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Risk Factors and Ergonomic Influence on Musculoskeletal Disorders in the Work Environment

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Abstract

Musculoskeletal disorders (MSDs) are medical conditions that affect the muscles, bones, ligaments, tendons, nerves and other supporting structures in the human body. This research aims to identify and analyze risk factors and the influence of ergonomics on musculoskeletal disorders in the work environment. Using qualitative methods based on literature review studies, this research explores various factors that contribute to musculoskeletal disorders through content analysis from various previously published literature sources. The main risk factors contributing to this disorder include unergonomic work postures, lifting heavy loads, and repetitive movements. This research highlights the importance of ergonomic interventions, such as adjusting sitting position, setting up work tools, and ergonomics training for workers, in reducing the risk of musculoskeletal disorders. It is hoped that the results of this research will provide useful insights for occupational health practitioners, human resource managers, and policy makers in designing and implementing effective ergonomics programs in the workplace. By understanding risk factors and effective ergonomic interventions, companies can improve worker health and well-being, reduce the incidence of musculoskeletal disorders, and ultimately increase work productivity and efficiency.

Introduction

Disturbance musculoskeletal (Musculoskeletal Disorders or MSD) is condition medical influences muscles, bones, ligaments, tendons, nerves, and structures supporter others in the body man (Wardani & Multazam, 2023). Disturbance This covers various problem health like painful back, injury strain recurrent, syndrome tunnel carpal, tendinitis, osteoarthritis, and more Again. MSDs are often caused by activity physical overload, poor posture, movement repeated, or exposure to prolonged vibration (Pramudita & Sari, 2024). Condition This Can I or chronic, depending on duration and intensity exposure to factor risk. MSDs is one of them reason main inability work and absence from work Work. In many countries, disruption This become burden significant economy for system health and productivity power Work. Workers in various sector, start from manufacture until service health, risky experience disturbance musculoskeletal. For example, workers office sitting inside period long time and use computer risky experience painful back and neck, temporary worker the factory does it movement repeated risky experience injury strain recurrence and tendinitis.

Diagnosis of MSDs involves evaluation comprehensive covering history medical, examination physical, and, deep a number of case, test imaging like X- ray or MRI. Symptom general from disturbance This covers pain, stiffness, swelling, numbness, and loss range motion. Associated

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pain with MSDs you can range from light until severe and can influence ability somebody For do activity daily. Intervention Early and appropriate management is essential For prevent worsening condition and reduce impact period long from MSDs (Indriastuti, 2012). The usual handling of MSDs involve a multimodal approach that can covers therapy physical, change ergonomics, use drug reliever pain, and deep a number of cases, surgery. Therapy physique often includes exercise stretching and strengthening purposeful muscles For increase flexibility and reduce pressure on the affected structure. Change ergonomics in place work, like adjustment sitting position or arrangement tool work, is also very important For prevent and manage disturbance musculoskeletal. Use drug nonsteroidal anti-inflammatories (NSAIDs) can help reduce pain and inflammation in some cases certain. Prevention is aspect key in overcome MSDs (Simanungkalit et al., 2020). Prevention program usually involve training ergonomics For workers, promotions habit life Healthy like sport regular, and on -site intervention Work For reduce risk injury. Awareness about importance posture good body, technique safe lifting, and adequate rest during activity repetition is very important For reduce MSDs incidents.

Problem disturbance musculoskeletal (musculoskeletal disorders) in Indonesia are increasing get attention special, esp in environment risky work tall. Risk factors main contributor to disturbance This including posture work that doesn't ergonomics, lifting burden weight, and movement repeated (Asnel & Pratiwi, 2021). For example, workers in the sector manufacture often face demands significant physical, such as lift or move goods heavy in a way continously. Apart from that, posture wrong body when works, like bow or twist body, can cause pressure excess on muscles and joints, which in the end leads to disruption musculoskeletal. In context ergonomics, a lot companies in Indonesia yet apply principles adequate ergonomics in place Work. Ergonomics is science that studies How designing tools and environment work accordingly with abilities and limitations man (Hardianto et al., 2023). Lack of application good ergonomics can seen from design place work that doesn't in accordance with anatomy body man For example, a table too much work tall or low, chair without support adequate back, as well tool hard work worker For take posture that is not experience. Nonconformity This cause tension muscles and stress on joints that can trigger disturbance musculoskeletal.

