International Journal of Yoga, Physiotherapy and Physical Education
www.sportsjournal.in
ISSN: 2456-5067
Received: 01-03-2024, Accepted: 24-03-2024, Published: 15-04-2024
Volume 9, Issue 2, 2024, Page No. 12-16

Work-related musculoskeletal disorders in nurses working in ICU

Bhakti Dharmadhikari[1], Gaurai Gharote[2], Mahendra Shende[3]
[1] Department of Physiotherapy, Indutai Tilak College of Physiotherapy, Tilak Maharashtra Vidyapeeth, Pune, Maharashtra, India
[2] Professor, Department of Physiotherapy, Indutai Tilak College of Physiotherapy, Tilak Maharashtra Vidyapeeth, Pune, Maharashtra, India
[3] Principal, Department of Physiotherapy, Indutai Tilak College of Physiotherapy, Tilak Maharashtra Vidyapeeth, Pune, Maharashtra, India

Abstract
Background: This cross-sectional study looked at the prevalence of work-related musculoskeletal problems among intensive care nurses in Pune. This is caused by repetitive movements, poor posture, exertion, and long hours of working. This study examines the commonly affected joints among ICU nurses according to age groups.
Method: The design was a quantitative, descriptive study using a Modified Nordic Questionnaire. The questionnaire contains body chart and questions related to musculoskeletal injuries. Nurses working in mixed ICUs completed an online survey about work-related musculoskeletal injuries.
Result: Low back pain was the most often reported musculoskeletal problem (74.4%), followed by neck (61.6%) and shoulder discomfort (39.2%), whereas knees (14.4%), ankle/feet (12%), elbows (9.6%), wrist/hands (9.6%), upper back (5.6%), and hips/thighs (4%) are least affected joints.
Conclusion: The present study found that the prevalence of work-related musculoskeletal is highly related to age. These findings highlight the need for nurses and supervisors to raise risk awareness, enhance physical and psychosocial working conditions, and promote a safer workplace. They benefit from rehabilitation programs that include therapeutic activities and posture training. More consideration should be given to the back and neck handicap status of ICU nurses to improve the working environment and ergonomics. More research is needed to determine whether work-related musculoskeletal improvement in ICUs following exercise and physical therapy.

Keywords: Prevalence, work-related musculoskeletal disorders, ICU nurses

Introduction
Work-related musculoskeletal disorders encompass a wide range of dysfunctions that occur at the job, affecting the muscles, nerves, joints, tendons, cartilage, and intervertebral discs [1] In particular work-related musculoskeletal disorders affect the lower back, neck, and shoulder. The term work-related musculoskeletal disorders refers to musculoskeletal disorders that are made worse or long-lasting by work conditions [1] According to W.H.O., work-related musculoskeletal disorders are defined as musculoskeletal problems that often cause pain, which is frequently persistent, and limit dexterity and mobility, which makes it harder for a person to work and engage in society. If a bodily position is held for an extended period, it may result in discomfort and exhaustion, for instance. Prolonged standing work might result in foot pain, overall muscle exhaustion, and lower back pain [2]. Musculoskeletal diseases associated with the job wear out nurses physically, especially those who work in critical care units where meeting patients' demands often require prolonged physical exertion. The harm that persistent physical strain and exertion inflict on biological tissues is linked to musculoskeletal problems. Numerous inflammatory symptoms that impact muscles, tendons, ligaments, joints, and nerves result in pain and suffering [2]. One of the major risk factors leading to the development of work-related musculoskeletal disorders in work activities. Work activities that cause extreme fatigue in various body parts such as the upper and lower extremities, lower back, and neck lead to musculoskeletal disorders, and such conditions are termed occupational disorders. The occurrence of work-related musculoskeletal disorders is generally higher among critical care unit nurses than that of clinical care unit nurses. In particular, critical care unit nurses working full-time have an even higher risk of developing work-related musculoskeletal disorders [2]. It is commonly observed that if a body position is maintained for a prolonged period, it can lead to pain, discomfort, and fatigue. Similarly intensive care unit nurses hold their neck and shoulders in a fixed position and this prolonged abnormal posture leads to the development of musculoskeletal disorders. The long hours of sitting or standing can also lead to the development of musculoskeletal symptoms [2]. When adopted for long periods spinal disc compression is increased, eventually leading to higher loads on the spine. The physical load on the spine will exponentially increase, causing fatigue, pain, and a gradual decrease in the ability to work. Work posture and movement, Repetitiveness and pace of work, Force and movement, Monotonous tasks, Temperature, and Lack of or poor communication are some risk factors associated with continuous work and prolonged posture [3]. Musculoskeletal problems represent a significant occupational health issue for nurses. Musculoskeletal problems related to the workplace may cause an employee to miss work or look for

