

FACTORS RELATED TO MUSCULOSKELETAL DISORDERS IN CONVECTION SEWING

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ABSTRACT

This study aims to provide an overview of the factors associated with musculoskeletal disorders in convection tailors. This study uses a systematic literature review. Based on the results of the review and review of 8 journal articles, it can be concluded that several factors that influence this musculoskeletal disorder are the length of time sitting, excessive workload, poor work posture, work stress, lack of adequate rest, length of time working as a convection tailor, risk factors ergonomics, work environment arrangements, work, and rest patterns, and lack of training on ergonomics and safe work practices. In conclusion, several socio-demographic factors influence the occurrence of musculoskeletal disorders, including gender, marital status, education level, BMI, physical exercise patterns, and medical history.

Keywords: Musculoskeletal Disorders, Occupational Health Nursing, Sewing Machine Operators, Convection Tailors

INTRODUCTION

An increase in the number of workers continues to occur throughout the world every year (The World Bank, 2022). The same thing also happened in Indonesia. The number of Indonesian workers of productive age (15-64 years) is quite high. This number has continued to increase in the last 10 years, from 109.241 million workers in 2010 to 127.647 million in 2020 (International Labor Organization, 2022).

The increase in the number of workers also has an impact on increasing the opening of new jobs, including in the clothing industry sector, both on a large and small scale. The clothing industry is one of the job aggregates that require special attention in community nursing practice. This is because there are biological, environmental and behavioral risks that will affect the health of workers.

Occupational Health Nursing (K3) is part of community nursing which specializes in providing health services to groups of clients, especially in the work environment. OSH nursing practice involves a variety of nursing skills that are developed based on health needs in the workplace, with a focus on health promotion, health restoration, disease and injury prevention, and protection against work-related hazards and the work environment (AAOHN, 2022).

As case managers, OSH nurses provide counseling and crisis intervention, as well as carry out health promotion and risk reduction. They are also responsible for complying with applicable laws and regulations, as well as identifying hazards in the workplace and work environment. In carrying out their role, OSH nurses work closely with management and collaborate with various other practitioners, both those

working in the health and non-health sectors, to meet occupational health needs (AAOHN, 2022).

Research by the World Health Organization (WHO) in the European region shows that unhealthy working conditions contribute at least 1.6% to the burden of disease. Statistics show that the main risks associated with workload include injuries (40% of workload-related illnesses), noise (22%), carcinogens (18%), airborne particulate matter (17%), and ergonomic hazards (such as those caused by body in a certain position for a long time) (3%) (WHO, 2021).

According to research from Aprilia & Tantriani (2017) in Polewali Mandar which used a correlation study research design, found that tailors who had a good working position were 12 people and 12 people were not good and 23 people were not good then for musculoskeletal complaints of tailors who have complaints as many as 20 people and have no complaints as many as 15 people. With the result P-value = 0.006, which means there is a relationship between work position and musculoskeletal complaints (Surotinoyo et al., 2021).

Musculoskeletal disorders are a major occupational health problem in Europe (Sem Vandekerckhove et al., 2021). Approximately three out of 5 workers in the European Union report musculoskeletal problems. The types of musculoskeletal disorders most commonly reported by workers are lower back pain and muscle pain in the upper arms. Data from the European Union Labor Force Survey (EU-LFS) indicates that 60% of workers with work-related health problems are identified as having musculoskeletal disorders, while 16% of workers with work-related health problems experience stress, depression and anxiety. . Then 1 in 5 people in the European Union experience chronic disorders of the back and neck in the last year (De Kok et al., 2019).

The relatively high workload in Indonesia requires workers to work for long periods of time. As many as 38% of workers work 35-48 hours per week (Directorate of Population and Employment Statistics, 2022). Long working hours and accompanied by monotonous positions such as sitting for a long time and lack of physical activity or repeated physical activity for a long time can increase the risk of musculoskeletal disorders in workers (European Agency for Safety and Health at Work, 2021) (Vandekerckhove et al., 2021).

One type of work that is at risk of health problems is a sewing machine operator or seamstress in the large-scale convection or garment industry. This work is risky because tailors often work in a monotonous position with high speed, non-neutral joint postures and continuous and repetitive movements. As a result, the physical activity of tailors is low. The results of the 2018 Basic Health Research Survey (Riskesdas) show that there is a proportion of 22% of the population who work as labourers, drivers and household helpers who have less physical activity (Riskesdas Team 2018, 2019).

