The Prevalence and Risk Factors of Low Back Pain Among Healthcare Workers in Asia

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ABSTRACT

Introduction: Low Back Pain is a musculoskeletal disorder and not a disease. Among healthcare workers (HCw), this is the disorder they experience most often, and knowledge about the prevalence of of low back pain (LBP) and its risk factors among healthcare workers is important to determine appropriate training for them The purpose of this study was to identify the magnitude of low back pain (LBP) problems in HCw as well as to determine which risk factors are determinants. **Method:** This study used a systematic review via meta-analysis guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). **Results:** Through a search of 13 articles from several countries in Asia, which analyzed 5753 respondents (1080 or 18.8% were males and 4673 or 81.2% were females), the average prevalence of LBP was 58.1%. This value was calculated without estimating the time span of its occurrence. If this range was calculated, of the 11 articles that calculated the lifetime incidence of LBP, the average was 60%. The risk factors were manual patient removal, heavy object lifting, sex, age, stress, type of work, workplace environment, and work duration. **Conclusion:** This study found a high prevalence, and there are still many risk factors for LBP that require special attention. Healthcare workers are advised to pay attention to ergonomics and working behavior, while hospital leaders are advised to conduct training on the risk factors of LBP.

Keywords: healthcare workers, low back pain, prevalence, risk factors

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INTRODUCTION

Low Back Pain (LBP) is a health problem that is often experienced by people in several developed countries (James *et al.*, 2018), and its prevalence varies worldwide. The duration of pain cannot be ascertained (Novitasari *et al.*, 2016), and some people experience pain for more than a day, while others experience pain for a month (Hoy *et al.*, 2012). The number of patients with LBP received by hospitals is high (Beyera, O'Brien and Campbell, 2020).

LBP is associated with musculoskeletal disorders (MSDs), not diseases, and they are generally caused by psychological and mental factors such as stress, excessive emotions, the need for respect from colleagues, and role conflict between healthcare workers (Freimann, Pääsuke and Merisalu, 2016). LBP is also caused by ergonomic factors when a person is required to lift items that weigh more than their ability and habits (Surya, 2022), in addition to biological factors (Sharma, Shrestha and Jensen, 2016).

D'Ettorre *et al.* (2019) found an increased risk of LBP in healthcare workers, especially in those who worked at the reception desk for long hours. Other research also stated that the health problem most suffered by healthcare workers is LBP (Dlungwane, Voce and Knight, 2018). Several studies in Asia

have stated that MSDs are experienced by 75% of healthcare workers in Indonesia, including hospital nurses and nursing home caregivers (Iridiastadi *et al.*, 2019). LBP among Indian healthcare workers is low at only 24.74% (Arun, 2020).

Khumalo and Haffejee (2022) found that the prevalence of LBP among basic healthcare workers is 79.3%, that LBP is mostly affected by females, and that it is caused by lifting heavy objects. A study in Ethiopia found that 44.2% of healthcare workers experienced LBP over the past year, and that the causes were night shifts and low job satisfaction (Gashawbeza and Ezo, 2022). Knowledge of the prevalence of LBP and its risk factors among healthcare workers is important to determine appropriate training for them (Facci, 2018).

Several studies have found that the risk factors for LBP include lack of knowledge about ergonomics (Hakim and Mohsen, 2017), prolonged standing (Şimşek, Yağci and Şenol, 2017; Negash, Tadele and Ferede, 2022; Zewudie *et al.*, 2022; Awosan *et al.*, 2017), lifting heavy objects (Adesola Ojo *et al.*, 2021; Awosan *et al.*, 2017), and job stress (Vinstrup, Jakobsen and Andersen, 2020), and no research has been conducted on LBP in Asia using literacy studies. These studies focused only on the LBP period (Sang, Wang and Jin, 2021), LBP among healthcare students (Wong *et al.*, 2021), and LBP in 12 random countries (Edwards *et al.*, 2017). The purpose of this study was to identify the magnitude of low back pain (LBP) problems in healthcare workers (HCw) in Asia and to identify the risk factors.

