REVIEW ARTICLE

WORK-RELATED MUSCULOSKELETAL DISORDERS AMONG HEALTH PROFESSIONALS: REVIEW OF THE PREVALENCE, COMPLICATIONS, PREDISPOSING FACTOR, RELATED OUTPUT PERFORMANCE AND MANAGEMENT

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ABSTRACT

Musculoskeletal disorders are injuries over a period of time due to workers' exposure to some multifactorial work hazards. The major causes of musculoskeletal injuries are long work involving forceful, repeating movements, and maintaining awkward body postures. This paper focuses on the associated prevalence, complications, predisposing factors, related output performance, and management of musculoskeletal disorders among health-related professionals. Work-related musculoskeletal disorders (WMSD) are unhealthy situations that occur in work environments to workers thereby leading to health hazards. Which in most cases leads to high costs to employers, for instance, absenteeism lost productivity and increased health care, disability, worker's compensation costs, and so on. MSD cases are more severe than the average nonfatal injury or illness. Nurses have the highest incident rate of WMSD but are not fatal and are followed by physicians, pharmacists, laboratory scientists, and physiotherapists in that order. The body parts of these health workers associated with WMSD include both the upper and lower limbs, with the structure of the upper limb being the most affected. Therefore, relevant measures should be taken by policymakers to adjust workplace ergonomics and staff welfare should be paramount to reduce musculoskeletal injuries among professional health workers, and they should be enlightened on proper workplace ergonomics.

Keywords: Musculoskeletal Disorders, Injuries, Work Hazards, Health Professional

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INTRODUCTION

Ergonomics is the study that deals with the relationship between Workers' efficiency and compatibility at the workplace. This aspect is important because it measures the output or productivity of an organization. There are so many factors that can affect workers' productivity at their workplace, and one of the factors is musculoskeletal disorder. Importantly, poor ergonomic conditions, when the work is incompatible with the worker's health and impedes their ability to continue their job (1). These ergonomic conditions are majorly caused by ergonomic work hazards, which subsequently lead to pain, injuries, discomfort, and fatigues. (1). The resultant injuries from poor ergonomic conditions are collectively known as musculoskeletal injuries (MSI) (2), which can be in form of repetitive strain injuries (RSI) or repetitive motor injuries (RMI), or musculoskeletal disorders (MSDs) (1, 2). Musculoskeletal disorders can be described as discomforts if not diagnosed by a qualified health professional.

The major causes of musculoskeletal injuries are long work involving forceful, repeating movements, and maintaining awkward body postures (3, 4). It has been suggested that workplace ergonomic hazards can predict WMSDs, therefore, to locate a hazard, observe the possible manifestations (4). Also, discomforts from work-related musculoskeletal are painful and often disabling injuries, which affect parts of the body; the wrist, back, legs, shoulders, neck muscles, and joints (5). Early diagnosis of ergonomic hazards, injuries, and illnesses can prevent WMSD and subsequently create an enabling work environment especially in the health care establishments (4). Therefore it is important to identify prevalence, complications, predisposing factors, workers' output, and management as related to WMSD among health professionals.

OVERVIEW OF MUSCULOSKELETAL DISORDERS

Musculoskeletal disorders are injuries over a period of time due to workers' exposure to some multifactorial work hazards. The injuries are sustained over a long periodically and slowly in the work environment (6). These injuries eventually have an adverse effect on both the worker's health and the worker's workplace (6). The accompanying symptoms may appear singly or in multiple forms, showing pain and discomfort in some body parts for example; the neck, shoulders, lower back, and legs (7). Pain and Aches are the major symptoms of complications that can occur in the musculoskeletal system. They may arise from injury which the signals are relayed through from the spinal cord to the brain (8). Individuals perceive and interpret these pain signals differently. For instance, the experience is associated with the depth of the damage and on the type; sometimes it is based individual's personality or previous experiences (9). Also, the body its self can reinforce and subside the pain pathway in the nerve (9). However, some factors like psychological factors play a major role in some cases can cause more pain, although, other processes in the body involved in the pathway system can reduce it. It has been shown that sleep patterns and physical activity are of significant importance for pain experience (9).