Lack of physical activity in workers, especially tailors who are often in a constant sitting position for a long time, is not only a risk factor for disease due to ergonomic problems, but is also classified as one of the highest risk factors for premature death globally (Munir et al., 2018). Recent studies telsh compare between low levels of physical activity and high physical activity. High physical activity can reduce the risk of death. Adequate physical activity can also at reducing the risk of cardiovascular disease and hypertension, type 2 diabetes, cancer, and improving mental health such as reducing depression and anxiety, increasing

cognitive function and quality of sleep, which in turn can improve quality of life (WHO, 2020).

The role of the occupational health nurse goes beyond providing emergency care and prevention of occupational illness and injury. Nurses are also involved in health promotion, overall risk management, environmental stewardship, and efforts to reduce health-related corporate expenditures. The interpersonal nature of occupational health nursing is very important in dealing with complex occupational health and safety problems.

Occupational health nurses work closely with a variety of disciplines and corporate management. They collaborate with various disciplines to create a safe and healthy work environment, implement occupational health policies, carry out risk assessments, and take necessary interventions. In addition, they also provide health promotion to workers, carry out routine health monitoring, and provide psychosocial support to workers who need it. They represent the workforce in an effort to create a healthy and safe work environment.

Providing health promotion is one of the roles of occupational health nurses in preventing workers' health problems, including musculoskeletal disorders. A study in Semarang investigated the effectiveness of a combination of Brain Gym (BG) and Touch for Health (TfH) stretching in reducing fatigue and musculoskeletal complaints in sewing machine operators or seamstresses in the garment industry. The results showed that the combination of stretching and BG + TfH was effective in reducing fatigue and musculoskeletal complaints. The decrease in musculoskeletal complaints mainly occurred in the left wrist, left hand and left knee. The percentage of severity of musculoskeletal complaints also decreased in the upper extremities (except for the constant right shoulder and left elbow), trunk, and lower legs (except for an increase in the right thigh). Performing light movements for 5 minutes twice a day can provide significant benefits for seamstresses who work in conditions that demand focus and without pauses, given the daily production target that must be achieved (Ismayenti et al., 2021).