METHODS

This systematic review used meta-analysis and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Moher *et al.*, 2009).

Search Strategy

The first researcher searched for references on Google Scholar, Crossref, PubMed, and Scopus using Harzing's Publish or Perish edition 8.6.4214.8378 (Harzing, 2022), researcher also looked for articles with the keywords of prevalence of or risk factor for low back pain, musculoskeletal, healthcare workers, health care, hospital care, and so on which are believed to be relevant. Several similar keywords were also searched manually in other databases to complement the data used in this study. The first researcher added data from several articles, both those that had been defined and those that had not. The first and third researchers consulted several librarians to determine and review relevant articles.

Study Selection

This study uses Mendeley Desktop version 1.19.8 (Mendeley, 2020) for reference management and searching for duplicate data from past searches. A third researcher manually filtered the articles based on their titles, abstracts, and keywords. Researchers have also screened several articles discussing the prevalence and risk factors of LBP among healthcare workers. The third researcher wrote, analyzed, and reviewed the articles screened by the first researcher.

Data Extraction

The second researcher screened the data based on the publication year of the articles between 2010 and 2022 and considered the study design, study locations (in this case Asian countries), participant characteristics (in this case healthcare workers), and prevalence and risk factors for LBP. The respondents were nurses, doctors, administrative staff, and community health workers working in hospitals. The prevalence of LBP was taken in part, namely, the frequency of LBP in a short period of time,

Table 1. Research Inclusion and Exclusion Criteria

Inclusion	Exclusion
Prevalence in the last 12 months and 7 days (a small part)	Research methods conducted apart from Cross-sectional
Overall prevalence/ throughout life	Consumptive risk factors in samples such as fruits, smoking, drinking coffee, drinking tea, and others
Risk factors for gender, age, ergonomics, and psychology	Location of research conducted outside the Asian region
Research methods using Cross-sectional	Year of publication still below 2010
Research sample of more than 50	Study samples that are still less than 50
The location of the study is in Asia (One article represents one country)	
Publication year 2010-2022	

such as the past 12 months or seven days. However, most of the data were also taken as a whole, that is, throughout the life of healthcare workers. This study did not include consumption of cigarettes, alcohol, and food or drink into account; it only included gender, age, ergonomics, and the psychology of healthcare workers. The location of the research taken from this article is the Asian state. Some countries in Asia may not have been included in this study if they were not found in the article search. Countries that have more than one article will be filtered by the index and completeness of the article so that each country has one article that represents it. The countries that have been determined by the second researcher include Saudi Arabia, Bahrain, Bangladesh, Taiwan, India, Malaysia, Thailand, Indonesia, Jordan, Pakistan, Qatar, Iran, and South Korea. Some of the inclusion and exclusion criteria are shown in table 1.

RESULTS

The initial search resulted in 1575 articles. As 54 were duplicates, only 1521 of them were used for further filtering. Using the title, abstract, and keywords related to the prevalence values and risk factors of LBP among healthcare workers, 71 articles were eligible for analysis, the details of which are presented in Figure 1.

Based on this review, only 51 articles used an Asian context. These articles were filtered again to obtain one article from each country. The results are from 13 Asian countries covering 5753 respondents; 1080 males (18.8%) and 4673 females (81.2%). The results of the search for the filtered articles are shown in Table 2.

Pevalence Low Back Pain

The prevalence of LBP in 13 Asian countries was 58.1 %, regardless of the time of occurrence. Meanwhile, from 11 studies that considered the entire span of occurrence, the prevalence reached 60%. The highest prevalence was in South Korea, which is 90.3% (June and Cho, 2011) and the lowest prevalence was in Thailand, which is 34.2% (Sopajareeya, 2021), however, as the prevalence of the latter country was calculated using the span of seven days prior, the exact lifetime prevalence or the occurrence during service as healthcare workers is unknown. The lowest prevalence, regardless of the time of occurrence, is in Indonesia (40.5%) (Mahmud *et al.*, 2021), and the prevalence of all 13 Asian countries is provided in Table 2.

