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Massage Therapy Impact on Musculoskeletal Disorders of the Neck, Shoulder, and Low Back in Nurses

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Abstract

***Background**: This study summarizes the current evidence on the effectiveness of different massage therapies as a method for assessing neck, shoulder, and low back pain in nurses. A systematic literature review has been performed.*

***Methods:** Six databases were searched, Cochrane, PubMed, CINAHL, Medline, Web of Science, and Science direct, from studies in English, published by April 2023. No other filters were used for the literature search. We included 8 studies in the final analysis.*

***Findings**: Reflexology was more effective than conventional massage in relieving low back pain, both immediately and in the short term. Acupressure was found to have a positive effect on work performance and activities of daily living. In addition, the groups receiving Swedish massage therapy reported a sense of relief and an improvement in overall mood.*

***Conclusions**: No definitive conclusions can be drawn about the effectiveness of massage therapy in reducing neck, shoulder, and back pain in nurses as the literature findings are not coherent. A key component it is massage therapy that can be used as a tool for management of musculoskeletal pain disorders.*

***Keywords:** musculoskeletal manipulations, nursing staff, pain.*

Background

Health and work-related disorders are inextricably linked. Work-related musculoskeletal disorders (WMSD) are abnormalities of the musculoskeletal system that are predominantly caused by the performance of work tasks and the immediate workplace environment [1]. Pain, discomfort, or tingling in a specific area of the body are typical symptoms of certain disorders affecting muscles, tendons, or nerves [2]. Pain is frequently present with these types of health problems. It can be divided into two main categories, acute and chronic pain. These two types of pain can also be distinguished into short-term sensations, typically due to injury or illness, and persistent pain, which lasts for extended period of time and often occurs for no apparent reason [3].

WMSDs are highly widespread in many different professions [4]. More than 500,000 workers in the Great Britain have WMSDs, which requires days off from work each year [5]. Among Slovenian workers, a WMSD related absence lasted an average of 29 days, and each worker missed 2.82 calendar days due to this category of illness [6]. WMSDs are highly prevalent in secondary industries [2,7], such as construction, manufacturing, agriculture, forestry etc. [1], with an average 12-month prevalence of 42 to 60 % [7]. An even higher prevalence is found in health professions such as nursing, physical therapy and physicians [8,9,10], with nursing having the highest rates (33 – 88 %) [11]. Nursing is an occupation that has the highest potential for developing WMSD of all occupations, and an occupation that also has the highest global incidence, 104.2 WMSD cases per 10,000 full-time workers [12].

The physical and emotional demands of the nursing profession can be high [13]. Physically demanding nursing jobs that predispose nurses to WMSD include manual handling of patients, i.e., using excessive muscular force or effort to lift, move, push, pull, hold, transport patients, severe flexion, bending, twisting, and abrupt movements, as well as repetitive movements, in addition to standing for hours [1,14]. According to surveys of nurses, 20% of their time is spent on patient handling duty [15]. Although physically demanding tasks play a significant role in the prevalence of WMSDs in nurses, there are other factors that must be considered. These include organizational, psychological and demographic factors [16,17].

The occurrence of musculoskeletal problems among nurses increases with age [18], higher BMI [19], and an increasing number of extended work hours [20]. Individual, psychological, and ergonomic characteristics can be used to predict the

likelihood of WMSD [21]. This type of disorders most commonly occure in the cervical spine, shoulder, and especially the low back [22,4], with prevalence in the low back ranging from 30 % to 60 % [23]. Studies that focused on upper extremity MSD in nurses reported a prevalence of shoulder problems in 43-53 % and neck injuries in 31-48 % of nurses [22]. The entire nursing staff is frequently absent from work and takes a substantial number of days off because of WMSD (National Research Council (US) and Institute of Medicine (US) Panel on Musculoskeletal Disorders and the Workplace, 2001) [24]. For this reason, WMSDs can lead to increased absenteeism, decreased productivity, and higher health care costs [25,26]. Nurses may have temporary job restrictions and have an increased risk of errors due to acute pain. As a result of the long-term physical and emotional stress caused by chronic pain, nurses may experience burnout, absenteeism, and higher turnover rates [27,28]. In addition, persistent pain can make it difficult for nurses to carry out their duties effectively, which can negatively impact patient care [29]. It is important that nurses physical, emotional, and spiritual health aspects remain in balance when caring for and treating others. Health-related problems that are affecting employees have an impact on the quality of care and how it is carried out [30,31].

