

Prevalence and Risk Factors of Work-related Musculoskeletal Disorders among Nurses in Saudi Arabia: A Systematic Review

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ABSTRACT

Objectives: To investigate the prevalence and risk factors of work-related musculoskeletal disorders (WRMSDs) among nurses in Saudi Arabia. **Methods:** A total of 678 pertinent publications were found after a comprehensive search across four databases. 334 full-text publications were examined after duplicates were eliminated using Rayyan QCRI and relevance was checked; eight studies finally satisfied the requirements for inclusion. **Results:** We included eight studies with a total of 1469 patients, and the majority 1299 (88.4%) were females. The prevalence of WRMSDs among Saudi nurses ranged from 61.7% to 100%, with an overall prevalence of 79.7% across the studies reviewed. Occupational factors include repetitive movements, prolonged standing, frequent bending, and patient lifting, particularly in physically demanding departments like emergency and critical care. Personal factors, such as being underweight, low physical fitness, and inadequate shift breaks, also exacerbate the risk. Additionally, long working hours, limited ergonomic resources, and the absence of workplace policies tailored to preventing WRMSDs further compound the problem. **Conclusion:** WRMSDs, especially low back pain, are a major health concern among nurses in Saudi Arabia, driven by physically demanding tasks and poor workplace ergonomics. Addressing these issues requires comprehensive interventions, including ergonomic improvements, training, and supportive workplace policies. Implementing such strategies will enhance nurse well-being, improve job satisfaction, and ultimately lead to better patient care. Future research should prioritize long-term studies and evaluate the effectiveness of preventive measures.

KEYWORDS: Work-related musculoskeletal disorders; Nurses; Occupational fatigue; Saudi Arabia; Systematic review.

1. Introduction

Among healthcare professionals, MSDs are a collection of illnesses that primarily impact nurses [1–3]. Hand, wrist, elbow, shoulder, neck, low back, and leg discomfort and complaints are hallmarks of these conditions. Vibration, force exertion, repetitive jobs, and uncomfortable posture are the main causes of MSDs [4]. MSDs are a major occupational health issue for nurses, according to epidemiological studies [5,6]. In addition to causing work limitations, absenteeism, or even the desire to change occupations, MSDs can have a severe impact on one's quality of life [7]. The primary healthcare professionals who have regular, close contact with patients are nurses, who also interact with the hospital's equipment and surroundings. Therefore, in order to prevent MSDs, ergonomics talks about the patient, machine, and healthcare providers [8].

Professional nurses who experience WRMSD are more likely to take sick days annually, retire early, and have worse health [9, 10]. According to Grabbe et al., WMSD5 accounted for 56% of all sick days taken by professional nurses. According to Trinkoff et al., the main causes of early retirement among nurses are psychological demands, hard work, and WMSD [11, 12]. Among nurses, the lower back has been found to be the most susceptible anatomical region for WMSD [13, 14].

WRMSDs are a significant global health concern, particularly among healthcare workers, including nurses. Nurses are often exposed to physical strain due to prolonged standing, repetitive movements, lifting patients, and other demanding tasks, making them vulnerable to developing musculoskeletal issues. In Saudi Arabia, the healthcare sector is rapidly growing, with increasing demands placed on nursing professionals. Despite the critical role nurses play in patient care, limited research has comprehensively examined the prevalence and risk factors of WRMSDs in this population within the Saudi Arabian context. Understanding these factors is essential to designing effective prevention strategies, improving occupational health, and ensuring the sustainability of the nursing workforce in the country.

This systematic review aims to investigate the prevalence and risk factors of WRMSDs among nurses in Saudi Arabia. By analyzing existing literature, the review seeks to identify the most commonly affected body regions, assess the occupational and individual factors contributing to WRMSDs, and highlight gaps in current research. The ultimate goal is to provide evidence-based recommendations for improving workplace ergonomics and promoting the health and well-being of nurses in Saudi Arabia.

2. Methods

Search strategy

The PRISMA and GATHER criteria were adhered to in the systematic review. To locate pertinent research on the prevalence and risk factors of WRMSDs among nurses in Saudi Arabia, a comprehensive search was carried out. Four electronic databases were searched by the reviewers: SCOPUS, Web of Science, Cochrane, and PubMed. We eliminated any duplicates and uploaded all of the abstracts and titles

that we could find using electronic searches into Rayyan. After that, all of the study texts that met the requirements for inclusion based on the abstract or title were gathered for a thorough examination. Two reviewers independently assessed the extracted papers' suitability and discussed any discrepancies.