Neither do workers in the informal sector escape from risk disturbance musculoskeletal. As example, handyman buildings, street vendors, and farmers often works in conditions that are not ergonomic. Craftsman building often must lift burden heavy and working in a position that does not comfortable For period long time. Street vendors perhaps must stand or sit inside same position throughout day without get enough rest, temporarily farmer Possible do activity physique heavy like plowing fields or harvest plant in posture less than ideal body. All activity This can cause tension in muscles and joints, which ultimately trigger disturbance musculoskeletal. Other factors contribute to disturbance musculoskeletal in Indonesia is lack of awareness and education about importance posture Good body and technique ergonomic work (Suhendar et al., 2023). Many workers do n't get adequate training about method lift burden with That's right, it's important get enough rest, or method arrange place Work them for more ergonomic. In addition, company often ignored importance investment in equipment ergonomic work, such as chair with support good back, good table customized height, and tools help lift. As a result, workers more prone to to disturbance musculoskeletal Because Keep going continuously Work in conditions that are not ideal.

For overcome problem this is necessary effort collaborative between government, companies, and workers. Government need set strict regulations about standard ergonomics in place work and make sure its implementation. Companies need more aware will importance ergonomics and ready invest source Power For create environment healthy work. On the other hand, workers must also given adequate training about technique Ergonomic work and its importance

guard posture good body. With effort together, hopefully incident disturbance musculoskeletal in Indonesia can minimized, increased productivity and well-being worker in a way whole.

This article explained various factor contributing risks to disturbance musculoskeletal (MSD), start from posture wrong work up to habit bad physique. More more, article This study influence condition ergonomics in place Work to MSD events, highlighting importance design place nice work For prevent injury and improve health worker. With approach scientific supported by empirical data, articles This No only give knowledge theoretical, but also solutions practically possible implemented by the company For create environment more work healthy and productive. Study in article This show how importance intervention ergonomics in prevent disturbance musculoskeletal. Through various studies case and analysis statistics, articles This describe How change small in design place work, like adjustment chair or table, can own impact big to health worker. For example, use supportive chair posture correct body or table that can customized height, yes reduce pressure on the back and neck, so prevent painful chronic and injury.

Methods

Study This aim for identify and analyze factors risk as well as influence ergonomics to disturbance musculoskeletal in the environment Work with use method qualitative based literature review study. Qualitative method chosen Because possible researcher For dig in a way deep various contributing factors to disturbance musculoskeletal through analysis content from various source literature that has published previously. This study No only focus on numerical data but also on narrative, interpretation, and comprehensive understanding about topic studied. Internal data collection process study This done with identify, select, and analyze various article scientific, books, reports, and sources academic other relevant ones with topic disturbance musculoskeletal and ergonomics in the environment Work. Sources literature used must fulfil criteria inclusion certain, like relevance with topic, publishing in period time a certain period (for example, 10 years last), and quality as well as credibility source. Researcher using academic databases such as PubMed, Google Scholar, and ScienceDirect for look for appropriate literature. Every articles found Then evaluated the quality use tool evaluation critical For ensure validity and reliability findings.

Data analysis was carried out with approach thematic, where researchers identify themes main thing that appears from analyzed literature. Themes This covers factors contributing risks to disturbance musculoskeletal, such as posture a body that doesn't ergonomics, repetition movement, use tool work that doesn't appropriate, as well factors individual like age, type gender, and condition health general. Additionally, research This is also research How intervention ergonomics, like planning place ergonomic work, training ergonomics for workers, and health and safety programs work, you can reduce risk disturbance musculoskeletal. For ensure accuracy and credibility findings, researchers use technique triangulate data with compare and contrast findings from various source literature.

This technique help in identify consistency findings as well as reduce researcher bias. Every themes and sub - themes identified from literature Then discussed in a way deep For give comprehensive understanding about factors risks and impacts ergonomics to disturbance musculoskeletal in the environment Work. Research result This expected can give useful insight for practitioner health work, manager source Power humans, and takers policy in designing and implementing an effective on - site ergonomics program Work. With understand factors risks and interventions effective ergonomics, enterprise can increase health and well-being workers, reduce incident disturbance musculoskeletal, and ultimately increase productivity and efficiency Work. Study this also delivers base for study furthermore For explore more carry on connection between ergonomics and health musculoskeletal in more context wide.

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Result and Discussion

Risk Factors To Musculoskeletal Disorders In The Environment Work

Disturbance musculoskeletal (Musculoskeletal Disorders, MSDs) are group influencing conditions muscles, bones, ligaments, tendons, and nerves, causing pain and irritation function in the body (Fatsiwi et al., 2021). MSDs are often related with activity everyday, work, or injury repeated, resulting in inconvenience or painful chronic. Disease This can involve various part body including back bottom, neck, shoulders, wrists arms, hands, hips, knees, and feet. MSDs is one of them reason main inability work and on -site absences work, so own impact significant economy Good for individual nor company (Saputra et al., 2023). Factors contributing risks to development of MSDs can shared become factor physical, psychosocial, and individual. Physical factors covers excessive activity, posture a body that doesn't ergonomics, movement repetition, and use excessive force. Psychosocial factors covers stress in place work, dissatisfaction work, and lack thereof support social. Temporary that, factor individual covers age, type gender, history injury previous, and conditions health general. Combination from various factor This often makes it worse symptoms and improve risk occurrence of MSDs.