alternative employment (Attar, 2014). Consequently, the stability of ICU teams and the welfare of ICU nurses depend on the avoidance of WRMDs. Because of prolonged awkward body positions, repeated movements, and risky working circumstances (Hoe, Kelsall, Urquhart, & Sim, 2012; S. J. Lee, Faucett, Gillen, Krause, & Landry, 2013), the nursing profession is vulnerable to work-related motor disorders (WRMDs) [4]. The etiology of work-related musculoskeletal disorders has been linked to several extrinsic and intrinsic variables. Three main risk factors have been linked to work-related musculoskeletal disorders: high force levels, uncomfortable postures, and repetitive activity, according to Silverstein *et al*. It is common for nurses to engage in tasks that include moving large objects, lifting patients, assuming awkward positions, and moving patients from the floor to beds [5, 14]. According to a recent study conducted by Amer, nurses who work in the Intensive Care Unit are more likely to suffer lower back pain (79.3%), knee pain (72.4%), shoulder pain (72.4%), neck pain (62.1%), and elbow pain (8.6%). (6,20) It is important to increase awareness among ICU nurses regarding proper techniques of patient handling and movements of patients by developing coping strategies, and educational programs, and implementing special policies and procedures [6]. Utilizing efficient coping strategies and educational programs reduces the occurrence of work-related musculoskeletal disorders (MSDs) in nurses, while simultaneously enhancing their effectiveness in delivering high-quality patient care [6]. Nurses in critical care units must exert significant effort and skill to meet the needs of their patients, and as a result, the risk of musculoskeletal disorders development increases. It is a well-known truth that maintaining a body position for a long time can cause discomfort and weariness. Similarly, critical care nurses maintain a stable posture with their neck and shoulders, which contributes to the development of musculoskeletal disorders characterized by injuries and pain [6, 21]. Compared to non-specialized nurses, critical care nurses have a higher risk of developing work-related musculoskeletal illnesses (WMSDs). Compared to other healthcare professions, nurses experience a greater prevalence of work-related musculoskeletal disorders (30–88%), depending on the body part. Workplace factors that lead to work-related musculoskeletal ailments include job strain, patient manual handling, and physical and psychological burden. Additionally, when physical demands increase, working long hours, being on call, having to work overtime, and working on days off all contribute to an increase in musculoskeletal issues [7, 21-24]. Reflecting on suffering as it relates to the work of Intensive Care Unit (ICU) nurses necessitates an understanding of the situations these professionals face as a result of their work density and rhythm, the diversity of technology used, and the constant responsibility of this job, which frequently does not end when the work shift ends, and, as a result, can lead to levels of suffering greater than one can imagine [8]. Work in the ICU is difficult because patients are considered critical and pose a life-threatening risk. Nurses face problems due to the technical intricacy of patient care, as well as the high maintenance needs of patients, their families, doctors, and institutions, all of which can lead them to suffer. Given the technological instruments in the ICU and the large number of treatments that patients undergo, the atmosphere is acknowledged as one of the most stressful and aggressive, both from the user's and service provider's perspectives. Furthermore, the stress given to the health team as a result of the persistent presence of mortality promotes feelings of suffering [8-10]. Working with suffering, anguish, and witnessing death might increase nurses' work-related stress. It is also true that providing care to critical patients, who may have an unstable clinical condition, contributes to fatigue and, as a result, suffering. Though work may be viewed as a source of suffering, it is still essential in life. It is viewed not simply as a means of livelihood, but also as inextricably linked to social standing. In nursing, it is directly related to the nursing team's activities, task division by category, ill persons, mortality, rapid work rhythm, and other factors [8-11]. Many employees suffering from musculoskeletal pain continue to work, which may exacerbate pain and other symptoms [12]. Hospital staff personnel must avoid occupational injuries and keep healthy to give better care to their patients. Musculoskeletal problems can impair employees' efficiency and performance. Previous research has explored the link between hospital staff (doctors and nurses) and work-related musculoskeletal disorders (WMSDs) [13-14].