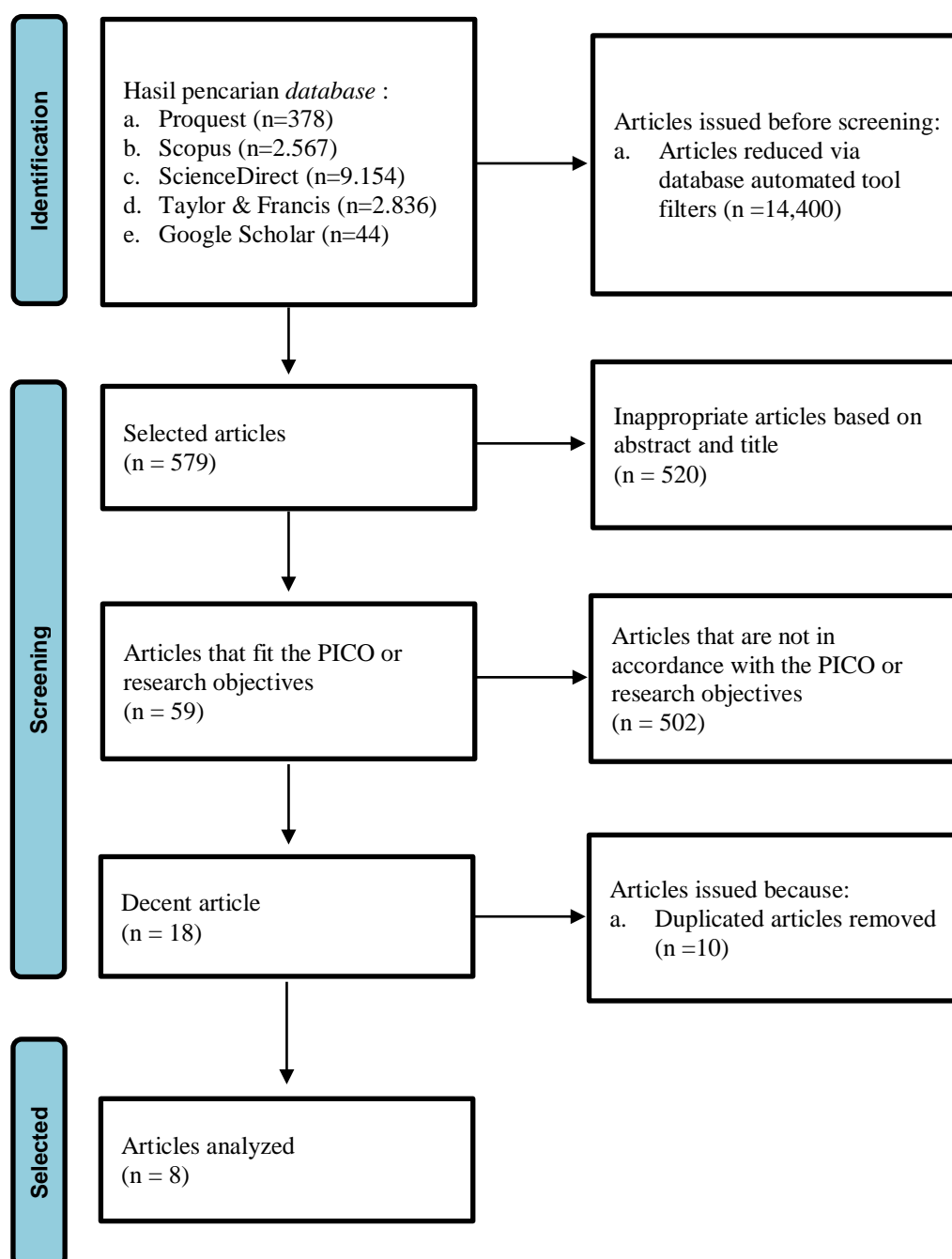
Improving the health and welfare of tailors in both the large-scale garment industry and small-scale convection requires an in-depth understanding of the factors that cause musculoskeletal disorders. This understanding can be a consideration for taking effective promotive and preventive steps to reduce risks and improve working conditions. The purpose of this systematic review is to dig deeper into the factors that cause musculoskeletal disorders in convection tailors, so as to provide a better understanding and become the basis for developing better strategies in maintaining the health and performance of tailors in the convection industry.

RESEARCH METHODS

Data Search

The article search used in this study used the PRISMA method to determine factors associated with musculoskeletal disorders in convection tailors. A search for this article was conducted in May 2023 using 5 electronic databases. Then the screening of articles was carried out in 2 stages, first screening in the form of titles and abstracts followed by reading the full contents of the article based on the inclusion criteria that had been set in this study.

The initial search yielded 14,979 articles from all databases combined. After being reduced based on the database's automatic filter, 579 articles were obtained. Then based on the abstract and title reduced again so that 59 articles are obtained that are in accordance with the research objectives. After reading the full text of 59 research articles, 18 articles were eligible. Then duplication articles were issued so that in the end only 8 studies met the criteria. Selection details are shown in the flow diagram (PRISMA) in Scheme 1.



Gambar. 1
Flow Diagram for New Systematic Reviews : PRISMA 2020

Inclusion Criteria

The inclusion criteria included in the search for this research article are quantitative research articles that explain the causes of musculoskeletal disorders in convection workers or the garment industry. The publication of this article is limited from 2019 to 2023 which is written in English. To assess the quality of journal articles the author uses a checklist from the Joanna Briggs Institute (JBI). Journal articles are considered to be of good quality if they meet the critical appraisal criteria of at least 70% with a cut-off value determined by the author. The exclusion criteria from the articles were systematic review article criteria, literature review and meta analysis.

Search strategy

A search for this article was conducted in May 2023 using electronic databases, namely Proquest, Scopus, Science Direct, Taylor & Francis, and Google Scholar using the keywords garment workers, garment factory workers, sewing workers, sewing machine operators, tailors, musculoskeletal disorder, musculoskeletal pain, and factors.