Common symptoms from disturbance musculoskeletal covers pain, stiffness, swelling, and limitations movement over the affected area. This pain Can nature I or chronic, and often worsened by activity or movement certain. For example, workers who do movement repeated or lift burden heavy as regularly as possible experience painful back chronic bottom. In some cases, symptoms the Can develop become more conditions Serious such as tendinitis, carpal tunnel syndrome, or a herniated disc, which require intervention medical more carry on (Suratno et al., 2022). Treatment and prevention of MSDs requires approach multifaceted involving change environment work, adjustment ergonomics, as well education and training for worker. Modification place Work can covers use tool designed aids For reduce burden physical, settings reset layout place Work For minimize posture bad body, and implementation timetable enough rest For prevent fatigue muscle (Oktavia & Susilawati, 2024). Additionally, an exercise program physical design For strengthen muscle and improve flexibility can help in reduce risk and manage symptoms of MSDs. Importance effective prevention and treatment against MSDs no only impact on improvement health and well-being individual, but also on productivity and efficiency Work in a way whole. Decline number occurrence of MSDs through effort proper prevention can reduce related costs with maintenance medical, absenteeism, and loss productivity. Therefore that, approach holistic that combines intervention medical, ergonomics, and education is key in manage and prevent disturbance musculoskeletal in various environment Work.

Disturbance musculoskeletal (Musculoskeletal Disorders, MSDs) in the environment Work is one of problem frequent health faced by workers in various industrial (Halijah et al., 2023) sector. Disturbance This can influence muscles, joints, ligaments, nerves, and structures supporter others, which cause pain, discomfort, and impairment ability functional. For understand and overcome MSDs effectively effective, important For identify factors contributing risks to appearance disturbance this is in place Work. Following is a number of factor risk main thing that is necessary noticed according to (Abdul et al., 2024):

Ergonomics and Positioning Improper Work

Bad ergonomics, like position work that doesn't appropriate, usage tool work that doesn't ergonomics, and settings place work that doesn't adequate, is factor main contributor to Disturbance Musculoskeletal (MSDs). MSDs are problem frequent health experienced by workers in various sector industries, especially those that require position awkward body, slouching, or sitting deeply long time. Work with condition work that doesn't ergonomic can cause stress excess on muscles and joints, which in turn increase risk injury period long. As

example, workers spending office part big day it works in frequent sitting position experience interference in parts back, neck and shoulders. Sitting position is not ergonomic, like chairs that don't provide sufficient support For back or that chair too low so that make user must bow For access table work, you can cause excessive pressure on the bones back and muscles back. Additionally, use computers that don't customized with position body users can also cause wrist disorders hands and arms, which are known as Repetitive Strain Injuries (RSIs).

In sector industry, work that requires movement repetitive or position a body that doesn't natural too increase risk of MSDs. For example, workers the factory must bow or lift burden heavy without tool help suitable ergonomics can experience injury to the part back, shoulders, or knee. Use tool work that doesn't ergonomic, like machine in need repetitive movements without There is adjustment For minimize pressure on the body, can result fatigue muscle and system disorders musculoskeletal. For overcome problem this is important For increase awareness about importance ergonomics in place Work. Steps prevention can covers provision ergonomic chair with support good back, table work that can be done arranged height, as well training For worker about position correct work and use tool safe work With prioritize well-being ergonomic , firm can reduce number absenteeism consequence injury, increase productivity, and maintenance health period the length of the workers they.

Repetitive Movement

Involving activities movement repeated in period a long time, like type in front computer, pick up goods heavy regularly, or use tool certain like hammer or grinder, can own impact Serious to health musculoskeletal somebody. Tension that occurs in muscles and joints consequence movement repetitive This can cause injury, discomfort, even disturbance chronic. For example, workers who do work monotonous on the assembly line factory often experience disturbance like syndrome tunnel carpal or lateral epicondylitis, which is known as tennis elbow. Condition This develop Because microtrauma repeated over the network musculoskeletal. Microtrauma happen when network muscle or tendons are damaged damage small However continously Because pressure or repetitive movements. When movement repetitive done without Get enough rest, body No own time For repair and restore damaged network. Over time, this can cause inflammation chronic, reduction flexibility, and even damage permanent on the structure muscles and joints. Condition This often made worse by a lack of it awareness ergonomics in place work, where is the position? a body that doesn't experience or use equipment that does not in accordance can increase pressure on parts certain from body.