Musculoskeletal disorders are related to different types of pain experienced, which include; firstly, it can be painful and aches as a result of external mechanisms, chemical factors, pressure, and other influence on a nerve, and, secondly, by those influences without demonstrable injuries (9). Pain that is caused by external mechanisms is referred to as nociceptive pain (10), and about 90% of this type of pain begins in the pain receptors found in body tissue, as a result of stimulation (10). For example, in tissue injury, pain-inducing agents are generated and these stimulate the pain receptors (10). The advantage here is that this type of pain is important because it alerts the body of tissue injury and that the individual should take precautions against further damage (10). Also, pain caused by other influences on a nerve is termed neurogenic pain. Neurogenic pain is complex and a dangerous experience as it can be mediated through the following; burning, stabbing, piercing, or searing and it may come in lightning attacks. The pain originates because of damage to the nervous system (11). The causes of this type of pain include pressure on a nerve in the back or in the sciatic nerve which

gives serious pain in the leg, also wrist pain as a result of nerve pressure around the nerves of the wrist and lead to carpal tunnel syndrome, (11). Painkillers do not help in neurogenic pain and even high anti-depressant sometimes like morphine does not work and operation of that area is the only solution. (11). Pain without demonstrable injury is called idiopathic pain, which is the pain of unknown origin and, which is fairly uncommon. It is hard to treat or relieve since a biological reason is not found, although it is a painful experience (12). No drugs are normally administered for this type of pain however it is often done psychologically (12).

Survey of Living Conditions for the year 2002–03, reported that 57% and 68% of men and women respectively between the ages of 16–84 years; revealed that they had pains in some body parts like back, neck, shoulders, elbows, legs, or knees. Subsequently, 30% of the population stated that the pain was severe (13). Also, there is more pain among women in the age group of 45–64 years, and above age 65, there was no significant change in the prevalence of pain. The proportion of people with pain in the neck or shoulders has been the highest compared to other body parts since the 1980s (14). Furthermore, the working-age complaints increased to 30% in men and 48% among women, from previously 21% to 32% respectively (13). Women are seen to be prone to increased pain while the opposite is observed in men especially in (15).

PREVALENCE OF MUSCULOSKELETAL DISORDER IN DIFFERENT HEALTH-RELATED PROFESSIONS

The health care profession has been reported to have high-risk work-related musculoskeletal disorders (WMSDs) (16, 17, and 18). It was estimated that about one-third of all cases of sick leave among health care professionals is due to MSDs (20, 19). Data from developed countries suggest that WMSDs are high among health care providers but under-reported (21). In some countries especially Asian countries, it is much negligible. However, the reason for this paucity in literature in WMSDs among health care providers is because studies have mainly focused on selected health workers like physicians, dentists, physical therapists, lab technicians, and nurses (21).

Among these professionals, nursing has the highest occupational hazards and the most prone to MSDs; i.e. with the most prevalent rate globally (22). According to the World Health Organization (WHO), the associated problems of WRMSDs become increasingly threatening during their daily routine (23). Because nurses have the most challenging work in the hospital; they are physically drained from handling patients (24). Work-related musculoskeletal symptoms vary on the type of hospital they run and patients admitted into wards (25), which is the major reason for their work ordeals as related WRMSDs hazards (21).

Although each health worker has a percentage of MSDs prone, however, the body regions affected are of significant importance. The body parts with the greatest prevalence of WRMSDs are the low back, neck, shoulders, knees, forearms, hands, and ankles/feet, in that order and recently, the lower extremities have received more attention. Several studies taking into consideration the Asian continent and western world revealed that there have been a higher yearly prevalence of musculoskeletal disorders (MSDs) in at least a body part and/or region that has varied between 40 to 95% in nurses, and in western populations, where it further shows low back, neck, and shoulders are the most affected body structures, with the prevalence of 29–64%, 34–63%, and 17–75%, respectively (26). Conversely, a review reported that, over the last 12 months among female nurses, the knee and ankle/foot regions were most affected by MSDs. The prevalence in the knees of MSDs ranged from 7.5 and 77%, ankles ranged between 3.2 to 100%. While in the lower legs (the shins) it was varied between 8.5 and 10.5%, thigh/hip area, was between 11–100% (26).

Surgeons and interventional medical specialists, also have a high chance to acquire work-related MSDs (27). Because of the long working schedule which involves repetitive movements, static and awkward postures. These professionals are challenged with instrument innovation, which plays a major part in MSDs.

Ergonomists have related surgeons' working environment to those of certain industrial workers (27). The increasing prevalence rate of work-related MSDs

among at-risk physicians has been called an impending epidemic and it has been reported that above 80% of physicians experience significant pain; for example, the occurrence of tendonitis and carpal tunnel syndrome in physicians appears to be high, This workforce is expected to reduce in manpower by the year 2025, with a loss of 25 200 to 33 200 surgeons alone, and disability is a major contributing factor (28).