Material and Methods

Research design

This study was epidemiological in nature, with the aim of finding the prevalence of work-related musculoskeletal injuries in ICU nurses. The study was therefore survey based, cross sectional, and quantitative using a Modified Nordic Questionnaire.

Participants

The nurses' consent was taken, ICU nurses were given the Nordic questionnaire. The participants were included according to inclusion and exclusion criteria. A population of 130 ICU nurses was targeted out of which 125 ICU nurses willingly filled the questionnaire.

Research tool

Modified Nordic Questionnaire was used along with body chart.

Ethics, consent and permissions

Participants in this study received a consent form which introduced the research project by including the title of the study, the aims of the study and reassuring the participants their information confidentiality as well as of their responses. Consent was given by each participant.

Data collection

The Modified Nordic questionnaire was given to the respective participants in person. The questionnaire contained body chart as well as questions on musculoskeletal injuries. The data collection was done between November 2023 and January 2024.

Data analysis

It is done using SPSS, descriptive statistics, and plotting graphs using Excel.

Results

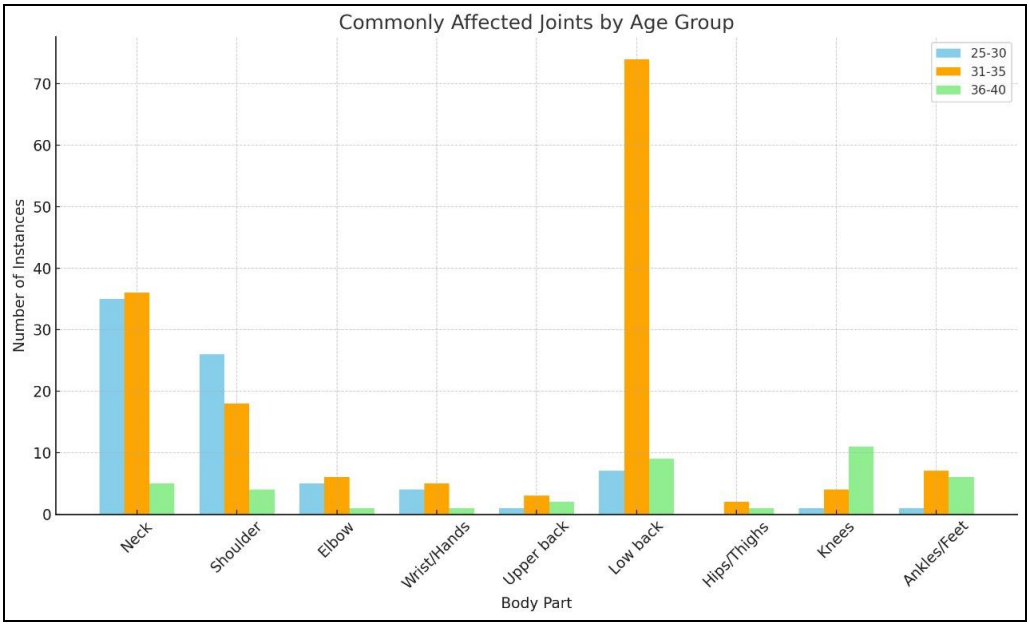
Prevalence of Musculoskeletal Disorders (MSDs)