Prevention become key main in manage risk disturbance musculoskeletal consequence activity repeated This. Initiative prevention covers arrangement repeat station Work For increase ergonomics, ensuring that worker take enough rest from burdensome activities muscles and joints, as well provide training about technique safe and efficient work. Apart from that, planning timetable possible work rotation tasks and variations activities can also be done help reduce excessive pressure on parts body certain. With comprehensive approach to ergonomics and awareness health musculoskeletal, corporate and individual can Work The same For reduce risk serious disorder this and keep health period length of workers.

Lifting and Physical Loads

Lifting, carrying, or push burden heavy in a way continously can give pressure excess in the system musculoskeletal somebody. Required work use power physique big, like worker construction, laborers transport, or worker warehouse, often exposed risk tall to injuries to the back, waist and knees consequence activity lift recurring weight. Tasks This need strength significant muscle and often involve position a body that doesn't ergonomic, like bending, reaching, or twist body For lift or move burden. As a result, structure musculoskeletal can experience stress chronic which can cause various disturbance like painful muscle, inflammation joints, or even damage structural period long. In the environment necessary work

activity intensive physical, workers often exposed bone behind they are at risk injury Serious. For example, when lift heavy load, pressure exerted on the bones behind can cause shift intervertebral discs or even herniation discs, which can be very painful and annoying mobility as well as productivity worke. Besides, tension repeated in the muscles back and waist can cause painful chronic and conditions like syndrome myofascial pain, where tissue muscle become tense and painful consequence stress chronic.

Beside risk injury physique directly, the workers involved in work heavy it is often also risky experience disturbance musculoskeletal degenerative period long. For example, is osteoarthritis, where to use recurring in the joints certain like knee can cause decline bone cartilage and inflammation chronic. Condition This No only influence quality life in a way overall, but also can result absence from work, costs high medical, and even disability in a number of severe cases. Therefore that 's important For consider prevention and management strategies effective risk in environment necessary work activity physique weight, incl education ergonomics, use equipment appropriate aids, and rotation balanced task For reduce impact negative on health musculoskeletal worker.

Duration and Intensity Work

Long working hours without adequate pause can become factor risk Serious for disturbance musculoskeletal (MSDs). When workers faced with demanding work concentration tall or activity intense physicality during hours without Get enough rest, muscles they prone to experience fatigue. For example, workers in the sector manufacturing must lift burden heavy or workers in the sector technology that has to take a front seat computer For a long time without sufficient pause, tends to be experience tension and fatigue muscles that contribute to risk injury period long. Tension chronic This can result inflammation, pain, and ultimately, disruption of the system musculoskeletal.

Apart from that, there are no work shifts regular or Work night is also a potential increase risk disturbance musculoskeletal. Work with night shift or rotating often annoying pattern Sleep experience the body and interfere with the regeneration process necessary muscles For recovery after activity physique. Studies have show that disturbance pattern Sleep can cause decline ability body For repair and restore network damaged muscles or tense consequence activity intense work. As a result, workers are involved in the night shift or work shifts that don't regular Possible more prone to to injuries and disorders musculoskeletal like carpal tunnel syndrome, pain back, or even osteoarthritis.

Next, impact negative from long working hours without adequate rest can made worse by the lack of chance For do Rest active or sport. Required work somebody For still in position certain For a long time, for example, can cause stiffness muscles and joints that cause decline flexibility and quality movement. Currently happen in a way Keep going continuously, you can leads to inflammation chronic and ultimately, weakness structure of the area of the body involved. Therefore that's important For consider importance management time good work and planning enough rest For reduce risk disturbance musculoskeletal stress caused by stress overwork and what not regular.

Worker Fitness and Health

Condition physical and health general worker is factor important influences risk Disturbance Musculoskeletal (MSDs). Not enough workers active in a way physique tend more prone to to disturbance This. Lack of activity physique can cause weakness muscle and decline flexibility, which increases possibility injury moment do tasks physique heavy or repetitive. Apart from that, you can also be overweight give pressure addition to joints and bones, worsening existing conditions or even trigger development of MSDs. For example, workers who experience obesity Possible experience more Lots pressure on bones back and joints knee moment lift or bring goods.