Large sums of money have been spent in recent years in an effort to reduce the prevalence of WMSDs in nurses. Interventions and prevention measures mostly targeted physical traits such as lifting and the use of ergonomic aids [32]. Injury prevention through management and employee education, the adaptation and modification of work duties, and ergonomic evaluations are all part of occupational therapy's involvement in the treatment of WRMDs [33]. It is critical that individuals affected by WMSDs actively participate in their treatment throughout therapy. Self-management is a word often used to describe active participation in therapy [34]. Actions that fall under self-management include: taking medications, following a special diet, maintaining, modifying, and creating new meaningful behaviors or life roles, and coping with the emotional consequences of WMSDs [35].

A variety of non-invasive techniques are available to address musculoskeletal pain in nurses. These techniques are characterized by their gentle and noninvasive nature, focused on promoting relaxation and alleviating discomfort without causing additional pain or distress. The most commonly used non-invasive techniques include: physical therapy, ergonomic adjustments, lifestyle modifications, cognitive behavioral therapy, mindfulnes and relaxation techniques, Swedish massage, myofascial release, acupressure and reflexology [25,36,20,37,38].

Massage therapy is a promising approach to relieve low back, shoulder and neck pain, not only because of its various physiological effects, such as decreased salivary cortisol, decreased heart rate [39], increased blood circulation and decreased muscle tension [40], but also because of its psychological benefits, such as decreased anxiety levels [41]. Various massage techniques can be used to treat specific pain compaints and individual needs. The most common techniques are: Swedish massage, reflexology and acupressure [42,36,38]. The Swedish form of massage is sometimes referred to as the Western or traditional style. It is a method of manipulating the muscles and connective tissues of the body that has been shown to be effective for relaxation, recovery, and health maintenace. The five basic grips of Swedish massage therapy are effleurage, petrissage, friction, percussion, and vibration. According to the idea of zone treatment, reflexology is a type of bodywork in which certain parts of the body are pressed to activate matching regions in other parts of the body [43]. This technique differs from massage in that it applies lighter pressure and superficial contact to specific areas of the foot, and involves a more straightforward motion [44]. In acupressure, acupuncture sites are pushed to encourage the flow of energy, or Qi, and is a type of bodywork based on ancient Chinese meridian theory [43]. However, some authors state that successful outcomes are entirely due to therapeutic interactions rather than the impact of a particular therapy [45]. According to them, research has shown that 'common elements' such as empathy, warmth, and therapeutic rapport have a stronger correlation with client outcomes than any specific treatment technique.

Numerous studies have investigated the effectiveness of massage therapy in relieving pain in individuals with WMSDs. However, its use and impact on nurses, specifically with regard to low back, shoulder, and neck pain, have not been extensively studied. Therefore, this review aims to summarize the current evidence on the effectiveness of massage therapy as a method for assessing WMDS in low back, shoulder, and neck pain in nurses.

Methods

Information sources and search strategy

The search for relevant studies took place in April 2023. Six scientific literature databases (Cochrane, PubMed, CINAHL, Medline, Web of Science, and Science direct) were screened, using the following search strategy: (nursing staff OR nurses) AND massage AND (back pain OR neck pain OR shoulder pain). We included studies published in English, regardless of the year of publication. The search was performed in three steps: 1) assessing the relevance of the article based on the title and keywords, 2) assessing the relevance of the article based on the abstract, and 3) assessing the relevance of the article based on the full text. All three steps were performed by two authors, who consulted a third author in case of ambiguity.

Extraction of search terms and formulation of PICO query

Before implementing the search algorithms, we established a set process for choosing search phrases. According to the PICO framework, we divided each review's abstract into four pieces for the population, interventions, comparisons, and outcomes. These sections correspond to the PICO framework [46]. When we couldn't locate any information for one of these categories in the abstract, we recovered applicable terms from the methods section (type of intervention or outcome). The shortest set of search phrases that best conveyed the research question was then extracted for each PICO category. Two assessors, both skilled in physiotherapy carried out this action. Finally, the retained search words were approved by all coauthors, including experienced professor.