Physical therapists have also been reported to have work-related musculoskeletal disorders (WMSDs) with a significant impact (29). It was reported that 1–6 physical therapists reported taking sick leave, changing practice habits and work settings, or quitting the profession because of WMSDs. Reported confirmed that in a particular country, 32% of physical therapists with WMSDs lost work time (30), 18% of physical therapists with WMSDs of the low back changed their work setting and that 12% reduced their patient care hours (31).

Furthermore, exposure to risk factors for WMSDs is likely to result from patient care activities, which involve the application of relatively high levels of pressure, performed in hazardous postures. Patient handling has been consistently associated with WMSDs in nurses as earlier stated and confirmed through a biomechanical study (32-34). However, nurses have one of the highest rates of nonfatal occupational musculoskeletal injuries (34).

Subsequently, pharmacists have been used as a reference group in the exploration of the risk ratio of MSDs among other health professionals like dentists, physiotherapists (PTs), and occupational therapists (OTs) (35). However, the relationship between pharmacists and MSDs has been rarely documented. The causative factors may include demographic factors, physical burden of work, ergonomics hazards, and psychosocial factors (36). The dispensing of a large volume of prescriptions within a short space of time amounts to work pressure that pharmacists encounter on a daily basis. Additionally, standing in a position for long durations is a long-term challenge to the functions of the body. It has been reported that low back pain (LBP) is one of the major symptoms of MSDs in pharmacists (37), and the incidence rate was 16.60%. Furthermore, in older pharmacists (28.49%; $P < .01$) and those who worked at district hospitals (23.51%; $P < .01$) revealed higher proportion of LBP. Also, female pharmacists [adjusted hazard ratio (aHR): 1.12, 95% confidence interval (95% CI): 1.01–1.24, $P = .0354$ and pharmacists with diabetes (aHR: 1.55; 95% CI: 1.20–2.01; $P = .0008$) and gout (aHR: 1.70; 95% CI: 1.37–2.09; $P < .0001$) had significant higher risks of LBP (38).

Laboratory work often requires fine task precision, repetitive, sustained, and abnormal postures, which increases the risk of musculoskeletal injury (39). The cumulative risk includes micro trauma from daily engagements (39). Time limitation and accuracy are in demand consistently in laboratory tasks, and with productivity, pressures heighten the work-related musculoskeletal risk (39). The female gender and working late hours always contribute to musculoskeletal problems (39). However, despite the attention given to ergonomic issues and improvements in equipment with good workplace design, laboratory technicians still have a high prevalence of workplace injuries (39), with a prevalence of 72% (40) and, 80% (41) in Iran and India respectively. The lower back (31 to 43%) and neck (18 to 33%) are also common to laboratory work-related musculoskeletal problems (43). Studies from other countries include; America, Ethiopia, Iran, Sweden, and Switzerland respectively (39, 43-45). Studies have also shown the prevalence in the shoulders, upper back, and hands/wrists to be 58 to 60%, 25 to 57%, 28 to 57% respectively, to be prominent sites of musculoskeletal problems or injuries during routine laboratory activities (39). Problems in knees, ankles, and feet (10 to 20%) may be prevalent with standing for a long period and shifting location for different equipment needs (41).

PREDISPOSING FACTORS OF WORK-RELATED MUSCULOSKELETAL DISORDERS

Several factors can predispose to musculoskeletal disorders especially when it is work-related. But most important examples are ***working posture, work repetition, vibration, temperature, and so on***.

Working posture is a posture an employee makes while performing work duties. It can either be short or for a long period of time depending on the nature of the job. The human body can have segments or divisions, such as an arm, forearm, thigh, or trunk, linked to other segments by joints (46). MSDs may be the result of injury arising due to overload at these joints over a period of time. Developing musculoskeletal disorders is closely linked to either biomechanical or psychosocial factors associated with work.

Biomechanical risk factors, besides posture, also take into consideration force exertion and time. Posture duration and pattern of postural loading (exertion of external forces) and unloading (recovery periods) determine the character of the load (static or repetitive). These two load types are especially strenuous and can trigger MSDs development. For example, the two types of loads have been reported to affect the neck while over-flexing it, pain in the forearm, shoulder, and knee region, back pain due to bending and twisting, bending and twisting of the trunk (48-52).

Repetitive movements are hazardous because it is the use of the same joints and muscle groups for a long period (51). Jobs that require repetitive movements always involve other risk factors for WMSD such as fixed body position and force; where the worker, in order to perform the task, has to balance the shoulder and neck in a fixed position to exert some force (51-53). It is a human characteristic to work at differential rates at different times (53).