Risk Factor

In Saudi Arabia, manual patient removal has been found to be related to and significantly
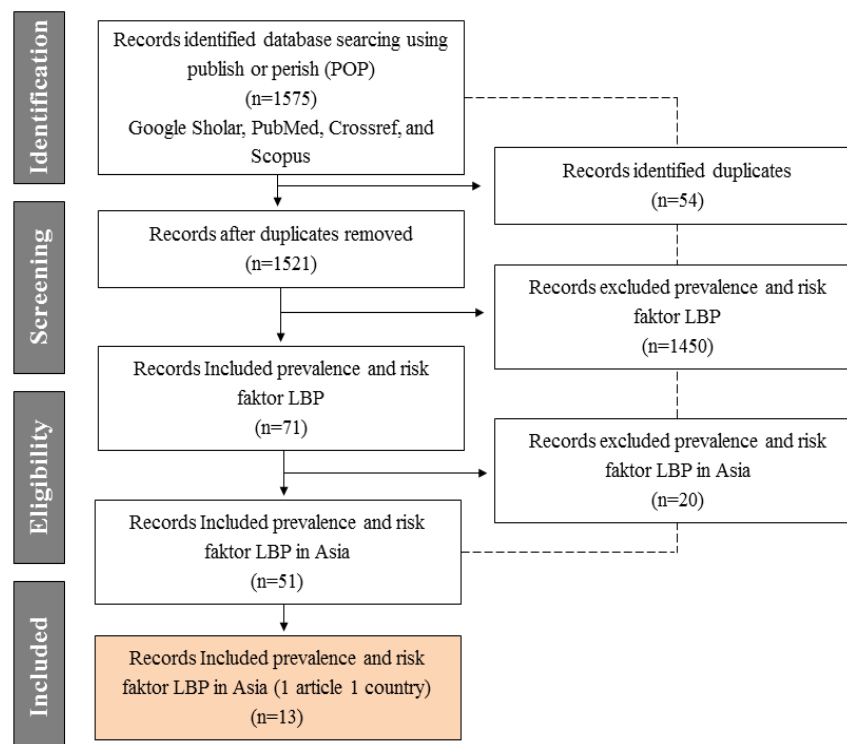

Figure 1. Flow of Article review using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)

influences LBP occurrence (Islam *et al*., 2020; Nair, 2020; Wong, Teo, and Kyaw, 2010; Sopajareeya, 2021). In addition, it can lift heavy objects (Qareeballa *et al*., 2018; Islam *et al*., 2020; Nair, 2020; Wong *et al*., 2010). Studies have also found a significant effect of sex (Mahmud *et al*., 2021;