Body Part	Count	Prevalence (%)
Neck	77	61.6
Shoulder	49	39.2
Elbow	12	9.6
Wrist/Hands	12	9.6
Upper back	7	5.6
Low back	93	74.4
Hips/Thighs	5	4.0
Knees	18	14.4
Ankles/Feet	15	12.0

This detailed presentation provides both the number of nurses reporting troubles in each area and the corresponding prevalence rates, offering a clear view of the most affected body parts. The highest counts and prevalence rates are observed in the lower back, neck, and shoulder emphasizing the critical areas of concern for occupational health interventions among nursing staff.

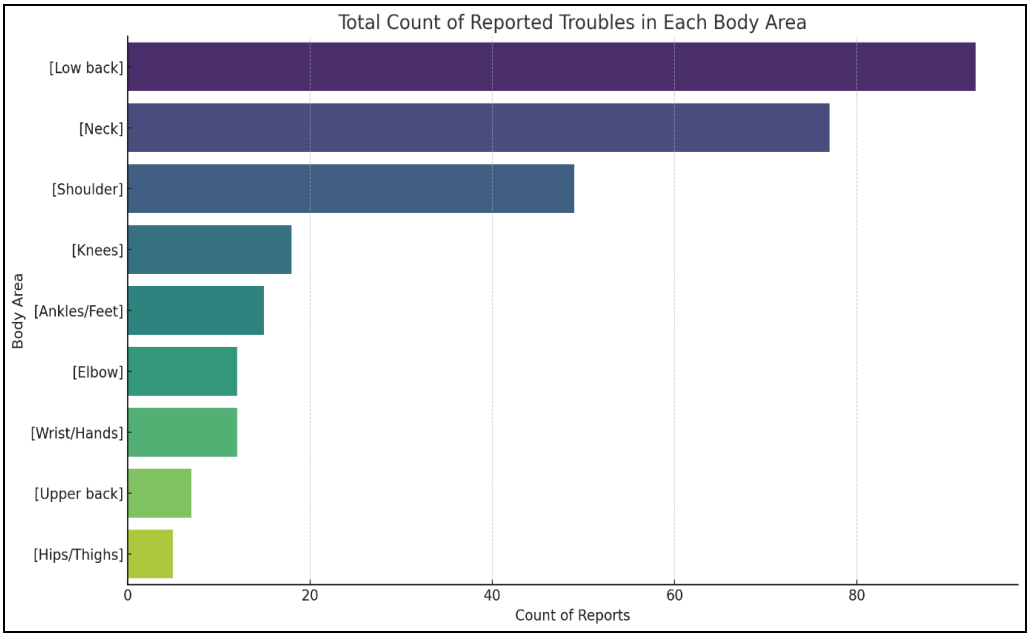
Body Part	25-30	31-35	36-40
Neck	35	36	5
Shoulder	26	18	4
Elbow	5	6	1
Wrist/Hands	4	5	1
Upper back	1	3	2
Low back	7	74	9
Hips/Thighs	0	2	1
Knees	1	4	11
Ankles/Feet	1	7	6

Age is an important factor influencing the occurrence of work-related musculoskeletal disorders. Lower back issues in particular show a strong positive correlation with age, indicating an increased prevalence among older nurses. Neck and shoulder issues in particular show a strong positive correlation among young age nurses.



Bar Chart of Trouble Reports per Area

This bar graph shows trouble areas from minimum to maximum joints affected.



Discussion

This study aimed to describe the prevalence of work-related musculoskeletal disorders among ICU nurses in Pune. The study found a concerningly high prevalence of work-related musculoskeletal disorders, notably in the lower back and neck. Nurses on understaffed wards are more likely to report utilization of incorrect lifting techniques due to a sense of urgency and pressure to finish duties. The fast-paced nature of critical care, combined with the necessity for frequent patient repositioning, may increase the risk of musculoskeletal disorders when compared to non-ICU nurses.