Study population—selection

The PEO (Population, Exposure, and Outcome) factors were implemented as inclusion criteria for our review: (i) Population: Saudi Nurses, (ii) the prevalence and risk factors of WRMSDs among nurses in Saudi Arabia: Occupational fatigue and stress, (iii) Outcome: WRMSDs.

Data extraction

Data from studies that satisfied the inclusion requirements were extracted by two objective reviewers using a predetermined and uniform methodology. The following information was retrieved and recorded: (i) First author (ii) Year of publication, (iii) Study design, (iv) City, (v) Sample size, (vi) Age, (vii) Gender, (viii) Nurses' department, (ix) Condition, (x) Prevalence of WRMSD, (xi) Main outcomes.

Quality review

Since bias resulting from omitted factors is frequent in studies in this field, we used the ROBINS-I technique to assess the likelihood of bias since it enables a thorough examination of confounding. The ROBINS-I tool can be used for cohort designs where individuals exposed to different staffing levels are tracked over time and is designed to assess non-randomized studies. Each paper's risk of bias was evaluated independently by two reviewers, and any differences were settled by group discussion [15].

3. Results

The specified search strategy yielded 687 publications (Figure 1). After removing duplicates ($n=334$), 344 trials were evaluated based on title and abstract. Of these, 289 failed to satisfy eligibility criteria, leaving just 55 full-text articles for comprehensive review. A total of 8 satisfied the requirements for eligibility with evidence synthesis for analysis.

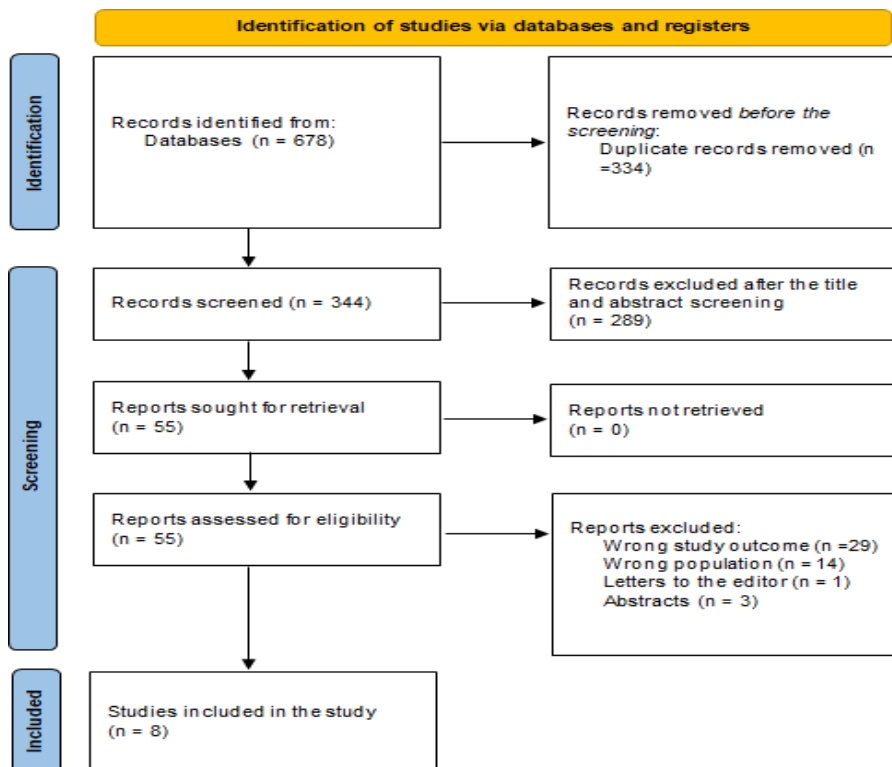


Figure (1): PRISMA flowchart [16].

Sociodemographic and clinical outcomes

We included eight studies with a total of 1469 patients, and the majority 1299 (88.4%) were females. Regarding study designs, all studies were cross-sectionals [17-24]. Three studies were implemented in Jeddah [21-23], two in Riyadh [20, 24], one in Dahrhan [17], one in Dammam [18], and one in Hail [19].