In order to maximize sensitivity, search phrases within each PICO category were joined with the Boolean operator OR to create the final search query. Next, all categories were combined

using AND to recover only the citations matching all PICO elements [46]. Search words with multiple words in them (such as nursing staff) were not enclosed in quotes but rather in parenthesis.

Eligibility criteria

Inclusion criteria were structured according to the PICOS tool:

- Population (P): The population included female and male nurses of all ages with neck, shoulder, or low back pain. Studies that examined other pathologies were excluded.
- Intervention (I): Studies in which at least one group received massage therapy were included. No exclusion criteria were set depending on the intensity, duration, and frequency of massage therapy. Studies in which massage therapy was combined with other interventions were excluded.
- Comparison (C): Studies that examined the effectiveness of massage therapy compared with a control group that received another form of intervention or no intervention were included.
- Outcomes (O): Studies that examined baseline pain intensity were included.
- Study design (S): Randomized control trials (with at least one experimental and control group) and pilot studies were included.

Study extraction and data analysis

Data collection was performed by two authors and disagreements were resolved through consultation with other co-author. Of the included studies, we summarized the study design, purpose, characteristics of the intervention (treatment groups, type of intervention, number of weeks, duration, and frequency), population characteristics (gender and age of participants), outcome measures (pain intensity), and main results. We have carefully examined the relevant research and dissected its main conclusions. We accomplished this using the method of coding and producing content categories [47]. We adopted an inductive method known as "open coding." The codes were organized into categories. Using the categories we created, we answered the research question in the discussion.

Assessment of the quality of the included studies

Two authors evaluated the quality of the included studies using the JBI Critical Appraisal Tools: the JBI Randomised Controlled Trials Checklist and the JBI Quasi-Experimental Studies Checklist [48]. The quality of the studies was rated as poor (60-69%), moderate (70-80%), high (80-89%) or excellent (over 90%). Potential disagreements between the authors were resolved by consulting the other co-author.

Results

We have found 436 studies, of which 44 were in the Cochrane database, 36 in PubMed, four in CINAHL, five in Medline, six in Web of Science, and 341 in Science direct. After excluding 19 duplicates, all studies were screened by title, keywords, and abstract for inclusion criteria. After reviewing the entire text, five studies were excluded for inappropriate content. Due to their quality and relevant material, we included 8 studies. We did not exclude any of the articles due to poor quality because they were all of excellent grade. The process of literature search is shown in **Error! Reference source not found.**.