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Apart from factors physical, condition health generality also plays a role in increase risk of MSDs. Workers who suffer condition health like arthritis or diabetes has risk taller For experience disturbance musculoskeletal. Arthritis, for example, can cause inflammation restrictive joints movement and improve sensitivity to pressure physique. Diabetes, on the other hand, can influence circulation blood and function nerves, which is important For support health bones and muscles. Conditions This need management special and considerate extra to ergonomics Work as well as pattern activity physique For reduce risk related injuries with work.

For reduce risk injury and improve health overall, important for worker For guard fitness physical and apply style life Healthy. Routine regular exercise can strengthen muscles and bones, improve flexibility, as well reduce tension in joints and muscles. Additionally, patterns Eat healthy and caring ideal body weight will be help reduce pressure extra on the body. Combination between fitness good physique and proper ergonomics in place Work can help worker overcome burden physical encounter daily with more efficient and safer. With thus, integration attention to condition physical and health general become crucial in effort prevention and management Disturbance Musculoskeletal in the environment Work.

Influence Ergonomics To Musculoskeletal Disorders in The Environment Work

Ergonomics is studies about interaction between humans and the elements from system Work they With objective For ensure health, comfort and efficiency maximum in environment Work (Gustara & Susilawati, 2023). Discipline This integrate principles scientific from various field like biomechanics, anthropometry, physiology, psychology, and engineering industry For designing equipment tasks, and environment suitable work with characteristics physical and psychological man (Prabarukmi & Widajati, 2020). Ergonomics No only limited to design physique like sitting position or placement equipment, but also includes aspects like arrangement time work, rotation tasks, and management stress For minimize risk injury musculoskeletal and improve productivity. Application ergonomics in various sector industrial and professional become crucial in reduce amount case disturbance musculoskeletal (GMS) occurs consequence activity repetitive work or a position that does not ergonomic (Devi et al., 2023). For example, in the environment office, adjustment tall table work and chairs, as well proper use of the monitor can reduce tension in the neck and back, which often becomes source painful chronic. In sector manufacturing, design tool heavy or machine that considers strength physique worker as well as use tool help lift it right can reduce risk injury back and injury others related with appointment burden heavy.

Besides Also, ergonomics plays a role important in increase quality life working individuals in ergonomic environment (Yusuf et al., 2023). With provide environment attentive work need physical and psychological workers, companies can increase satisfaction work, reduce absenteeism Because disease related work, and improve productivity in a way whole. This illustrates that ergonomics No only focuses on reduction risk injury, but also contributes to well-being general workers and performance organization in a way whole. With Keep going develop and implement principles Appropriate ergonomics, one hopes is that public Work will become more healthy, more comfortable, and more productive in period long (Watunnida & Widanarko, 2023).

Ergonomics is branch science that focuses on design environment supportive work health and comfort physical workers (Ferusgel et al., 2019). With consider characteristics physique man as well as activity work performed, ergonomics aim For reduce risk disturbance musculoskeletal (MSD), which is problem health Serious in various industries (Silfyana et al., 2024). Disturbance This covers various condition like painful back, syndrome tunnel carpal, and various injuries caused by activity repetitive physical or posture that is not ergonomic. Good understanding about ergonomics No only help prevent MSD, but also improve efficiency

work and quality workers ' lives. Importance ergonomics in prevent MSD especially seen in environment involved work activity intense physicality or position a body that doesn't experience (Fina, 2021). For example, workers factory frequently lift or move object heavy can experience injury to the part back or muscle. Ergonomics can help designing tool help or work processes that reduce burden physical must borne by the worker, so reduce risk injury period long. Additionally, adjustments to seating, table work, or tool Work other can help guard posture correct body and reduce stress on joints and muscles.

Case study show that implementation principles ergonomics has succeed reduce level incidence of MSD in various industry. For example is use equipment ergonomic like available chairs customized its height or table work that can be done arranged its height in accordance with need individual. Use tools This No only increase comfort worker but also reduce stress physical contribution against MSD (Wijaya et al., 2011). In context this is training about Ergonomics is also important for workers understand principles base For guard health physique they are in place Work. However, challenges in apply ergonomics it often comes down to cost and awareness. Many companies small or intermediate Possible No own sufficient budget For buy equipment ergonomic or provide adequate training for employee they (Pertiwi et al., 2022). Apart from that, awareness will importance Ergonomics can too varies between various sector industry. Education and support efforts from government or institution other can help increase awareness as well as facilitate access to solution ergonomic for more Lots worker.