Subsequently, it is a general belief that, when it is too cold, our hands can become numb. With these numbed hands, we are may not determine the exact amount of force needed to accomplish a task. (54). A cold environment also makes our bodies less flexible, because every movement we make and in every position we hold, tasks us, and when it happens, it is likely to result in WMSDs. Also in hot weather and humid, workers get fatigued easily and become susceptible to injury (54).

COMPLICATIONS OF WORK-RELATED MUSCULOSKELETAL DISORDER

Complications of musculoskeletal disorders are common and are a consequence of the injury itself, which may be unavoidable, although, others are iatrogenic. Regardless of the origin of the complication, it is important to recognize good treatment options to improve the outcome (55). Musculotendinous injuries that result from repetitive and forceful tasks are due to pressure, overstretch, compression, friction, ischemia, and overexertion of the muscles (55). It was suggested that these injuries may lead to inflammatory responses. (55). While the end result is mostly pain, loss of motor function, and so on. It is challenging to determine the causality between tissues and behavioral responses among workers. (56). For example, edematous changes were found in these tissues in patients of <3-month duration, while prostaglandin E2 (PGE2) and vascular endothelial growth factor (VEGF) were increased in patients of 4–7-month symptom duration, while fibrotic changes were present in patients of longer symptom duration (>7 months). (56). Also, muscle tissue biopsy from patients with chronic overuse syndromes, trapezius muscle biopsies from workers with continuous trapezius myalgia of one-year duration showed evidence of muscular pathological changes but no inflammation was observed (57).

However, the analyses of the first dorsal interosseous muscle gotten from some of the patients with painful chronic overuse syndrome found increased inflammatory cells and pathological changes in their muscle cells (58). Furthermore, continued exposure to repeated muscle strains at fast velocities (25 mm/s) leads to muscle fibrosis, while repeated muscle strains at low velocities (10 mm/s) lead to compensatory, adaptive responses, these were also observed in animal studies (60-63). Subsequently, the interactions between motor behavioral changes with tissue changes in Messner's studies confirm that functional declines

accompany tissue injury, inflammation, and fibrosis/degeneration (63).

EFFECT OF MUSCULOSKELETAL DISORDER ON THE PERFORMANCES AND OUTPUT MANAGEMENT AMONG WORKERS

The performance of workers is a very important factor that could affect the overall productivity of an organization. For instance, in the industrial repetitive task, the performance of workers has a major impact on the work output (64). The workers may be present at work but the efficiency of work output is low due to work-related musculoskeletal disorders i.e. work productivity loss is not only seen as time loss but the incapacity of the workers.) (64). Also, it has been suggested that pain might have a negative impact on an individual's performance, which includes; concentration, cognitive capacity, mood, mobility, stamina, and agility, and so on (65). Also, the findings of studies have shown that individuals with musculoskeletal pain may suffer from mental health symptoms, such as lack of concentration, insomnia, stress-related pain, ability, and other disabling conditions which causes loss of work time and negatively affects the work output (66-69). It was observed that there is a significant link between the prevalence rate of WMSDs and productivity loss in terms of presentism (70). Also, it was suggested that 26% of subjects with MSDs symptoms in the neck or arms have reported a loss in productivity (71, 72). Good health in society is the major factor responsible for sustainable, inclusive growth and smartness. Based on this, active people have a positive impact on productivity and competitiveness (73).

MANAGEMENT OF MUSCULOSKELETAL DISORDERS

Ergonomics is the science that deals with the association of jobs demands and workplace conditions among the working strength (74). Ergonomics aimed to reduce pressure and minimize tissue damage and, most important diseases that are associated with the use of muscles, repeated tasks, and bad posture, (74). Therefore, ergonomics programs at the designated workplaces can help prevent injuries, illnesses by minimizing WMSD risk factors. Three principal approaches to ergonomics are by using engineering, administrative controls, and personal protective equipment (PPE) (74). In ergonomics evaluation, it is important to note that, before proposing any interventions, the assessment plan is made available. This will help reduce the incidence of MSD at work by improving self-management among workers (74-76).

Engineering controls; this is the most effective method to tackle WMSDs. it is a method that takes into account the capabilities of the workforce using engineering or innovative approaches. For example improving the way things can be transported, with mechanical aid to reduce heavy load lifting and carrying tasks (77).

Administrative control deals with strategies to reduce WMSD risk, however, it does not totally eliminate workplace hazards. Administrative control is not as effective as the engineering controls but can be used as a temporary measure in case of emergencies. Administrative control uses some of the following methods; reducing shift length, giving more breaks for rest and recovery, rotating workers through jobs that are physically tiring (78).