RESEARCH RESULT

Table. 1
Literature Search

Author Name, Article Title, Type of Literature	Year	Objective	Findings
Manju et al., A Study on Work-Related Musculoskeletal Disorders among Sewing Machine Operators. kuantitatif dan deskriptif	2020	This study aims to determine the demographic status of sewing machine operators, examine work organization and workspace design, and to find occupational health problems and musculoskeletal symptoms in sewing machine operators.	The results showed that the majority (43.3%) of respondents experienced symptoms of musculoskeletal disorders within 7 days to 12 months, followed by respondents (33.3%) who experienced musculoskeletal disorders in the last 2-3 years
Nabi et al., Factors Associated with Musculoskeletal Disorders Among Female Readymade Garment Workers in Bangladesh: A Comparative Study Between OSH Compliant and Non-Compliant Factories. Studi <i>multicenter cross-sectional</i> .	2021	The purpose of this study was to compare the prevalence of musculoskeletal disorders between apparel workers in factories who are not compliant with those who comply with the International Labor Organization (ILO) based on	This study found a high increase in musculoskeletal disorders among female apparel garment workers, especially in non-OSH compliant factories who worked long hours. The adoption of ILO minimum standards based on OSH standards and the

		Occupational Safety and Health (OSH) standards and to identified other factors associated with a higher prevalence rate of musculoskeletal disorders.	introduction of low-cost interventions to improve working conditions in non-OSH-compliant factories will help sustain the pace of development in this sector in Bangladesh, and ensure the health of the women working there.
Okareh et al., Prevalence of Ergonomic Hazards and Persistent Work-Related Musculoskeletal Pain among Textile Sewing Machine Operators. <i>Studi cross-sectional.</i>	2021	This study aims to identify occupational health and safety hazards and the prevalence of body pain in textile sewing machine operators in Ibadan	The overall prevalence of work-related musculoskeletal pain (WRMP) in the last 12 months and the last 7 days was 92% and 58%. The highest cases of musculoskeletal pain were low back pain at 71.1%, followed by neck pain (52.6%) and upper back pain. While the lowest was on the elbows (11.1%) and wrists/hands (11.1%). There was a significant relationship between age and WRMP in the last 12 months ($p= 0.018$) and 7 days ($p= 0.048$). There was also a significant association between years of work experience and WRMP ($p = 0.023$) in the last 12 months. Gender ($p= 0.001$) and type of chair (especially bench ($p= 0.002$) and bench with cushion ($p= 0.005$)) were significantly associated with WRMP in the last 7 days. Physical and ergonomic hazards were identified to be more related to WRMP in sewing

Abate & Hailemaram, Improving Work-Related Musculoskeletal disorder for sewing Machine Operators in Ethiopia. Studi <i>cross-sectional</i>	2023	The aim of this study was to evaluate health risks and improve interventions for sewing machine operators in Ethiopia	This study shows that the design of a sewing machine operator's chair has a significant correlation with the incidence of pain in different parts of the body, especially in the upper and lower back with an OR of more than 93% in the lower and upper back area. Therefore, a chair needs to be designed taking into account the anthropometric measurements of the sewing machine operator and the needs of the workplace to increase work safety and productivity.
Pal et al., How Common are Aches and Pains among Garment Factory Workers? A Work-related Musculoskeletal Disorder Assessment Study in Three Factories of South 24 Parganas District, West Bengal. Studi <i>cross- sectional</i> .	2021	To determine the prevalence of work-related musculoskeletal disorders (WMSD) among workers and to assess the relationship between WMSD and socio-demographic, behavioral, and occupational factors.	Most of the workers are male (70.27%), aged between 36 to 55 years (42.34%), and are illiterate (33.78%). 70.72% of workers experience WMSD. The presence of WMSD is significantly related to educational status, sedentary work, unsatisfactory work environment, and stress levels
Bayzid & Kamrujjaman, Prevalence and Determinant Factors of Musculoskeletal Pain among Female Ready Made Garment Workers Residing in Northern Dhaka City: A Cross- Sectional Study. Studi <i>cross-sectional</i> deskriptif.	2019	The purpose of this study is to determine the prevalence and factors responsible for the incidence of musculoskeletal pain and to identify patterns of musculoskeletal pain in female workers in apparel garment factories.	Prevalence of pain It is estimated that musculoskeletal pain among female garment workers is quite high. Knowledge of determinants can help prevent & reduce musculoskeletal pain
Perera et al., The Association between Works Related Musculoskeletal Body Discomfort and	2022	The aim of this study was to investigate the relationship between work-	Of all samples, 72.99% of operators experienced musculoskeletal discomfort.