Work-related injuries are defined as bodily injuries sustained on the job site (Gossman & Knoblauch, 2017). Poor ergonomics, equipment abuse, and insufficient safety training can all contribute to workplace injuries (S. J. Lee, Lee, & Gershon, 2015; Tinubu, Mbada, Oyeyemi, & Fabunmi, 2010). Work-related musculoskeletal disorders (WRMDs) are frequent and can affect muscles, nerves, tendons, joints, cartilage, and intervertebral disks (Bai, Wang, & Yue, 2009; Freimann, Coggon, Merisalu, Animagi, & Paasuke, 2013; Wang, Yan, Huang, & Dai, 2017) [1].

Musculoskeletal problems pose a significant occupational health risk to nurses. According to studies conducted in Brazil and Italy (Carugno *et al*., 2012), Estonia (Freimann *et al*., 2013), Uganda (Munabi, Buwembo, Kitara, Ochieng, & Mwaka, 2014), Nigeria (Tinubu *et al*., 2010), and California (S. J. Lee *et al*., 2015), the annual prevalence of Work-related musculoskeletal disorders among nurses ranges from 40% to 85%. In China, the prevalence of WRMDs among nurses ranges from 56% to 92% (Cheng, Wang, Wu, Shen, & Jing, 2017; Liu *et al*., 2015; Wang *et al*., 2017; Zhang, Li, & Gui, 2016), with the most prevalent symptoms being lower back, neck, and shoulder discomfort [1].

In our study, work-related musculoskeletal disorders were most prevalent in the lower back (74.4%), neck (61.6%), shoulder (39.2%), knees (14.4%), ankle/feet (12%), elbows (9.6%), wrist/hands (9.6%), upper back (5.6%), and hips/thighs (4%). It shows a higher prevalence of musculoskeletal disorders in low back and neck.

The prevalence of work-related musculoskeletal disorders symptoms in the study population over the previous year was 96.8%. Low back pain had the highest reported work-related musculoskeletal disorders rate (80.5%), followed by neck pain (79.0%) and shoulder pain (70.4%) [1].

89.1% of nurses reported experiencing physical pain or discomfort at work. Work-related musculoskeletal disorders were most prevalent in the low back (48.2%), followed by the shoulder (34.6%), neck (33.1%), and knee (29%). Other locations with lower frequency included thoracic (10.5%), feet and ankle (7.6%), elbow (1.88%), and hip (1.6%) [2].

Nurses who work rotating shifts may face weariness, trouble concentrating, and a compromised immune system, leaving them more susceptible to harm. Limited staffing and severe workloads might erode nurses' sense of control over their working conditions. Time constraints can lead to sentiments of dissatisfaction, anxiety, and even harmful patient handling techniques [2].

According to a previous study, Low back pain was the most commonly reported musculoskeletal disorder (80.1%), followed by neck (78.6%) and shoulder pain (70.4%) [4].

Our study found a positive correlation between age and musculoskeletal disorders, Lower back issues in particular show a strong positive correlation with increased age, indicating an increased prevalence among older nurses (31-35 age group). Neck and shoulder issues in particular show a strong positive correlation among young age nurses (25-30 age group).

Previous study shows that prevalence of musculoskeletal disorders (MSDs) increases with age. 49% of affected nurses were aged between 25 and 30, and 39% were aged between 31 and 35. This study demonstrates a statistically significant correlation between the development of MSDs and lower back pain and neck pain (Tinubu *et al*) [6].

This previous study also shows a statistically significant relation between developing musculoskeletal disorders with lower back and neck pain and these findings are supported by Tinubu *et al* [6].

According to a recent study conducted by Amer, nurses who work in the Intensive Care Unit are more likely to experience lower back pain (79.3%), knee pain (72.4%), shoulder pain (72.4%), neck discomfort (62.1%), and elbow pain (8.6%) [6, 20].

