isan; 2014.
[31] Department of Thai Traditional and Alternative Medicine, Ministry of Public Health. Rusie Dotton [The Hermit's Body Twist: 15 Standard Positions]. Nonthaburi: The Department, 2017. Available from: https://digital.nlt.go.th/dlib/files/original/f6bdf6281b17259d176eebcef8dc9cb8.pdf
[32] Keeratitanont K, Jensen MP, Chatchawan U, Auvichayapat P. The efficacy of traditional Thai massage for the treatment of chronic pain: a systematic review. Complement Ther Clin Pract. 2015;21(1):26–32.
[33] Boonruen S. The effect of royal Thai traditional massage with Maneeveda exercise in office syndrome patients at Dontum Hospital, Nakhonpathom Province. J Nurs Educ. 2021;14(1):91–105.