Table 2. Articles that are Included in the Research Results

Author/ Year of Publication	Title	Countries/ Design Study	Sample		Prevalence	Risk Factors
			Male	Female		
Almaghrabi and Alsharif, 2021	Prevalence of Low Back Pain and Associated Risk Factors among Nurses at King Abdulaziz University Hospital	Saudi Arabia/ Cross-Sectional	31	203	82.9%	Manual removal of the patient
Qareeballa *et al*., 2018	Prevalence of low back pain among female nurses working in secondary and tertiary healthcare, kingdom of Bahrain	Bahrain/Cross-Sectional	0	215	73.5%	Lifting objects, walking, and passing long distances
Islam *et al*., 2020	Prevalence and Risk Factors of Low Back Pain among Medical Professionals Working In Selected Tertiary Hospitals in Dhaka City	Banglades/ Descriptive Cross-Sectional	64	107	66.1%	Lifting objects, lifting patients, and Body Posture
Lin *et al*., 2012	Prevalence, characteristics, and work-related risk factors of low back pain among hospital nurses in taiwan: a cross-sectional survey	Taiwan/ Cross-Sectional	0	217	82.03%	Administrative officer, duration of employment, and age
Nair, 2020	Prevalence and risk factors associated with low back pain among nurses in a tertiary care hospital in south India	India/ Cross-Sectional	6	78	73.8%	Standing for long periods, lifting and moving patients, duration of work (long sitting), chair height, and night shift
Wong, Teo and Kyaw, 2010	Prevalence and Risk Factors Associated with Low Back Pain Among Health Care Providers in a District Hospital	Malaysia/ Cross-Sectional	69	289	72.5%	Poor posture, lifting objects and or patients
Sopajareeya, 2021	Assessment of Risk Factors of Low Back Pain Among Hospital Nurses	Thailand/ Cross-Sectional	0	225	34.2% (Past 7 days)	Lifting patients and previous LBP risks
Sri *et al*., 2021	The prevalence and risk factors of low back pain among the nurses at Sardjito Hospital, Yogyakarta, Indonesia	Indonesia/ Cross-Sectional	142	658	40,5%	Previous complaints of the spine, the apparatus for lateral transfer, place of work and sex
Suliman, 2018	Prevalence of low back pain and associated factors among nurses in Jordan	Jordan/ Cross-Sectional	127	257	69%	Older age, gender (women are more at risk), duration of work, and weight
Tahir *et al*., 2017	Prevalence of Work Related Low Back Pain in Healthcare Professionals	Pakistan/ Cross-Sectional	510	461	51%	Age, gender, work environment, and work stress
Abolfotouh *et al*., 2015	Prevalence, consequences and predictors of low back pain among nurses in a tertiary care setting	Qatar/ Cross-Sectional	64	190	54.3% (Past 12 month)	Sports, types of work, and stress
Choobineh *et al*., 2021	Investigating association between job stress dimensions and prevalence of low back pain among hospital nurses	Iran/ Cross-Sectional	52	443	69.9%	Low social support, stress, psychological demands
June and Cho, 2011	Low back pain and work-related factors among nurses in intensive care units	South Korea/ Cross-Sectional	15	1330	90.3%	Types of work, and the process of work

Suliman, 2018; Tahir *et al.*, 2017) and age (Lin *et al.*, 2012; Suliman, 2018; Tahir *et al.*, 2017) on LBP occurrence. In addition, the disorder is also affected by psychological factors such as stress (Abolfotouh *et al.*, 2017; Abolfotouh *et al.*, 2015; Choobineh *et al.*, 2021). Type of work (Lin *et al.*, 2012); Mahmud *et al.*, 2021; Abolfotouh *et al.*, 2015; June and Cho, 2011), workplace environment such as chair shape and work shift (Nair, 2020; Mahmud *et al.*, 2021; Tahir *et al.*, 2017), and working duration (Lin *et al.*, 2012; Nair, 2020; Suliman, 2018) The detail can be seen in Figure 2.

Studies also found a significant influence of past LBP complaints (Sopajareeya, 2021; Mahmud *et al.*, 2021), poor body posture (Islam *et al.*, 2020; Wong *et al.*, 2010), prolonged standing (Nair, 2020), walking (Qareeballa *et al.*, 2018), and weight (Suliman, 2018) on LBP occurrences. Removing patients, lifting heavy objects, gender, age, stress, type of work, workplace environment, and work duration were declared to influence LBP occurrences since three or more articles have found the effect of those variables.

DISCUSSION

This study found an average presentation of LBP events of 60%, excluding the determination of the frequency of occurrence, which was not much different from the results of another study in Saudi Arabia (Abdulmonem, Nizar and Abdullaha, 2015) which found the overall presentation of LBP to healthcare workers, especially doctors, at 59.4%. Another study in India found that the prevalence of LBP (66 %) was not significantly different from the results of this study (Kb and Pavana, 2018).

However, each study had different results, similar to a study from Japan that found a low incidence of LBP of 17.7% (Yoshimoto *et al.*, 2017), the percentage difference with the current research is visibly large. Meanwhile, LBP prevalence in Turkey is far greater than the average of this research (88.2%), which was found by (Pour *et al.*, 2016), This is the general prevalence in the country due to the lack of understanding of LBP, and health workers are still working on improper body conditions and positions. Regardless of the level of the disorder's prevalence, healthcare workers should be given training and behavioral approaches to develop their knowledge about LBP and to enable them to avoid its occurrence, both subacute and chronic (Braillon, 2017).