Our study shows a strong positive correlation between age and low back (0.60) indicating that as age increases, the low back issues also increase. Previous studies revealed a relationship between age and specific joint discomfort; among young adult nurses, the neck and shoulder joints are frequently impacted. A prior study (Risk factors and risk profiles for neck pain in young adults: Prospective studies from adolescence to young adulthood—The North-Trondelag Health Study) provides evidence for this finding. [17] However the lower back is typically impacted in older adult nurses. (Low back pain in older adults: risk factors, management options, and future directions) [18].

More research is needed to go into these particular risk factors in greater depth. The significant prevalence of work-related musculoskeletal problems highlights the importance of preventive measures in ICU settings. Implementing ergonomic solutions, providing adequate training on safe patient handling procedures, and promoting regular breaks can significantly reduce the occurrence of musculoskeletal problems among ICU nurses [4].

Nurses at intensive care units (ICUs) and respiratory care centers (RCCs) execute procedures daily, as well as provide nursing care. They not only require adequate physical strength and professional skills but they are also subjected to a very stressful working atmosphere in ICUs. During working hours, ICU nurses regularly transport heavy patients who need trunk bending and rotational mobility help. These movements put a strain on the neck and lower back, making nurses more prone to musculoskeletal diseases [12, 25].

Limitation

The sample size and specialized ICU environment may restrict the generalizability of our findings to other settings. Small sample sizes may not fully represent the larger population of ICU nurses, making it difficult to apply the findings broadly.

Many studies in healthcare research are cross-sectional, with data collected at a single point in time. This approach may fail to represent the dynamic nature of musculoskeletal problems as they develop and progress over time. Ethical issues may limit the scope of certain workplace interventions or changes that can be introduced or assessed. Balancing nurses' well-being with the necessity for research might be difficult from an ethical standpoint.

Conclusion

A significant proportion of nurses' report experiencing musculoskeletal discomfort, with the highest prevalence observed in the lower back (74.4%) and neck (61.6%). This indicates that work-related musculoskeletal disorders pose a considerable health concern among the nursing workforce. Age plays a significant role in the development of work-related musculoskeletal disorders. Specifically, older nurses tend to experience a higher prevalence of lower back issues, Conversely, younger nurses tend to experience a higher prevalence of neck and shoulder issues, highlighting the influence of age on different types of musculoskeletal problems among healthcare professionals.

Acknowledgement

We would like to thank the ICU nurses who participated in the study.