Ergonomic Risk Level among Female Sewing Machine Operators in Sri Lanka. Studi <i>cross-sectional</i> deskriptif.	related musculoskeletal discomfort and ergonomic risk levels among female sewing machine operators in selected garment factories in the western province, Sri Lanka.	Qualitative data were obtained using a previously validated questionnaire; Cornell Musculoskeletal Discomfort Questionnaire and Rapid Entire Body Assessment (REBA). The average age of the study population was 33.55 ± 1.64 years. The highest prevalence of discomfort was reported in the neck (53.94%) and lower back (69.2%). The average ergonomic risk level was 8.42 ± 0.16 which is 50.36% in the study population. Most sewing machine operators are at a high level of ergonomic risk in the western province of Sri Lanka, and the prevalence of musculoskeletal disorders is higher in the lower back and neck area where ergonomic interventions are supposed to be carried out.	
Oo & Taneepanichskul, Work-related Musculoskeletal Disorders, Psychosocial Factors, Work Productivity, and Work Ability Among Garment Factory Workers in Myanmar. studi <i>cross-sectional</i>	2022	This study aims to find a relationship between work ability, productivity status, psychosocial factors, and work-related musculoskeletal disorders (WRMSDs) in sewing machine operators in garment factories in Myanmar.	This study found that as many as 347 (93.8%) sewing machine operators experienced WRMSDs. Prevalence rates are much higher than those reported in other studies. In addition, WRMSDs are related to age, education, and physical demands. In the regression analysis, gender, job stress, physical demands, and work productivity were

significant predictors of WRMSDs, with high ORs. other factors do not have a significant relationship.

The results of this study indicate that of all samples from one study, 72.99% of operators experienced musculoskeletal discomfort. Qualitative data were obtained using a previously validated questionnaire; Cornell Musculoskeletal Discomfort Questionnaire and Rapid Entire Body Assessment (REBA). The average age of the study population was 33.55 ± 1.64 years. The highest prevalence of discomfort was reported in the neck (53.94%) and lower back (69.2%). The average ergonomic risk level was 8.42 ± 0.16 which is 50.36% in the study population. Most sewing machine operators are at a high level of ergonomic risk in the western province of Sri Lanka, and the prevalence of musculoskeletal disorders is higher in the lower back and neck area where ergonomic interventions are supposed to be carried out.

The overall prevalence of work-related musculoskeletal pain (WRMP) in the last 12 months and the last 7 days was 92% and 58%. The highest cases of musculoskeletal pain were low back pain at 71.1%, followed by neck pain (52.6%) and upper back pain. While the lowest was on the elbows (11.1%) and wrists/hands (11.1%). There was a significant relationship between age and WRMP in the last 12 months ($p = 0.018$) and 7 days ($p = 0.048$). There was also a significant association between years of work experience and WRMP ($p = 0.023$) in the last 12 months. Gender ($p = 0.001$) and type of chair (especially bench ($p = 0.002$) and bench with padding ($p = 0.005$)) were significantly associated with WRMP in the last 7 days. Physical and ergonomic hazards were identified to be more related to WRMP in sewing machine operators.

DISCUSSION

The tailor profession will face job hazards. According to OSHA, the work of a seamstress involves various hazards, namely hazards associated with work designs in the garment industry, for example: chair designs, sewing table designs and sewing tables. Risks related to work activities carried out such as: cutting, pattern making and sewing. Tailors are at risk for work-related and posture-related musculoskeletal disorders that occur during daily work activities. It can be seen that MSD in tailors is the most common occupational disease. We have to control the case rate and the impact of MSD on the garment industry. Therefore, it is necessary to carry out an assessment of one of the occupational risk factors that can cause MSD, the one that seamstresses complain about the most is low back pain (LBP) (Ramayanti & Koesyanto, 2021). Disorders of the musculoskeletal system can be caused by work performance factors such as body posture, workload, duration and frequency of work, as well as individual factors such as age, sex, BMI and habits (Rahayu et al., 2020).