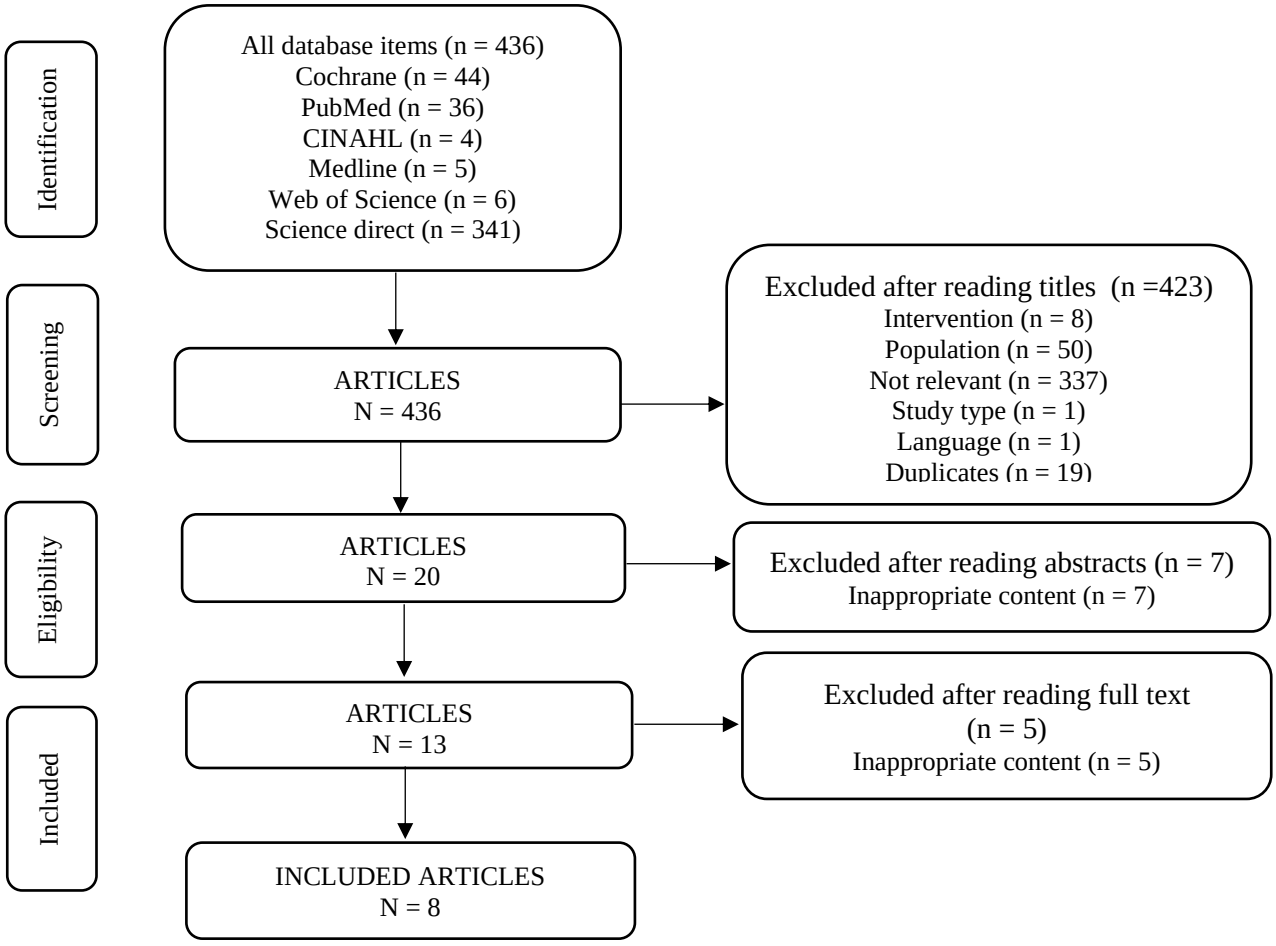

Figure 1: Summary of study search protocol.

Table 1: Overview of the studies included in the systematic review.

Author, year, country	Study design	Research objective, goals	Material, methods	Sample size, population N	Results	PICO relevance	JBI quality
da Silva et al. (2018), Brazil [49]	Randomized clinical trial	The aim was to determine the effectiveness of foot reflexology in relieving work-related acute low back pain in a nursing team	EG: specific reflexology (n=17); 2 sessions with a 72-hour interval CG: non-specific reflexology (n=19); 2 sessions with a 72-hour interval Sociodemographic questionnaire, questionnaire for low back pain, VAS.	n=36 (M=4; F=32) Mean age = 42.6±10,8y	The reduction in acute low back pain was statistically significant in EG ($p < 0.001$). In the CG, there was an increase in pain intensity ($p > 0,05$).	3	13/13 100 %
Babadi et al. (2016), Iran [50]	Randomized clinical trial	The aim was to determine the effectiveness of foot reflexology in relieving chronic low back pain in nurses.	EG: reflexology (n=25); 2 weeks, 3 times a week, each session lasted 40 min (20 min for each foot). CG: simple massage therapy (n=25); 2 weeks, 3 times a week, each session lasted 40 min (20 min for each foot). Three-part questionnaire (1: demographic data, 2: characteristics of pain, 3: McGill pain questionnaire)	n=50 (M=30; F=20) Mean age = 41,1 ± 7,0y	There was a statistically significant ($p < 0.001$) reduction in pain in both groups, but reflexology appeared to be more effective. There was a statistically significant ($p < 0,001$) difference between EG and CG.	3	13/13 100 %
Borges et al. (2014), Brazil [51]	Randomized clinical trial	The aim was to evaluate the effectiveness of massage in reducing occupational low back pain in employees of a nursing team in an emergency department.	EG: massage by acupressure (n=14); 6 weeks, 2 times a week, each session lasted 20 min. CG1: Garlium Arseneid Laser turned off (n=15); 6 weeks, 2 times a week, each session lasted 20 min. CG2: no intervention (n=14); answering to the evaluation tools. Socio-demographic questionnaire, NPRS.	n=43 (M=10, F=33); Mean age = 39,6 ± 9,6y	There was a statistically significant ($p<0.001$) reduction in pain in the massage group. There was a greater reduction in pain at the first to second assessment than at the second and third. In the group that received laser treatment, there was also a decrease in pain intensity, but it was not statistically significant ($p>0.05$). In the third group, which received no intervention, pain increased between assessments	3	11/13 84,6 %
Borges et al. (2012), Brazil [52]	Quasi experimental	The aim was to evaluate the effectiveness of massage therapy in reducing of occupational low back pain.	Massage therapy (smoothing, acupressure, kneading), 4 weeks, 2 times a week, each session lasted 30 min. NPRS, Oswestry disability index.	n=18 (M=7, F=11); Mean age = 38y	Massage therapy was an effective method to reduce occupational low back pain.	3	7/9 77,8 %