This research finds eight risk factors for LBP. The first is the manual removal of patients. This finding is similar to the findings of (Ibrahim *et al*. (2019), Al Amer (2020), and Sanjoy *et al*. (2017), who reported that pushing patients on their wheelchairs, lifting them from their beds, moving them to their chairs, and adjusting their sleeping position affect LBP occurrences among healthcare workers. The second method is the lifting of heavy objects. This is relevant to Agl's (2021) finding that lifting heavy objects increases the likelihood of LBP occurrence.

Sex was the third risk factor. This finding is supported by the research of (Alshahrani, 2020) and (ALMaghrabi, ALSharif and ALMutary, 2021), the fourth is age (ALMaghrabi, ALSharif and ALMutary, 2021; Mohseni-Bandpei *et al.*, 2011; Imani *et al.*, 2018); the fifth is stress because a high level of stress increases the likelihood of people suffering from LBP (Zewudie *et al.*, 2022; Vinstrup, Jakobsen and
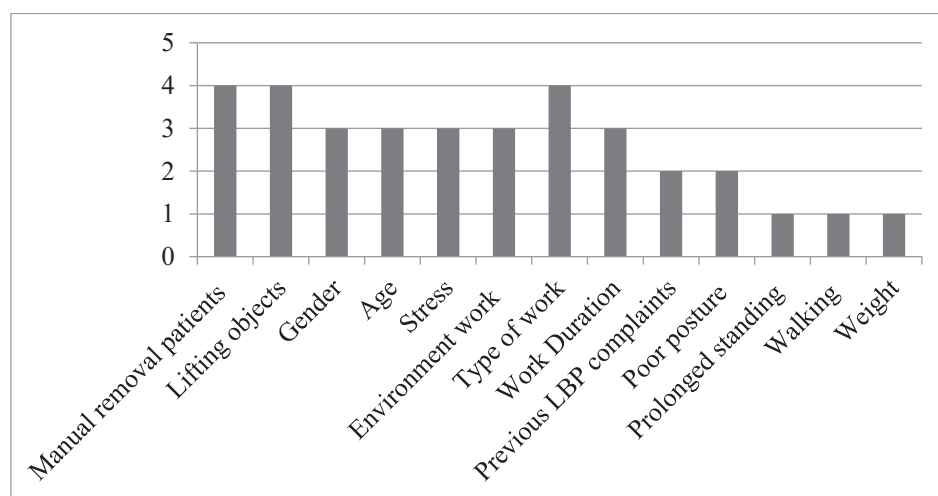
Figure 2. LBP Risk Factor Review Results

Andersen, 2020), The sixth) type of work, as found by (Alshahrani, 2020), The sixth) type of work, as found by (Mondal *et al*., 2018) - and situations at work (Al Amer, 2020), The last one is work duration (Imani *et al*., 2018) found evidences that longer work hours can increase the likeliness of healthcare workers of having LBP.

Some of the aforementioned systematic reviews will not be complete if they are not accompanied by real actions from those responsible for healthcare workers. The results of this review also highlight the need for validation and practical design based on evidence of ergonomic program implementation for healthcare workers in preventing the occurrence of LBP.

CONCLUSION

This study found a high prevalence of LBP among healthcare workers in Asia and eight risk factors for LBP: manual patient removal, heavy object lifting, sex, age, stress, type of work, workplace environment, and work duration. Therefore, hospital leaders, management, and local governments are recommended to take measures to ensure that healthcare workers are well informed about LBP's risk factors and the vulnerability of their work environment, as well as to provide ergonomic places for their work and to apply regulations and policies to prevent healthcare workers suffering from the disorder.

CONFLICTS OF INTEREST

No conflict of interest arose during the course of this research, as both authors agreed upon the task division prior to the research process. This study was not affiliated with any sponsors. In addition, researchers have always consulted experts to avoid unwanted future disputes and conflicting interests.

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REFERENCES

Abdulmonem, A., Nizar, A. and Abdullaha, A. (2015) 'Prevalence and Associated Factors of Low Back Pain among Clinicians of a Major Referral Hospital', *Medical Journal of Malaysia*, 70(1), pp. 12–17.