The prevalence of WRMSD among nurses ranged 61.7% [23] to 100% [18, 19, 20], with a total prevalence of 1171 (79.7%). Together the studies reveal a common profile of occupational and traumatic risk factors predisposing to WRMSDs in nurses. Occupational factors are considered to be repetitive movements, prolonged standing, the need to lift patients and bend repeatedly as well as being in physically heavy departments such as emergency/critical care. The repetitive tasks carried out mostly under stress exert maximum stress on nurses' musculoskeletal system. Other important contributors are personal factors which include being underweight, lack of physical fitness and poor shifts breaks. Long hours, restricted ergonomic accessories at work and absence of specific workplace policies will additionally increase the risk for musculoskeletal disorders [17-24].

Table (1): Outcome measures of the included studies

Study ID	Study design	City	Sociodemographic	Population type	Follow-up (months)	Failure rate (%)	Main outcomes
Alziyadi et al., 2021 [17]	Cross-sectional	Dahran	N: 194 Mean age: 36 Females: 194 (100%)	Multi-departments	LBP	144 (74%)	Regardless of age, body mass index, department, or job experience, LBT was quite common among nurses. Short breaks and sitting periods, extended periods of standing, and certain job-related tasks (such as transferring a wheelchair, trolley, or bed, or placing patients) were risk factors.
Aleid et al., 2021 [18]	Cross-sectional	Dammam	N: 100 Age range: 25 to>56 Females: 77 (77%)	Critical care nurses	Different MSDs	100 (100%)	Lifting objects above the waist, bending to pick things up off the floor, and moving patients around in bed are among the work tasks that are significantly linked to the development of MSDs.
Alrimali et al., 2024 [19]	Cross-sectional	Hail	N: 177 Mean age: 20 to>56 Females: 133 (75.1%)	Emergency nurses	Different MSDs	100 (100%)	According to the study, there was a notable incidence of MSDs among the ED nurses who were tested, and this prevalence was greatly impacted by particular demographic and occupational characteristics.
Tariah et al., 2020 [20]	Cross-sectional	Riyadh	N: 94 Females: 92 (97.9%)	Multi-departments	Different MSDs	100 (100%)	Nurses are particularly vulnerable to WRMDs. The involvement of occupational therapists is crucial in this regard. Hospital managers, rehabilitation centers, and nurses themselves should all take action to address this worldwide issue.
Attar, 2014 [21]	Cross-sectional	Jeddah	N: 200 Mean age: 34.6 Females: 191 (95.5%)	Multi-departments	Different MSDs	170 (85%)	Nurses frequently experience WMSDs, and the frequency of symptoms matches those from other facilities. Long shifts and being underweight were risk factors that led to the development of WMSDs; these factors may be hard to prevent.
Almaghrabi & Alsharif, 2021 [22]	Cross-sectional	Jeddah	N: 234 Females: 203(86.8%)	Multi-departments	LBP	194 (82.9%)	Nurses should prioritize their personal health because low back pain is a critical health issue that they face. The increased prevalence of LBP among KAUH nurses may have been caused by the nature of their jobs. Among KAUH nurses, the only risk factor statistically substantially linked to LBP was manual patient lifting.
Gaowgzeh, 2019 [23]	Cross-sectional	Jeddah	N: 60 Age range: 20-60	Multi-departments	LBP	37 (61.7%)	Lower back pain is very common among nurses who work in Jeddah's

			Females: 42 (70%)				hospitals. The physical therapist's role is crucial in lowering the risk of job-related musculoskeletal problems among nurses, and it is required that nurses perform stretching and relaxation exercises in between work schedules.
Jardi et al., 2020 [24]	Cross-sectional	Riyadh	N: 410 Age range: 20 to>40 Females: 367 (89.5%)	Multi-departments	LBP	326 (79.5%)	In this significant segment of the healthcare workforce, the prevalence of LBP is higher than ever before. The prevalence of LBP among Saudi-Arabian nurses should be decreased by implementing evidence-based therapies for the condition, such as stress reduction techniques, stress counseling, and policies pertaining to enhancing job satisfaction.