Research conducted by Nataliningrum & Sistarina (2021) shows there is connection between factor risk exposure ergonomics from work with complaint musculoskeletal doctor teeth in the Cimahi City area, West Java. Risk factors exposure ergonomics in the area neck and complaints disturbance musculoskeletal area neck have connection significant while in the region hands and wrists hand right there is meaningful relationship. Research conducted by Aprilianne et al (2023) in the project development apartment in North Jakarta involves survey against 62 workers and 9 superiors , as well observation OWAS method for 39 workers For identify and assess factor risk ergonomics that occur in stages work casting and casting. From the results questionnaire, identified a number of factor risk with level risk high, like use of power tools, repetitive movements, positions workers who don't OK , works in condition dark, and rapture heavy load . Result of OWAS observations show exists risk low, medium, and high.

Ergonomics own crucial role in manage and prevent disturbance musculoskeletal in place Work. Through appropriate design and good understanding about need physique workers, can created environment safe, comfortable and productive work. Investment in ergonomics No only is step proactive For guard health workers, but also can increase efficiency operations and satisfaction Work in a way whole (Antari & Rosidah, 2024). Other studies and research regarding ergonomics in the environment Work often highlights role important design ergonomic in prevent and reduce incident disturbance musculoskeletal. Through careful analysis to activity work, posture body, and style work used, researchers can identify areas for improvement ergonomic can applied For increase well-being and productivity worker (Manunel et al., 2022). Implementation solution proper ergonomics can reduce stress physical experience workers, so reduce incident injury consequence use repeated or position a body that doesn't experience.

Additionally, approach ergonomics also leads to improvements condition Work in a way whole. This includes educate worker about importance good posture and practice safe work, as well provide training suitable ergonomics (Putri & Amalia, 2021). With increase awareness and knowledge worker about ergonomics, company can create culture supportive work health and well-being they. This matter No only profitable individual in a way directly, but also improve efficiency operational and reduce cost related injury Work (Ridlo & Fasya, 2023). With thus, ergonomics No only become draft theoretica, but also becoming real and impactful practice big to health workers in the environment Work. Through application principles good

ergonomics, firm can reduce incident disturbance musculoskeletal, improve productivity, and creating environment more work healthy and safe for all worker. Therefore that 's investment in design and implementation ergonomics in place Work No only A necessity, but also a investment in sustainability and prosperity organization in a way whole.

Conclusion

This study deepen complexity and impact disturbance musculoskeletal (MSD) in the environment work, with focus on factors potential risks influence and ergonomic strategies that can reduce prevalence disturbance This. MSD disorders become attention seriously on the spot Work Because can cause discomfort, decline productivity, even inability period long If No managed with Good. Study This aim For identify factors risk related major with MSD as well analyze How approach ergonomics can help in reduce incident case the. Factors risk main ones that are often related with MSD covers posture a body that doesn't precise, movement intensive repetitive, load hard work, as well condition environment work that doesn't ergonomic. Posture a body that doesn't right, for example, can increase pressure on joints and muscles, causing excessive tension and the end trigger inflammation or injury period long . Intensive repetitive movements can also occur result fatigue muscles and ligaments, which later increase risk of MSD in certain areas like back, shoulders, or wrist hand.

Ergonomics, in context this, be key For overcome challenge This. Approach ergonomic covers design place suitable work with anatomy and physiology human use equipment ergonomic work, as well reduced work process settings pressure physical on the body worker . For example, using chair with support a good back and a table that can customized its height can help guard posture good body. Additionally, use tool help like equipment ergonomic lift can reduce risk injury moment lift burden heavy. Importance application ergonomics in a way can be effective too seen from results study The previous one shows decline significant in MSD events after applied change proper ergonomics in the environment Work. This matter underlines that investment in ergonomics No only beneficial for well-being individual in place Work but also profitable for productivity whole company. Implementation of training programs Routine ergonomics can also give benefit period long with increase awareness worker to practice safe and healthy work. In conclusion, management risks and implementation of effective ergonomics strategies can in a way significant reduce prevalence disturbance musculoskeletal in the environment Work. Study This highlighting importance awareness will factor risk potential as well as need For apply solution suitable ergonomics For support health and well-being worker. With thus, integration good ergonomics No only is must For obey regulation safety work, but also a investment intelligent for company to increase quality life and productivity power.