Eghbali et al. (2012), Iran [53]	Randomized clinical trial	The aim was to evaluate the effectiveness of foot reflexology in relieving chronic low back pain in nurses.	EG: reflexology (n=25); 2 weeks, 3 times a week, twice a day, each session lasted 40 min. CG: nonspecific massage therapy (n=25); 3 times a week, twice a day, each session lasted 40 min. Three-part questionnaire (1: demographic data, 2: characteristics of pain, 3: NPRS).	n=50 (M=30; F=20) Mean age = 40,9y ± 6,9	There was a statistically significant reduction in pain in both groups before and after the intervention ($p<0.001$).	3	13/13 100 %
Back et al. (2009), Canada [54]	Quasi experimental	The aim was to study the effects of massage therapy on the health of health care workers.	Massage therapy, 4 weeks, 1 time a week, each session lasted 20 min. QPS Nordic, Brief Pain Inventory (Short form).	n=98 (M=21, F=83); Mean age = 46,4 ± 8,9y	In the short term, there was a statistically significant decrease in pain severity ($p<0.038$). After 6 weeks, pain symptoms increased.	3	7/9 77,8 %
Katz et al. (1999), Canada [55]	Randomized control trial	The aim was to evaluate the effectiveness of an on-site massage therapy in reducing pain and tension in nursing staff.	EG: massage therapy (n=19); 8 sessions at an interval of 12 ± 5,5 days, each session lasted 15 min CG: seated rest (n=13); 8 sessions at an interval of 17 ± 13,2 days; each rest lasted 15 min Demographic questionnaire, VAS, questionnaire assesing pain	n=32 (M=2, F=30); Mean age = 39,1 ± 6y	There was a staistically significant ($p < 0,05$) reduction in pain in the massage group that lasted up to a day or longer in more than 70% of participants. Pain decreased by 59% in the EG, compared with CG, where pain decreased by only 3%. The difference between the two groups was statistically significant ($p < 0,001$)	3	11/13 84,6 %
Katz et al. (1999), Canada [56]	Quasi experimental	The aim was to determine whether massage therapy reduces pain among nursing staff in a large teaching hospital	Massage therapy; 8 sessions at an interval of 9.0 ± 2.5 days, each session lasted 15 min. Demographic questionnaire; VAS, questionnaire assesing pain	n=12 (10 nurses and two nonmedical ward staff) (F=12); Mean age = 39 ± 10,2	Pain intensity was significantly lower after massage therapy ($p<0.01$). In approximately 50% of participants, these effects persisted for more than one day.	3	7/9 77,8 %
Legend: EG = experimental group; CG = control group; JBI quaity = critical appraisal tool; NPRS = numeric pain rating scale; VAS = visual analogue scale; QPS Nordic = General Nordic Questionnaire for Psychological and Social factors at work.							

Table 2: Codes sorted by categories.