Table (2): Risk of bias assessment using ROBINS-I

Study ID	Bias due to confounding	Bias in the selection of participants into	Bias in the classification of interventions	Bias due to deviations from the intended interval	Bias due to missing data	Bias in the measurement of outcomes	Bias in the selection of reported result	Overall bias
Alziyadi et al., 2021 [17]	Mod	Mod	Low	Low	Low	Low	Low	Low
Aleid et al., 2021 [18]	Low	Mod	Low	Low	Low	Low	Low	Low
Alrimali et al., 2024 [19]	Mod	Low	Mod	Mod	Low	Low	Low	Moderate
Tariah et al., 2020 [20]	Mod	Mod	Low	Low	Low	Mod	Low	Moderate
Attar, 2014 [21]	Low	Mod	Mod	Mod	Low	Mod	Low	Moderate
Almaghrabi & Alsharif, 2021 [22]	Mod	Mod	Low	Low	Low	Low	Mod	Moderate
Gaowgzeh, 2019 [23]	Mod	Crit	Low	Low	Low	Low	Mod	Critical
Jardi et al., 2020 [24]	Crit	Crit	Low	Low	Mod	Low	Low	Critical

4. Discussion

This review found that the prevalence of WRMSD among nurses ranged 61.7% [23] to 100% [18, 19, 20], with a total prevalence of 1171 (79.7%). This was higher than the results of other earlier systematic reviews. Soyler & Ozer recorded that the

prevalence of MSDs among nurses was observed to range from 33.0% to 88.0% [25]. Soroush et al. also found that given the high incidence of these conditions among Iranian nurses, it is essential to control them by offering efficient ergonomics training and ensuring that they engage in the right exercises [26].

Given the high incidence of these conditions among Iranian nurses, it is essential to provide them with efficient ergonomics training and to engage in the right exercises. In their study, Abedini et al. evaluated MSDs among nursing staff who were responsible for patient transfers. Legs and hands had the highest prevalence rate of MSDs among nurses, ranking second and third, respectively, after backache; however, this is not compatible with our findings [27]. According to the majority of research, neck, knee, and upper back disorders were the most common, followed by backaches. This is because nursing staff who were responsible for patient transfers were included in Abedini's research sample. We can conclude that these nurses stand for longer based on the results of earlier research [28].

This systematic review underlines the high prevalence of WRMSDs in nurses in Saudi Arabia, in particular LBP as the predominant syndrome. Findings emphasize the physical nature of nursing tasks hasten work-related musculoskeletal disorders (e.g., lifting/patient moving, standing, repetitive movements) as occupational factors. Obesity and lack of breaks were personal risk factors enriching over the top of ergonomic inadequacy in the workplace in addition occupational factors. The results highlight the immediate need that exists to improve upon occupational care competencies among nurses for their care and abilities. The same trends are detected across studies in the literature regardless of the specificities to settings (i.e., settings and departments investigated) outlining these factors as universal in nature within nursing. Emergency and critical care nurses it must be mentioned have increased burden from the acute/ physically demanding nature of their work. The results suggest suitable interventions at institution and policy level to reduce future risks for nurses in the workplace.

Bernal et al. also concluded that hospital nurses' and nursing assistants' MSD is linked to psychosocial risk factors at work. Improving the psychosocial work environment may have an effect on lowering MSDs, even if the majority of workplace preventive measures concentrate on ergonomic risk factors [29]. Ellapen & Narsigan found that nurses are susceptible to WMSD, particularly lower back pain and injuries. Poor patient transfer technique, the high physical demands of the nursing profession, nurses' poor conditioning, and obesity are risk factors that predispose them to lower back pain and injury [30]. Soylar & Ozer also found that for nurses who directly care for patients, work-related MSD was a prevalent occupational health issue. Both the organizational aspects of hospitals and the demographic traits of nurses are linked to work-related MSD [31].

Clinical implications of this review findings are more than one. First, health care facilities need to employ evidence-based ergonomic interventions (e.g. use assistive devices for patient transfers and proper workstation layouts). On the other hand; Continued training programs on how to handle safely can provide nurses with the knowledge to reduce their risk of injury in physically-demanding tasks. Furthermore, including a regular break and encouraging physical fitness of nurses will also be able

to alleviate prolonged standing, repetitive movements. Logic would say that health care administrators need to devote time and resources into mental health & stress reduction strategies as job satisfaction and emotional well-being are directly associated to physical health. Finally, attending physical therapists as occupational health team members allows WRMSD in nurses to get individualized exercise plans and rehabilitation process.