Musculoskeletal Disorders (MSDs) are injuries or pain and disorders that affect the movement of the human body or the musculoskeletal system (Aprianto et al., 2021). Musculoskeletal Disorders (MSDs) are work-related illnesses caused by a work environment mismatch between job requirements and job performance (Maulana et al., 2021). According to global data, MSD contributes between 42% and

58% of total occupational diseases and 40% of total work-related medical costs. According to data from the UK Labor Force Survey (LSF), the prevalence of musculoskeletal diseases in workers is very high, namely 1.144 million cases with a distribution of 493,000 back diseases, 426,000 diseases in the upper body and 224,000 diseases in the lower body. A similar study in the United States found that up to 6 million MSDs occur annually, with an average of 300-400 events per 100,000 workers (Aprianto et al., 2021). In 2013, 2.3 million people died from work accidents and occupational diseases each year. Although the incidence of musculoskeletal disorders varies by age and diagnosis, between 20% and 335 people worldwide are living with a painful musculoskeletal disorder (Oktavia et al., 2023; Surotinoyo et al., 2021).

Musculoskeletal disorders in convection tailors are a health problem that commonly occurs in workers in the large-scale convection and garment industries. Bayzid & Kamrujjaman (2019) through their research on women workers making clothes in northern Dhaka City stated that the prevalence of musculoskeletal pain among workers was 41.9% with shoulders, neck and lower back as the more common places to experience musculoskeletal pain. Several factors influence this condition including prolonged sitting, excessive workload, poor work posture, high work intensity, work stress, and lack of adequate rest. Working more than 8 hours per day, sitting for more than 6 hours per day, and workload and work pressure have a significant impact on the disorder musculoskeletal. This study shows that there is a significant relationship between length of time sitting and work stress with musculoskeletal disorders in tailors or apparel manufacturing workers.

The results of this study are in line with the results of a study in Bangladesh in 2019 which showed that women workers in the garment industry experienced complaints such as back and joint pain, prolonged headaches, eye pain, and difficulty breathing due to exposure to cloth dust, lack of adequate lighting, sitting continuously without giving the back a rest, as well as being exposed to constant noise from machines which makes them feel tired on an ongoing basis (Akhter et al., 2019).

Research conducted by Manju et al., (2020) also showed musculoskeletal disorders in sewing machine operators. As many as 23.4% of respondents experienced musculoskeletal disorders in the form of knee pain, 20% of respondents experienced lower back pain, and 18.4% of respondents experienced neck pain. This is due to non-ergonomic work postures, high work intensity, repetitive workloads, long working hours and lack of adequate rest. The high level of knee pain is due to the seamstress constantly operating the machine with her feet. Neck, shoulder and back pain is caused because seamstresses have to bend forward over the cutting table and while sewing to do their job.

Working conditions are a factor that is quite influential on the incidence of musculoskeletal disorders in convection tailors. These working conditions are strongly influenced by the policies and facilities provided by the company. Research conducted by Nabi et al., (2021) compared factors related to musculoskeletal disorders in female garment workers in Bangladesh between companies that comply with Occupational Health and Safety (K3) standards and companies that do not comply with K3 standards. There is a high risk of musculoskeletal disorders among women workers in the garment industry, especially those who work in companies that do not comply with K3 standards. Overall there were 57% (235 people) of

respondents who reported pain in the musculoskeletal at least in one part of the body. Among the reported cases, low back pain was the highest (41%) followed by knee pain (33%). The results of this study indicate that factors associated with musculoskeletal disorders in garment workers may include risk factors for ergonomics, work intensity, repetitive workload, work environment arrangements, work and rest patterns, and lack of training on ergonomics and safe work practices.

The results of the research above show somewhat different results from research conducted by Okareh et al., (2021) in North Ibadan, Nigeria. They identified the prevalence of ergonomic hazards and persistent musculoskeletal pain in textile sewing machine operators. This study found that there was a significant relationship between age and musculoskeletal disorders in the last 12 months ($p=0.018$) and 7 days ($p=0.048$). Then there is also a significant relationship between years of work experience and musculoskeletal disorders in the last 12 months ($p=0.023$) but not in the last 7 days. Gender and type of chair (especially benches ($p=0.002$) and benches with cushions ($p=0.005$)) had a significant relationship with work-related musculoskeletal pain in the last 7 days. The results showed that age, work experience in a certain period of time, gender and the type of chair used by sewing machine operators can affect the incidence of musculoskeletal pain, while other variables such as marital status, rest period, employment status, working hours per day and history of musculoskeletal pain do not show a significant relationship in the last 12 months or in last 7 days.