References

Abdul, F. N., Khalifatul Husna, A., & Prastowo, B. (2024). Analisis Risiko Musculoskeletal Disorders Pada Karyawan Pengemasan Di Ukm Kerupuk Dusun Bunder Malang. *Seroja Husada: Jurnal Kesehatan Masyarakat*, *1*(2), 179–183. https://doi.org/10.572349/husada.v1i1.363

Antari, I. G. A. D., & Rosidah, N. (2024). Analisis Posisi Kerja Terhadap Keluhan Musculoskeletal Disorders (MSDs) Pada Penjahit Garmen Puri Kawan. *Seroja Husada: Jurnal Kesehatan Masyarakat*, *1*(2). https://doi.org/10.572349/husada.v1i1.363

Aprilianne, C., Gracia, G., & Nugraha, P. (2023). Analisa Faktor Risiko Ergonomi Tenaga Kerja Konstruksi Untuk Pekerjaan Pembetonan Pada Proyek Apartemen Di Daerah Jakarta Utara. *Jurnal Dimensi Pratama Teknik Sipil, 12*(1), 17-24.

Asnel, R., & Pratiwi, A. (2021). Analisis Faktor-Faktor Yang Mempengaruhi Keluhan

Musculoskeletal Disorder Pada Pekerja Laundry. *Public Health and Safety International Journal*, *1*(1), 2715–5854. https://doi.org/10.55642/phasij.v1i01

Devi, N. L. P. M. L., Arnita, N. P. S., & Muryanifa, M. (2023). Analisis Faktor Risiko Ergonomi Pada Pekerja Pembuat Jaja Sengait Di Desa Sading Mengwi Badung. *OBAT: Jurnal Riset Ilmu Farmasi Dan Kesehatan*, *1*(6). https://doi.org/10.61132/obat.v1i6.134

Fatsiwi, Hakimi, Moh., & Huriah, T. (2021). Pengaruh Peregangan Senam Ergonomis terhadap Skor Nyeri Musculoskeletal Disorders (MSDs) pada Pekerja Pembuat Kaleng Alumunium. *Muhammadiyah Journal of Nursing*, *2*(1).

Ferusgel, A., Masni, & Arti, N. A. (2019). Faktor yang Mempengaruhi Risiko Musculoskeletal Disoders (MSDs) pada Driver Ojek Online Wanita Kota Medan. *Jurnal Penelitian Kesehatan "SUARA FORIKES*, *11*(1). https://doi.org/10.33846/sf11114

Fina, M. (2021). Pengukuran Risiko Kerja Dan Keluhan Muskuloskeletal Pada Pekerja Pengguna Komputer. *Journal of Innovation Research and Knowledge*, *1*(3).

Gustara, R. A., & Susilawati, S. (2023). Analisis Postur Kerja Terhadap Keluhan Gangguan Muskuloskeletal pada Pekerja Pemanen Kelapa Sawit. *SEHATMAS: Jurnal Ilmiah Kesehatan Masyarakat*, *2*(3), 625–633. https://doi.org/10.55123/sehatmas.v2i3.2101

Halijah, S., Suherry, K., Khairunnisa, R., Dwita Aprilia, P., & Utami, T. N. (2023). Hubungan Tingkat Risiko Ergonomi dan Masa Kerja dengan Keluhan Muskuloskeletal pada Pekerja: Studi Literature Review. *Arrazi: Scientific Journal of Health*, *1*(1). https://journal.csspublishing/index.php/arrazi

Hardianto, T. N., Sugiarto, H., Widyastuti, S. D., & Erina, R. (2023). Musculoskeletal Pada Pekerja Di Indusrti. *Jurnal Kesehatan Samodra Ilmu*, *14*(2). https://doi.org/xx.xxxxx/xxxxx

Indriastuti, M. (2012). Analisis Faktor Risiko Gangguan Muskuloskeletal Dengan Metode Quick Exposure Checklist (Qec) Pada Perajin Gerabah Di Kasongan Yogyakarta. *Jurnal Kesehatan Masyarakat*, *1*(2).

Manunel, E. S., Azizah, R., Mukono, H. J., Ruliati, L. P., & Landi, S. (2022). Ergonomic Risk Analysis with Complaints of Musculoscletal Disorders in Red Brick Workers. *Jurnal Ilmiah Kesehatan (JIKA)*, *4*(2), 296–308. https://doi.org/10.36590/jika.v4i2.382

Nataliningrum, R. D. M., & Sistarina, G. (2021). Faktor Risiko Pajanan Ergonomi Dan Gangguan Muskuloskeletal Pada Dokter Gigi Di Kota Cimahi Jawa Barat. Medika Kartika : Jurnal Kedokteran dan Kesehatan.

Oktavia, R., & Susilawati. (2024). Analisis Faktor-Faktor Yang Mempengaruhi Kejadian Musculoskeletal Disorders (Msds) Pada Pekerja di Sektor Manufaktur. *Cantaka: Jurnal Ilmu Ekonomi Dan Manajemen Literature Review*, *2*(1), 12–22.