5. Strengths and limitations

Review of interpreting outcomes have the advantages and increases the importance and relevance for transformation in nursing practice. It is a comprehensive snapshot of studies across various geographical sections of Saudi Arabia, highlighting a range of nursing work environments and settings. It certainly offers a thorough exploration all occupational and personal risk factors which are important knowledge to target for preventing initiatives and policy changes. Besides, the results particularly support practical approaches that can be implemented by health care facilities to increase workplace safety and decrease the incidence of WRMSDs within nursing.

Critically the review has some limitations despite its benefits. The major weakness of the included studies showed that most of them were cross-sectional, which makes it impossible to proof a cause-effect relationship between the risk factors and WRMSDs. Longitudinal data is absent which precludes long-term consequences of occupational hazards and sustainability of interventions. Lastly, although this included studies from many regions across Saudi Arabia which can enhance the generalizability of the study, some areas likely have low representation which may affect findings quality. Also, many of the studies were based on self-reported data which can result in recall bias or under/over-reported. These limitations highlight the importance of continued research with stronger study designs and greater regional representation.

6. Conclusion

WRMSDs, particularly low back pain, represent a significant occupational health concern among nurses in Saudi Arabia. This review highlights the interplay of occupational and personal risk factors, including physically demanding tasks, inadequate ergonomic support, and insufficient rest. Addressing these challenges requires a comprehensive approach involving workplace modifications, education, and policy reforms to enhance job satisfaction and nurse well-being. By implementing evidence-based interventions, healthcare institutions can not only improve the quality of life for nurses but also ensure better patient care outcomes. Future research should focus on longitudinal studies and intervention trials to strengthen the evidence base and inform more effective strategies for reducing WRMSDs in the nursing workforce.

References

Arvidsson I, Simonsen JG, Dahlgvist C, et al. Cross-sectional associations between occupational factors and musculoskeletal pain in women teachers, nurses and

- Shuruq Mohammed Durayfil Alanazi, Aeman Zaal M Alenezi, Hajer Wahsh Alshammry, Khlood Saleh Alharbi, Malak Khalaf Mishaan Al-Enezi, Njoom Wahash Alshammari, Yousef Hadi A Alanazi, Amjad Muthwid Ayed Almutrafi, Hana Mubarak Barak, Amani Hulayyil Jatli Alanzei
sonographers. *BMC Muscu-loskelet Disord.* 2016;17:35.
- Menzel N, Brooks SM, Bernard TE, et al. The physical workload of nursing personnel: association with muscu-loskeletal discomfort. *Int J Nurs Stud.* 2004;41:859–67
- Nelson A, Matz M, Chen F, et al. Development and evaluation of a multifaceted er-gonomics program to prevent injuries associated with patient handling tasks. *Int J Nurs Stud.* 2006;43:717–33.
- Long MH, Bogossian FE, Johnston V. The prevalence of work-related neck, shoulder, and upper back musculoskeletal disorders among midwives, nurses, and physicians: a systematic review. *Workplace Health Saf.* 2013;61:223-9.
- Owen BD, Keene K, Olson S. An ergonomic approach to reducing back/ shoulder stress in hospital nursing personnel: a five year follow up. *Int J Nurs Stud.* 2002;39:295–302.
- Bos E, Krol B, Star L, et al. Risk factors and musculoskeletal complaints in non-specialized nurses, IC nurses, operation room nurses, and X-ray technologists. *Int Arch Occup Environ Health.* 2007;80:198–206
- Choi SD, Brings K. Work-related musculoskeletal risks associated with nurses and nursing assistants handling over-weight and obese patients: A literature review. *Work.* 2016;53:439–48.
- Babayiğit MA, Kurt M. Hospital Ergonomics. *İstanbul Med J.* 2013;14:153-9.
- Trinkoff A, Geiger-Brown J, Brady B, Lipscomb J, Muntaner C. How long and how much are nurses now working? *Am J Nurs.* 2006, 106: 60-71, quiz 72.
- Nelson A, Harwood KJ, Tracey CA, Dunn KL. Myths and facts about safe patient handling in rehabilitation. *Rehabil Nurs.* 2008, 33: 10-17.
- Gabbe SG, Melville J, Mandel L, Walker E. Burnout in chairs of obstetrics and gynecology: diagnosis, treatment, and prevention. *Am J Obstet Gynecol.* 2002, 186: 601-612.
- Long MH, Johnston V, Bogossian F. Work-related upper quadrant musculoskeletal disorders in midwives, nurses and physicians: A systematic review of risk factors and functional consequences. *Appl Ergon.* 2012, 43: 455-467.
- Schlossmacher R, Amaral FG. Low back injuries related to nursing professionals working conditions: a systematic review. *Work* 41 Suppl 1: 2012, 5737-5738.
- Long MH, Bogossian FE, Johnston V. The prevalence of workrelated neck, shoulder, and upper back musculoskeletal disorders among midwives, nurses, and physicians: a systematic review. *Workplace Health Saf* 61: 2013, 223-229.
- Sterne JA, Hernán MA, Reeves BC, Savović J, Berkman ND, Viswanathan M, Henry D, Altman DG, Ansari MT, Boutron I, Carpenter JR. ROBINS-I: a tool for assessing risk of bias in non-randomised studies of interventions. *bmj.* 2016 Oct 12;355.
- Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart LA, Prisma-P Group. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic reviews.* 2015 Dec;4:1-9.
- Alziyadi RH, Elgezery MH, Alziyadi RH. Prevalence of low back pain and its associated risk factors among female nurses working in a tertiary hospital in Dhahran, Eastern Province, Saudi Arabia. *Middle East Journal of Family Medicine.* 2021 Jan 1;7(10):173.
- Aleid AA, Eid Elshnawie HA, Ammar A. Assessing the work activities related to musculoskeletal disorder among critical care nurses. *Critical Care Research and Practice.* 2021;2021(1):8896806.
- Alrimali AM, Alreshidi NM, Alshammari AA, Alenzy AR, Thomas R, Dinoy MA, Alanzi FA, Pasay-an E. Patterns of Musculoskeletal Disorders among Staff Nurses in the Emergency Department in Saudi Arabia: A Cross-sectional Study. *Nurse Media Journal of Nursing.* 2024 Apr 1;14(1):74-84.
- Tariah HA, Nafai S, Alajmi M, Almutairi F, Alanazi B. Work-related musculoskeletal disorders in nurses working in the Kingdom of Saudi Arabia. *Work.* 2020 Jan 1;65(2):421-8.
- Attar SM. Frequency and risk factors of musculoskeletal pain in nurses at a tertiary centre in