Pal et al., (2021) conducted a study to assess how common pain and discomfort in garment factory workers is related to their work in South 24 Parganas district, West Bengal, India. The results showed that 61.26% of workers complained of back pain, 44.59 workers complained of knee pain, 43.69% complained of lower leg pain, 32.43% complained of neck pain and 29.28 complained of shoulder pain. This condition is caused by several factors. As many as 70.72% of workers experienced musculoskeletal disorders. The presence of musculoskeletal disorders was significantly related to educational status (illiteracy (OR: 3.59; CI: 1.56–8.22), Education below high school (OR: 2.89; CI: 1.26–6, 62)), sedentary work (OR: 2.02; CI: 1.01–4.03), unsatisfactory work environment (OR: 8.38; CI: 1.95–36.06), and stress levels (mild (OR: 2.89; CI: 1.26–6.62), moderate-severe (OR: 6.98; CI: 1.46–33.25)). Lack of physical activity in workers, especially tailors who are often in a constant sitting position for a long time, is not only a risk factor for disease due to ergonomic problems, but is also classified as one of the highest risk factors for premature death globally (Munir et al. al., 2018). Recent studies telsh compare between low levels of physical activity and high physical activity. High physical activity can reduce the risk of death. Adequate physical activity can also at reducing the risk of cardiovascular disease and hypertension, type 2 diabetes, cancer, and improving mental health such as reducing depression and anxiety, increasing cognitive function and quality of sleep, which in turn can improve quality of life (WHO, 2020).

The role of the occupational health nurse goes beyond providing emergency care and prevention of occupational illness and injury. Nurses are also involved in health promotion, overall risk management, environmental stewardship, and efforts to reduce health-related corporate expenditures. The interpersonal nature of occupational health nursing is very important in dealing with complex occupational health and safety problems.

Research conducted by Perera et al., (2022) in Sri Lanka evaluates the relationship between work-related musculoskeletal discomfort and ergonomic risk levels in female sewing machine operators. Of all samples, 72.99% of operators experienced musculoskeletal discomfort. The results of the study stated that the average age of the study population was 33.55 ± 1.64 years. The highest prevalence of discomfort was reported in the neck (53.94%) and lower back (69.2%). The average ergonomic risk level was 8.42 ± 0.16 which is 50.36% in the study population. Most sewing machine operators in the western province of Sri Lanka are at a high level of ergonomics risk. The prevalence of musculoskeletal disorders is higher in the lower back and neck areas where ergonomic interventions should be performed. Several factors associated with musculoskeletal disorders in female sewing machine operators include non-ergonomic work postures, excessive repetitive movements, heavy workloads, and lack of attention to safe work practices.

Research conducted by Oo & Taneepanichskul (2022) discussed work-related musculoskeletal disorders, psychosocial factors, work productivity, and work ability in garment factory workers in Myanmar. This study found that as many as 347 (93.8%) sewing machine operators experienced musculoskeletal disorders. Prevalence rates are much higher than those reported in other studies. In addition, musculoskeletal disorders are related to age, education, and physical demands. In the regression analysis, gender, work stress, physical demands, and work productivity have a significant relationship with the incidence of musculoskeletal disorders.

Research conducted by Abate & Hailemaram (2023) discusses efforts to improve the treatment of work-related musculoskeletal disorders in sewing machine operators in Ethiopia. The prevalence of musculoskeletal disorders based on this study included lower back (93.6%), upper back (93.3%), neck (76%), one or both hips, thighs and buttocks (65.4%), shoulders (52%), elbows (45.8%), wrists/hands (40.2%), one or both ankles/feet (36.9%), and one or both knees (33%). The results of research conducted by Enika et al., (2023) showed that there was a significant relationship between length of work and low back pain in tailors at the Kabanjahe traditional market center.