References

1. Yang S, Li L, Wang L, Zeng J, Li Y. Risk factors for work-related musculoskeletal disorders among intensive care unit nurses in China: a structural equation model approach. Asian Nurs Res (Korean Soc Nurs Sci),2020:14(4):241-8.
2. Anap D, Iyer C, Rao K. Work-related musculoskeletal disorders among hospital nurses in rural Maharashtra, India: a multi-center survey. Int J Res Med Sci,2013:1(2):101-7.
3. Ribeiro T, Serranheira F, Loureiro H. Work-related musculoskeletal disorders in primary health care nurses. Appl Nurs Res,2017:33:72-7.
4. Yang S, Lu J, Zeng J, Wang L, Li Y. Prevalence and risk factors of work-related musculoskeletal disorders among intensive care unit nurses in China. Workplace Health Saf,2019:67(6):275-87.
5. Tinubu BM, Mbada CE, Oyeyemi AL, Fabunmi AA. Work-related musculoskeletal disorders among nurses in Ibadan, South-west Nigeria: a cross-sectional survey. BMC Musculoskelet Disord,2010:11:1-8.
6. Aleid AA, Eid Elshnawie HA, Ammar A. Assessing the work activities related to musculoskeletal disorder among critical care nurses. Crit Care Res Pract,2021:2021.
7. Clari M, Garzaro G, Di Maso M, Donato F. Upper limb work-related musculoskeletal disorders in operating room nurses: a multicenter cross-sectional study. Int J Occup Environ Med, 2019.
8. Martins JT, Robazzi ML. Nurses' work in intensive care units: feelings of suffering. Rev Lat Am Enfermagem,2009:17:52-8.
9. Shimizu HE, Ciampone MH. As representações sociais dos trabalhadores de enfermagem não enfermeiros (técnicos e auxiliares de enfermagem) sobre o trabalho em Unidade de Terapia Intensiva em um hospital-escola. Rev Esc Enferm USP,2002:36:148-55.
10. Martins JJ. O Cotidiano de Trabalho de Enfermagem em UTI: prazer e sofrimento? [dissertação]. Florianópolis (SC): Escola de Enfermagem da Universidade Federal de Santa Catarina, 2000.
11. Santos JM, Oliveira EB, Moreira AD. Estresse, fator de risco para a saúde do enfermeiro em centro de terapia intensiva. Rev Enferm UERJ,2006:580-5.
12. Kuo FY, Chen KL, Chen PH. Work-related musculoskeletal disorders among nurses in the intensive care units and respiratory care centers: A pilot cross-sectional descriptive study.
13. Imbeau D. Comparison of rest allowance models for static muscular work. Int J Ind Ergon,2009:39(1):73-80.
14. Wang J, Cui Y, He L, Xu X, Yuan Z, Jin X, *et al*. Work-related musculoskeletal disorders and risk factors among Chinese medical staff of obstetrics and gynecology. Int J Environ Res Public Health,2017:14(6):562.
15. Gharote G, Piwal P, Yeole U, Adakkite R, Gawali P. Prevalence of common work-related musculoskeletal pain in physiotherapy practitioners. Eur J Pharm Med Res,2016:3(5):398-402.
16. Jahre H, Grotle M, Småstuen M, Guddal MH, Smedbråten K, Richardsen KR, *et al*. Risk factors and risk profiles for neck pain in young adults: Prospective analyses from adolescence to young adulthood—The North-Trøndelag Health Study. PLoS ONE,2021:16(8):e0256006.
17. Wong AY, Karppinen J, Samartzis D. Low back pain in older adults: risk factors, management options, and future directions. Scoliosis,2017:12:14.
18. Punnett L, Wegman DH. Work-related musculoskeletal disorders: the epidemiologic evidence and the debate. J Electromyogr Kinesiol,2004:14(1):13-23.
19. Abdou SA. Work-related musculoskeletal symptoms among nurse staff in ismailia, Egypt. Egypt J Occup Med,2018:42(1):61-78.
20. Schneider E, Copsey S, Irastorza X. OSH [Occupational safety and health] in figures: work-related musculoskeletal disorders in the EU-facts and figures. Office for Official Publications of the European Communities, 2010.
21. Soylar P, Ozer A. Evaluation of the prevalence of musculoskeletal disorders in nurses: a systematic review. Med Sci,2018:7(3):479-85.
22. Pekkarinen L, Elovainio M, Sinervo T, Heponiemi T, Aalto AM, Noro A, *et al*. Job demands and musculoskeletal symptoms among female geriatric nurses: The moderating role of psychosocial resources. J Occup Health Psychol,2013:18(2):211.
23. 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(3):455-67.
24. Trinkoff AM, Le R, Geiger-Brown J, Lipscomb J, Lang G. Longitudinal relationship of work hours, mandatory overtime, and on-call to musculoskeletal problems in nurses. Am J Ind Med,2006:49(11):964-71.
25. Moreira RF, Sato TO, Foltran FA, Silva LC, Coury HJ. Prevalence of musculoskeletal symptoms in hospital nurse technicians and licensed practical nurses: associations with demographic factors. Braz J Phys Ther,2014:18:323-33.
26. Kuorinka I, Jonsson B, Kilbom A, Vinterberg H, Biering-Sørensen F, Andersson G, Jørgensen K. Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. Appl Ergon,1987:18(3):233-7.
27. O'Sullivan 7th edition.