- Jeddah, Saudi Arabia: a cross sectional study. BMC research notes. 2014 Dec;7:1-6.
- Almaghrabi A, Alsharif F. Prevalence of low back pain and associated risk factors among nurses at king abdulaziz university hospital. International Journal of Environmental Research and Public Health. 2021 Feb;18(4):1567.
- Gaowgzeh RA. Low back pain among nursing professionals in Jeddah, Saudi Arabia: prevalence and risk factors. Journal of back and musculoskeletal rehabilitation. 2019 Jan 1;32(4):555-60.
- Jradi H, Alanazi H, Mohammad Y. Psychosocial and occupational factors associated with low back pain among nurses in Saudi Arabia. Journal of occupational health. 2020 Jan;62(1):e12126.
- Soylar P, Ozer A. Evaluation of the prevalence of musculoskeletal disorders in nurses: a systematic review. Med Sci. 2018 Sep;7(3):479-85.
- Soroush A, Shamsi M, Izadi N, Heydarpour B, Samadzadeh S, Shahmohammadi A. Musculoskeletal disorders as common problems among iranian nurses: a systematic review and meta-analysis study. International journal of preventive medicine. 2018 Jan 1;9(1):27.
- Abedini R, Choobineh A, Hasanzadeh J. Musculoskeletal load assessment in hospital nurses with patient transfer activity Int J Occup Hyg. 2013;5:39–45
- Reed LF, Battistutta D, Young J, Newman B. Prevalence and risk factors for foot and ankle musculoskeletal disorders experienced by nurses BMC Musculoskelet Disord. 2014;15:196.
- Bernal D, Campos-Serna J, Tobias A, Vargas-Prada S, Benavides FG, Serra C. Work-related psychosocial risk factors and musculoskeletal disorders in hospital nurses and nursing aides: a systematic review and meta-analysis. International journal of nursing studies. 2015 Feb 1;52(2):635-48.
- Ellapen TJ, Narsigan S. Work related musculoskeletal disorders among nurses: systematic review. J Ergonomics. 2014 Apr;4:S4-003.
- Soylar P, Ozer A. Evaluation of the prevalence of musculoskeletal disorders in nurses: a systematic review. Med Sci. 2018 Sep;7(3):479-85.