Abolfotouh, S. M. *et al*. (2015) 'Prevalence, Consequences and Predictors of Low Back Pain among Nurses in a Tertiary Care Setting', *International Orthopaedics*, 39(12), pp. 2439–2449.

Adesola Ojo, O. *et al*. (2021) 'Prevalence, Risk Factors and Health Care Service Utilization for Low-Back Pain among Nigerian Automobile Technicians', *Journal of Musculoskeletal Disorders and Treatment*, 7(1), pp. 0–8.

Agl, B. A. Al (2021) 'Prevalence and Risk Factors of Low Back Pain among Health Care Providers in Security Forces Hospital', *JMSCR*, 9(5), pp. 169–177.

Almaghrabi, A. and Alsharif, F. (2021) 'Prevalence of Low Back Pain and Associated Risk Factors among Nurses at King Abdulaziz University Hospital.', *International Journal of Environmental Research and Public Health*, 18(4), pp. 1-11.

ALMaghrabi, A. O., ALSharif, F. H. and ALMutary, H. H. (2021) 'Prevalence of Low Back Pain and Associated Risk Factors among Nurses–Review', *International Journal of Novel Research in Healthcare and Nursing*, 8(1), pp. 150–158.

Alshahrani, A. (2020) 'Prevalence of Low Back Pain among Nursing Staff in Najran, Saudi Arabia: A Cross-Sectional Study', *Medical Sciences*, 8(45), pp. 1–9.

Al Amer, H. S. (2020) 'Low Back Pain Prevalence and Risk Factors among Health Workers in Saudi Arabia: A systematic Review and Meta-Analysis', *Journal of Occupational Health*, 62(1), pp. 1–23.

Arun, Y. (2020) 'Prevalence and Contributing Factors of Low Back Pain among Healthcare Workers at Tertiary Care Centre', *Journal of Medical Science And clinical Research*, 08(03), pp. 314–320.

Awosan, K. J. *et al*. (2017) 'Prevalence, Perception and Correlates of Low Back Pain among Healthcare Workers in Tertiary Health Institutions in Sokoto, Nigeria.', *Ghana Medical Journal*, 51(4), pp. 164–174.

Beyera, G. K., O'Brien, J. and Campbell, S. (2020) 'Hospital Admission and Associated Factors

among Individuals Presenting to Healthcare Facilities for Low Back Pain in Ethiopia', *International Journal of Rheumatic Diseases. Wiley*, 23(6), pp. 763–771.

Braillon, A. (2017) 'Noninvasive Treatments for Acute, Subacute, and Chronic Low Back Pain', *Annals of Internal Medicine*, 167(11), pp. 831–832.

Choobineh, A. *et al.* (2021) 'Investigating Association between Job Stress Dimensions and Prevalence of Low Back Pain among Hospital Nurses.', *Work* (Reading, Mass.), 69(1), pp. 307–314.

D'Ettorre, G., Vullo, A. and Pellicani, V. (2019) 'Assessing and Preventing Low Back Pain in Nurses. Implications for Practice Management', *Acta Biomedica*, 90(8), pp. 53–59.

Dlungwane, T., Voce, A. and Knight, S. (2018) 'Prevalence and Factors Associated with Low Back Pain among Nurses at a Regional Hospital in Research Design', *Health SA Gesondheid*, 23(0), pp. 1–6.

Edwards, J., *et al.* (2017) 'Prevalence of Low Back Pain in Emergency Settings: A Systematic Review and Meta- Analysis', *BMC Musculoskeletal Disorders,* 18(43), pp. 1-12.

Facci, R. (2018) 'Work Conditions in Brazilian Hospitals Regarding Prevention of Low Back Pain', *Occupational and Environmental Medicine*, 75(Suppl 2), pp. A329-A330.

Freimann, T., Pääsuke, M. and Merisalu, E. (2016) 'Work-related Psychosocial Factors and Mental Health Problems Associated with Musculoskeletal Pain in Nurses: A Cross-Sectional Study', *Pain Research and Management*, 2016., pp. 1-17.