Personal protective equipment provides a shield between the workers and hazardous sources at work. Examples include the use of respirators, chemical aprons, earplugs, safety goggles, and shoes, at work. Although these devices are expected to help in reducing the rate of exposure, the accuracy is not clear. Also, these devices may decrease one exposure but increase another when workers have to also overcome the stress from the device itself to perform the work effectively. A good example is wrist bending when using wrist splints at work (79).

Other methods of managing MSD at work are manual therapy strengthening exercise, transcutaneous electrical nerve stimulation (TENS), hydrotherapy, cryotherapy, and ultrasonography. This management approach employs a series of techniques in form of manual, physical, mental, invasive, and non-invasive to tackle MSD among workers (80-89)

SUMMARY AND CONCLUSION

Workers' efficiency and compatibility at the workplace are important and the study that deals with this association are known as Ergonomics. When the work is incompatible with the worker's health, there can be poor ergonomic conditions and this impedes their ability to continue their job. These conditions are majorly caused by ergonomic work hazards and subsequently lead to discomfort, fatigue, pain, and injuries. The injuries resulting from poor ergonomic conditions are collectively known as musculoskeletal injuries (MSI), which can be repetitive strain injuries (RSI) or repetitive motor injuries (RMI), or musculoskeletal disorders (MSDs)

Musculoskeletal disorders develop due to the continuous and prolonged exposure of workers to harmful and adverse effects on the work environment. Pain and Aches are conveyed via the nerves of the spinal cortex to the brain where they are perceived depending on severity and type of the injury personality and earlier experience. Types of pain related to musculoskeletal disorders; nociceptive pain (over 90%) caused by external mechanisms or chemicals. It warns that tissue injury has taken place, neurogenic pain caused by pressure or other influence on a nerve, and Idiopathic pain (pain ''of unknown origin')', does not demonstrable injury.

Studies have documented a higher annual prevalence of musculoskeletal disorders (MSDs) in at least one human body part and/or region that varied between 40 and 95% in a population of Asian nurses, In western populations, the low back, neck, and shoulders are the most significantly affected body parts, with the prevalence of 29–64%, 34–63%, and 17–75%, respectively. In the knees, the prevalence of MSDs ranged between 7.5 and 77%, and in the ankles, between 3.2 and 100%. The prevalence of MSDs in the lower legs (the shins) varied between 8.5 and 10.5%, and in the thigh/hip area, the prevalence range was 11–100%

There are many predisposing factors to work-related MSD, which include but are not limited to Working posture adopted by an employee while performing work tasks, Biomechanical risk factors like Posture duration and pattern of postural loading (exertion of external forces), and unloading (recovery periods) e.g. performing work with hands above shoulder level, working in the bent or twisted body positions for more than two hours a day is a strong risk factor for developing back, Repetitive movements especially when they involve the same joints and muscle groups over, Temperature, e.g. when it is too cold, or when we touch cold materials, our hands can become numb so that we are more likely to misjudge the amount of force we need to do our work and use too much

When continued task performance is superimposed upon injured and inflamed tissue the following complications can occur, Chronic or systemic inflammation, Fibrosis, Tissue breakdown (degeneration). This results in pain and loss of motor function.

Work productivity loss due to time loss, reduced concentration, cognitive capacity, rationality/mood, mobility, stamina, and agility that reduces functional incapacity of the. It was suggested that 26% of subjects with MSDs symptoms in the neck/shoulders or hands/arms reported a loss of productivity

Ergonomics, the science of fitting workplace conditions and job demands to the capability of the working population to reduce stress and eliminate injuries. It involves a three-tier hierarchy of controls widely accepted as an intervention strategy for reducing, eliminating, or controlling workplace hazards, Engineering controls, administrative controls, and Use of personal protective equipment. Other methods; Manual Therapy, Strengthening exercise, transcutaneous electrical nerve stimulation (TENS), Hydrotherapy, illness treatment through the water. Cryotherapy; to reduce burning pains and Ultrasonography; for localized pain.

Finally, Musculoskeletal disorders (MSD) are injuries or disorders of the muscles, nerves, tendons, joints, cartilage, and spinal discs. Work-related musculoskeletal disorders (WMSD) are conditions

associated with the work atmosphere and, outputs of work contribute to the condition. Which in most cases leads to high costs to employers, for instance, absenteeism lost productivity and increased health care, disability, worker's compensation costs, and so on. MSD cases are more severe than the average nonfatal injury or illness. Therefore, relevant measures should be taken by policymakers to adjust workplace ergonomics and staff welfare should be paramount to reduce musculoskeletal injuries among professional health workers, and they should be enlightened on proper workplace ergonomics.

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