Authors	Codes	Categories
Eghbali, Borges 2014 [51], Babadi 2016 [51], Borges 2012 [52], Back, Katz 1999a [55], Katz 1999b [56]	Nursing profession; nursing staff; nursing personel; nursing; nurse; nurses; holistic nursing; nursing workers; nursing team nurse specialist; health care providers; nursing occupation; auxiliary nurse; nursing technicians; health professional; health care workes; health care jobs; health care work; medicine; hospital enviorment; work enviorment; public hospital; teaching hospital; emergency room; intensitive therapy unit; surgical center; spinal injury unit; inpatient unit.	Health care
Eghbali, Borges 2014 [51], Babadi 2016 [51], Borges 2012 [52], Back, Katz 1999a [55], Katz 1999b [56]	Nonoccupation injury; work-related; trauma disorders; tissue damage; low back pain; non-specific back pain; neck pain; shouder pain; headache; osteoarthritis; dorsopathy; bone lesions.	Musculo-skeletal disorders
Eghbali, Borges 2014 [51], Babadi 2016 [51], Borges 2012 [52], Back, Katz 1999a [55], Katz 1999b [56]	Pain intensity; pain severity; pain perception; pain quality; pain location; pain duration; pain threshold; long term pain; perstistent pain; chronic pain; acute pain.	Pain
Eghbali, Borges 2014 [51], Babadi 2016 [51], Borges 2012 [52], Back, Katz 1999a [55], Katz 1999b [56]	Reflexology; refloxologist; refloxology points; hand massage; non-specific massage; simple massage; swedish massage; sports massage; chair massage; shiatsu; acupressure; relaxation; holistic approach; alternative therapy.	Different types of massage therapy
Eghbali, Borges 2014 [51], Babadi 2016 [51], Borges 2012 [52], Back, Katz 1999a [55], Katz 1999b [56]	Pain relieve; analgetic effect; release of endorfins; muscle relaxation; increasing blood circulation; reducing heart rate; increase limphatic flow; promote imune system; body awarness; stress relieve; reducing anxiety; improving work performance; promoting comfort; sleep improvements.	Effects of massage therapy

Discussion

The aim of our literature review was to determine the effectiveness of massage therapy in reducing WMSD in neck, shoulder, and low back pain in nurses. We have found that reflexology was more effective in relieving low back pain in nurses than simple massage without stimulation of reflex points, both immediately and in the short term [50,49,53]. Acupressure was found to be more effective than conventional physical therapy in relieving low back pain and had a positive effect on work performance and activities of daily living [51,52]. Swedish massage showed a significant effect on pain intensity but no long-term effect [55,56].

Nurses are the largest group of healthcare professionals and have a higher prevalence of WMSD than other workers [17]. A systematic review found that the prevalence of musculoskeletal disorders reported by nurses in the past 12 months ranged from 33% to 88% [11]. WMSD contribute most to the burden of occupational diseases and are largely related to ergonomic factors in the workplace [17].

Individuals usually do not respond to conventional therapies. However, the use of physical therapy and manual therapies such as massage therapy is recommended [50]. Three studies investigated the effect of foot reflexology on reducing low back pain in nurses. They found that the use of foot reflexology produced immediate and short-term pain reduction [50,49,53]. Similar findings were also obtained in a study by Quinn et al. [57] in which they reported significant pain reduction after six weeks of foot reflexology. These findings were consistent with the theory that the stimuli triggered by foot reflexology have positive effects such as relieving pain symptoms, as well as other health problems such as anxiety, stress, insomnia, and promoting well-being [49,58]. Simple massage without pressure on reflex points also had a positive effect on pain relief, but reflexology proved to be more effective [50,53]. In contrast, non-specific reflexology with only superficial touch, has not been shown to be effective [49]. Given the effects of foot reflexology on reducing pain intensity and pain perception, this technique could be used as an effective method of pain relief for nurses with chronic low back pain. In addition, foot reflexology should be taught to health care workers and encouraged to use it [50].