Based on the results of bivariate logistic regression analysis, this study stated that there was a significant relationship between musculoskeletal disorders in various parts of the body and the independent factors in this study. length of work in years, medical history, job satisfaction, bad work environment and uncomfortable chairs have a significant relationship with low back pain. Gender, marital status, length of work in years, BMI (Body Mass Index) ≤ 18 , medical history, job satisfaction, poor work environment, and uncomfortable sitting chairs have a significant relationship with upper back pain. Elementary level education, physical exercise, and job satisfaction have a significant relationship with neck pain. A bad work environment has a significant relationship with pain in the hips, thighs, buttocks. Primary level of education, length of work in years, physical exercise, job satisfaction, and a bad work environment have a significant relationship with shoulder pain. Primary level of education, length of work in years, and job satisfaction have a significant relationship with elbow pain. length of work in years, physical exercise, job satisfaction, poor work environment, and uncomfortable chairs have a significant relationship with wrist/hand pain. Physical exercise and poor work environment have a significant relationship with foot/ankle pain. An

uncomfortable sitting chair has a significant relationship with knee pain (Abate & Hailemaram, 2023).

Multivariate logistic regression analysis was also performed to identify the most significant factors. Variables with $p < 0.03$ in the bivariate analysis were included in the multivariate analysis. The results show that factors such as BMI, physical exercise habits, medical history, job satisfaction, work environment, and the suitability of chairs and sewing machines have a significant relationship with the severity of musculoskeletal disorders in various parts of the body (Abate & Hailemaram, 2023).

The garment industry cannot develop in the long term at the expense of the health of the workers. The responsibility of government and employers is to provide a safe and healthy working environment for garment workers. Providing proper counseling and health education to them can not only improve their overall health status, but also make them aware of their rights. There is an urgent need for regular pre-deployment medical examinations by trained medical personnel. As recommended by WHO, the integration of basic occupational health services with inf primary health care restructuring is an urgent need. Integrating basic occupational health services within the scope of the primary health care infrastructure will be key to the prevention, early diagnosis, and treatment of diseases that are common among workers, which in the long run will benefit both employees, employers, and the country as a whole (Pal et al ., 2021).

The availability of ergonomic work stations is very important to ensure the productivity and safety of workers. Bad work stations can cause musculoskeletal disorders in different parts of the body. Based on the evaluation of the prevalence of musculoskeletal disorders, design improvements for work chairs should be proposed as part of the various interventions needed to improve working conditions that increase the productivity and safety of workers in enterprises. This study is limited to the analysis of musculoskeletal disorders associated with non-ergonomically designed workplaces. Intervention in designing an adjustable seat with backrest to reduce major injuries associated with low back pain confirmed by the analysis needs to be implemented. Further research on the repair of tools, sewing machine work surfaces, and equipment can also be considered (Abate & Hailemaram, 2023).

The job of sewing is working with both hands which are always on the sewing machine table to hold the sewing object and both feet pressing the saddle of the generator starter, with the neck tilted forward. If this happens for a long enough time, then this profession can cause complaints of muscle aches in the shoulder area, neck pain, and back pain. The part that is often complained about is the muscles of the body (skeletal) which includes the muscles of the shoulders, neck, arms, waist, back, fingers and lower muscles (Nasution et al., 2021; Wulandari, 2017).

CONCLUSION

Some of the factors that affect this musculoskeletal disorder are the length of time sitting, excessive workload, poor work posture, work stress, lack of adequate rest, length of time working as a convection tailor, risk factors for ergonomics, work environment settings, work and rest patterns, and lack of training on ergonomics and safe work practices. In addition, several socio-demographic factors also influence the occurrence of musculoskeletal disorders, including gender, marital status, level of education, BMI, patterns of physical exercise, and medical history.

SUGGESTION

Occupational health nurses play a role in the promotion, prevention and restoration of health in the context of a healthy and safe work environment. A nurse in a work environment such as the convection industry needs to carry out nursing interventions as an effort to prevent workers from adverse health impacts. Providing proper counseling and health education to workers can not only improve their overall health status, but also make them aware of their rights.

Some solutions that nurses can recommend to business owners or policy makers include setting rest and work cycles, playing relaxation music while working, providing chairs with backrests and tables that can be adjusted in height to maintain an ergonomic body position, and implementing training programs with awareness of work safety.

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