Gashawbeza, B. and Ezo, E. (2022) 'Prevalence and Factors Associated with Low Back Pain among Health Care Providers in Public Hospitals of Gamo Zone, Southern Ethiopia', S*AGE Open Medicine*, 10, pp. 1-12.

Hakim, S. A. and Mohsen, A. (2017) 'Work-related and Ergonomic Risk Factors Associated with Low Back Pain among Bus Drivers', *Journal of the Egyptian Public Health Association*, 92(3), pp. 195–201.

Harzing, A. (2022) Publish or Perish, Sat 6 Feb 2016 16:10 (updated Sun 6 Nov 2022 14:58).

Hoy, D. *et al.* (2012) 'A Systematic Review of the Global Prevalence of Low Back Pain', *Arthritis and Rheumatism*, 64(6), pp. 2028–2037.

Ibrahim, M. I. *et al.* (2019) 'Low Back Pain and its Associated Factors among Nurses in Public Hospitals of Penang, Malaysia', *International Journal of Environmental Research and Public Health*, 16(21).

Imani, A. *et al.* (2018) 'Prevalence of Low Back Pain and its Related Factors among Pre-Hospital Emergency Personnel in Iran', *Journal of Emergency Practice and Trauma*, 5(1), pp. 8–13.

Iridiastadi, H. *et al.* (2019) 'The Prevalence of Musculoskeletal Complaints Among', 10(4), pp. 854–861.

Islam, M. J. *et al.* (2020) 'Prevalence and Risk Factors of Low Back Pain among Medical Professionals Working In Selected Tertiary Hospitals in Dhaka City', *Bangladesh Journal of Neurosurgery*, 9(2), pp. 135–141.

James, S. L. *et al.* (2018) 'Global, Regional, and National Incidence, Prevalence, and Years Lived with Disability for 354 Diseases and Injuries for 195 Countries and Territories, 1990-2017: A Systematic Analysis for the Global Burden of Disease Study 2017', *The Lancet*, 392(10159), pp. 1789–1858.

June, K. J. and Cho, S. H. (2011) 'Low Back Pain and Work-related Factors among Nurses in Intensive Care Units', *Journal of Clinical Nursing*, 20(3–4), pp. 479–487.

Kb, S. and Pavana (2018) 'Prevalence of Low Back Pain among Physiotherapy Interns and Post Graduate Students in Bangalore', *International Journal of Physical Education, Sports and Health*, 5(3), pp. 171–177.

Khumalo, K. and Haffejee, F. (2022) 'Prevalence and Associated Risk Factors of Low Back Pain among users of a Primary Health Care Clinic Serving Semi-Urban and Rural Settlements in KwaZulu-Natal, South Africa', *African Health Sciences,* 22(2), pp. 592–601.

Lin, P.-H. *et al.* (2012) 'Prevalence, Characteristics, and Work-Related Risk Factors of Low Back Pain among Hospital Nurses in Taiwan: A Cross-Sectional Survey.', *International Journal of Occupational Medicine and Environmental Health*, 25(1), pp. 41–50.

Mahmud, M. *et al.* (2021) 'The Prevalence and Risk Factors of Low Back Pain among the Nurses at Sardjito Hospital, Yogyakarta, Indonesia', *Pain & Intensive Care*, 25(1), pp. 19-26.

Mendeley (2020) Home Mendeley Desktop, Mendeley.

Moher, D. *et al.* (2009) 'Preferred Reporting Items for Systematic Reviews and Meta-Analyses : The

PRISMA Statement', *PloS MEDICINE*, 6(7), pp. 1–6.

Mohseni-Bandpei, M. A. *et al.* (2011) 'Prevalence and Risk Factors Associated with Low Back Pain in Iranian Surgeons', *Journal of Manipulative and Physiological Therapeutics*, 34(6), pp. 362–370.

Mondal, R. *et al.* (2018) 'Prevalence of Low Back Pain and its Associated Factors among Physiotherapists in Dhaka City of Bangladesh in 2016', *Journal of Occupational,* 7(2), pp. 70–74.