Eastern cultures advocate the use of massage for low back pain because of its analgesic effects, especially when applied to acupressure points, i.e., acupressure [59]. Two studies examined the effectiveness of acupressure in reducing low back pain in nurses compared to placebo laser therapy and a group that did not receive the intervention [51,52]. In both studies, pain decreased significantly after the use of acupressure, by 86% between the first and second follow-up. Pain reduction was continuous but less pronounced, decreasing by 17% from the second to the third follow-up [51,52]. Nurses had moderate disability at baseline and minimal disability at the end of follow-up, suggesting that this massage protocol has a positive effect on performing work and daily activities. Pain was minimally reduced in the placebo laser therapy group, while it increased in the other group that did not receive the intervention [51].

Swedish massage appears to have a significant effect on pain intensity, so it has the greatest benefit for individuals with preexisting musculoskeletal symptoms, but a long-term effect has not been demonstrated [54]. The effectiveness of Swedish massage has been investigated in three studies [54,55,56]. In one of the studies, pain symptoms worsened six weeks after the intervention ended, and lower job satisfaction and morale were also noted. The authors attributed the results to increased body awareness and a greater focus on pain perception after massage [54]. This is contradicted by the results of two studies in which pain intensity and the degree of tension in the neck and shoulders decreased significantly after Swedish massage in the workplace.

They compared the effects with a group that rested in a seated position and found that the latter did not contribute to pain relief [55,56]. In addition, more participants in the group receiving Swedish massage reported a sense of relief and an improvement in overall mood.

Pain relief (especially for chronic pain) should take into account all aspects that may influence pain perception, such as sensory, emotional, and evaluative aspects. Therefore, one should not only focus on the intensity and duration of pain, but try different techniques to reduce its complications [50]. Reflexology, acupressure and Swedish massage have been observed to have only short-term analgesic effects. Therefore, it is highly recommended to combine a massage therapy programme with other methods, such as exercise therapy, as they may have a longer lasting effect [54]. These methods can also be used as part of preventive actions to promote the care of healthcare workers and ensure better working conditions. Implementing an intervention to improve the overall health of workers also means reducing the cost to the institution of hiring new staff, replacing staff, overload of professionals, and reducing occupational risks as a result [60]. The results of the study are important to increase knowledge about massage therapy, identify triggers for WMSDs, and consider massage therapy as a possible treatment method for nurses.

Our systematic review has several limitations. The large heterogeneity of the included studies in terms of type of massage therapy and duration of interventions makes it difficult to provide clear clinical recommendations. Most studies were based on short-term measurements, and further studies are needed to clarify the long-term effects of massage therapy. Individual interventions were not described in sufficient detail, and information on the course, duration, and intensity of massage therapy varied. Future high-quality studies are needed to clarify the long-term effects of massage therapy.

Conclusion

Physically and emotionally demanding jobs in nursing can lead to WMSDs, which in turn can lead to increased absenteeism, lower productivity, and higher healthcare costs. Non-invasive treatment techniques such as Swedish massage, acupressure, and reflexology are used to treat musculoskeletal pain in nurses. No definitive conclusions can be drawn about the effectiveness of massage therapy in reducing neck, shoulder, and back pain in nurses as the literature findings are not coherent.

Applying Research to Occupational Health Practice

- Reflexology can be used for immediate and short-term relief of low back pain in nurses.
- Acupressure is an effective method for relieving low back pain and has a positive effect on nurses' work performance and activities of daily living.
- Swedish massage is an effective method for short-term relief of low back pain and for improving nurses' overall mood.
- It is highly recommended to combine a massage therapy programme with other methods, such as exercise therapy, as these can have a longer-lasting effect.

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Conflicts of Interest and Source of Funding

The authors have no conflict of interest to declare.

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Authors contribution:

The first and the second authors conducted the literature search and review, and selected the sources. The second and the third authors analysed the included studies. All three authors contributed to writing the review article.

Implications

- Reflexology can be used for immediate and short-term relief of low back pain in nurses.
- Acupressure is an effective method for relieving low back pain and has a positive effect on nurses' work performance and activities of daily living.
- Swedish massage is an effective method for short-term relief of low back pain and for improving nurses' overall mood.
- It is highly recommended to combine a massage therapy program with other methods, such as exercise therapy, as these can have a longer-lasting effect.

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