Pertiwi, W. E., Annissa, A., Lenardi, R., & Rahayu, S. (2022). Faktor-Faktor Yang Berhubungan Dengan Musculoskeletal Disorders (Msds) Pada Petani Sawah. *Jurnal Semesta Sehat*, *2*(1). https://jsemesta.iakmi.or.id/index.php/jm

Prabarukmi, G. S., & Widajati, N. (2020). The Correlation of Ergonomic Risk Factor with Musculoskeletal Complaints in Batik Workers. *Indonesian Journal of Occupational Safety and Health*, *9*(3), 279–288. https://doi.org/10.20473/ijosh.v9i3.2020.269-278

Pramudita, A. S., & Sari, M. (2024). Keluhan Musculoskeletal Disorders (MSDS) Pada Mahasiswa. *Jurnal Semesta Sehat*, *4*(1). http://jsemesta.iakmi.or.id/index.php/jm/

Putri, A. S., & Amalia, D. (2021). Analisis Postur Kerja dan Work-Related Musculoskeletal

Disorders dengan Metode ROSA pada Dinas Lingkungan Hidup Kota Batam. *Seminar Nasional & Call Paper Fakultas Sains Dan Teknologi*, *2*(1).

Ridlo, A. J., & Fasya, A. H. Z. (2023). Gambaran Keluhan Musculoskeletal Disorder (MSDs) pada Pekerja PDKB PT. PLN (Persero) UP3 Surabaya Selatan. *Sehat Rakyat: Jurnal Kesehatan Masyarakat*, *2*(2), 258–266. https://doi.org/10.54259/sehatrakyat.v2i2.1665

Saputra, I. M. A. S., Rahim, A. F., & Suparsa, M. (2023). Analisis Faktor Risiko Posisi Kerja Duduk Dengan Keluhan Muskuloskeletal Pada Pegawai Administrasi Rsud Kabupaten Bangli. *Advances In Social Humanities Research*, *1*(1).

Silfyana, S., Rakhmawati, F., & Ibrahim, M. (2024). Faktor Resiko Ergonomi Pada Ruang Penyimpanan Rekam Medis Di Rumah Sakit 'Aisyiyah Siti Fatimah Tulangan Sidoarjo Tahun 2023. *Jusindo*, *6*(1).

Simanungkalit, J. N., Rehuel, Y., & Sitepu, B. (2020). Bahaya Ergonomi Dan Gangguan Muskuloskletal Pada Petani Kebun Teh. *Jurnal Penelitian Perawat Profesional*, *2*(4). http://jurnal.globalhealthsciencegroup.com/index.php/JPPP

Suhendar, A., Sinaga, A. B., Firmansyah, A., Supriyadi, S., & Kusmasari, W. (2023). Analisis Risiko Musculoskeletal Disorders (MSDs) pada Pekerjaan Pengangkutan Galon Air Mineral. *Jurnal INTECH Teknik Industri Universitas Serang Raya*, *9*(1), 71–78. https://doi.org/10.30656/intech.v9i1.5641

Suratno, T. Y. L., Ruliati, L. P., & Sahdan, M. (2022). Faktor Yang Berhubungan dengan Keluhan Musculoskeletal Disorders (Msds) pada Pekerja Konstruksi Pt. Pembangunan Perumahan di Bendungan Manikin. *SEHATMAS: Jurnal Ilmiah Kesehatan Masyarakat*, *1*(4), 666–678. https://doi.org/10.55123/sehatmas.v1i4.970

Wardani, A. T., & Multazam, A. (2023). Analisis Faktor Resiko Musculoskeletal Disorders (Msds) Dengan Metode Nordic Body Map (Nbm) Dan Reba Pada Petugas Cleaning Service Di Rsu Permata Hati Semarapura. *Advances in Social Humanities Research*, *1*(1).

Watunnida, S., & Widanarko, B. (2023). Literatur Review: Faktor Risiko Gangguan Otot Rangka (Gotrak) Pada Tenaga Kesehatan. *INNOVATIVE: Journal Of Social Science Research*, *3*(5).

Wijaya, A. T., Darwita, R. R., & Bahar, A. (2011). The Relation between Risk Factors and Musculoskeletal Impairment in Dental Students: a Preliminary Study. *Journal of Dentistry Indonesia*, *18*(2), 33–37.

Yusuf, Febiyanti, M., Kurnia, R., & Kusuma, G. D. N. (2023). Studi Risiko Ergonomi dan Keluhan Subjektif Work-Related Musculoskeletal Disorders (WMSDs) pada Penjahit di Kota Tanjungpinang. *Jurnal Teknologi Dan Manajemen Industri Terapan (JTMIT)*, *2*(3), 224–233.