Nair, R. S. (2020) 'Prevalence and Risk Factors Associated with Low Back Pain among Nurses in a Tertiary Care Hospital in South India', *International Journal of Orthopaedics Sciences*, 6(1), pp. 301-306.

Negash, N. A., Tadele, A. and Ferede, A. J. (2022) 'Prevalence and Associated Factors of Low Back Pain Among Healthcare Professionals at University of Gondar Comprehensive and Specialized Hospital, Northwest Ethiopia: Cross-Sectional Study', *Journal of Pain Research. Informa UK Limited*, 15, pp. 1543–1552.

Novitasari, D. D. *et al.* (2016) 'Prevalence and Characteristics of Low Back Pain among Productive Age Population in Jatinangor', *Althea Medical Journal*, 3(3), pp. 469–476.

Pour, H. *et al.* (2016) 'The Prevalence, Severity and Occupational Risk Factors of Low Back Pain among ICU Nurses', *The Ulutas Medical Journal*, 2(3), pp. 138-147.

Qareeballa, A. *et al.* (2018) 'Prevalence of Low Back Pain among Female Nurses Working in Secondary and Tertiary Healthcare, Kingdom of Bahrain', *International Journal of Medical Science and Public Health*, 7(3), p. 183-187.

Sang, S., Wang, J. and Jin, J. (2021) 'Prevalence of Low Back Pain among Intensive Care Nurses: A Meta-Analysis.', *Nursing in critical care*, 26(6), pp. 476–484.

Sanjoy, S. S. *et al.* (2017) 'Occupational Factors and Low Back Pain: A Cross-Sectional Study of Bangladeshi Female Nurses', *BMC Research Notes*, 10(1), pp. 1–6.

Sharma, S., Shrestha, N. and Jensen, M. P. (2016) 'Pain-related Factors associated with Lost Work Days in Nurses with Low Back Pain: A Cross-Sectional Study', *Scandinavian Journal of Pain*, 11(11008), pp. 36–41.

Şimşek, Ş., Yağci, N. and Şenol, H. (2017) 'Prevalence of and Risk Factors for Low Back Pain among Healthcare Workers in Denizli', *Agri*, 29(2), pp. 71–78.

Sopajareeya, C. (2021) 'Assessment of Risk Factors of Low Back Pain Among Hospital Nurses', *Advances in Human Aspects of Healthcare*, 13(July), pp. 1–8.

Suliman, M. (2018) 'Prevalence of Low Back Pain and Associated Factors among Nurses in Jordan', *Nursing Forum*, 53(4), pp. 425–431.

Surya, A. W. (2022) Low Back Pain, YANKES.

Tahir, S. A. *et al.* (2017) 'Prevalence of Work Related Low Back Pain in Healthcare Professionals', *AJAHS*, 02(03), pp. 26–30.

Vinstrup, J., Jakobsen, M. D. and Andersen, L. L. (2020) 'Perceived Stress and Low-Back Pain Among Healthcare Workers: A Multi-Center Prospective Cohort Study', *Frontiers in Public Health*, 8, pp. 1-7.

Wong, A. Y. L. *et al.* (2021) 'Prevalence/Incidence of Low Back Pain and Associated Risk Factors Among Nursing and Medical Students: A Systematic Review and Meta-Analysis', *PM&R*, 13(11), pp. 1266-1280

Wong, T., Teo, N. and Kyaw, M. (2010) 'Prevalence and Risk Factors Associated with Low Back Pain Among Health Care Providers in a District Hospital', *Malaysian Orthopaedic Journal*, 4(2), pp. 23–28.

Yoshimoto, T. *et al.* (2017) 'Prognostic Psychosocial Factors for Disabling Low Back Pain in Japanese Hospital Workers', *PLoS ONE*, 12(5), pp. 1–12.

Zewudie, B. T. *et al.* (2022) 'Low Back Pain and Associated Factors among Obstetrics Care Providers in Public Hospitals of Amhara Regional State, Ethiopia: A Cross-Sectional Study', *BMJ Open*, 12(6), pp. 1-7.