Acknowledgment

First and before most, I thank **ALLA** for his great mercy, generous blesses and for allowing me to achieve this work.

I would like to express my sincere appreciation and deepest gratitude to **Prof. Dr. Diaa Abd El Hamid Marzouk** professor of Public health, Community, Environmental & Occupational Medicine, Ain Shams University for her great effort, advices, guidance and kind supervision.

I am greatly indebted to **Dr**. **Hanan Ezz Elarab**, Assistant Professor of Public health Community, Environmental & Occupational Medicine for her continuous encouragement and persistent support.

I wish to extend my genuine thanks to the working staff of Sheraton Cairo Hotel for their great help and cooperation.

I express my thanks and gratitude to my family, Doha, Omar, Kareem and Noha for their endless support.

Ahmed badr eldin Ahmed

Abstract

Musculoskeletal disorders are considered a major health problem affecting employees as well as employers. Musculoskeletal disorders is a broad umbrella term that including a wide variety of disorders involving the bones, joints and the soft tissues involved in moving those joints. The term includes such diverse problems as low back pain, repetitive strain injuries of various sorts and joint injuries. ***This study aimed to study*** the pattern of work related musculoskeletal disorders, and to determine the risk factors of work related musculoskeletal disorders among a five stars Egyptian Hotel workers. ***Methods***: A cross section study design for studying the prevalence of work related MSDs among five stars hotel workers, Sheraton Cairo, including all the hotel manpower (817) workers. A questionnaire was completed by the researcher while interviewing each worker. Nordic questionnaire was used to asses the MSDs symptoms. For subjects with MSDs reviewing their medical records, both pre-employment and periodic medical examination sheets to estimate frequency of musculoskeletal complains in each and carry out radiological examination x-ray, CT and MRI. ***Results:*** Study was done on 687 men (84.1%) and 130 women (15.9%). (72.3%) are married, (23.7%) singles and (1.6%) widows. (35.4%) are preparatory school graduated while (31.1%) university educated and (27.8%) secondary school education. the mean age of the study group is (Mean 44.92± SD9.9). according to job nature the most affected are waiters (33.4%) then receptionist (31.2%) then housekeeping(23.0%). The majority (60%) of study subjects were overweight and (23%) were obese. According to anatomical region affected assessed by Nordic questionnaire of MSDs, revealed that (17.4%) of study subjects had spine complaint (7.6%) had joints and(0.2%) had both spine and joints complaint. Overall Prevalence of musculoskeletal disorders among hotel workers was 25.2%. Regional affection were lower back (14.44%), right knee (5.02%),left knee (4.16%),right lower leg (3.18%),neck(2.2%),left lower leg (1.35%),right shoulder (1.1%),left shoulder(0.61%),right forearm(0.37%),right thigh (0.37%),right upper arm (0.37%),left thigh (0.37%),hip (0.24%), right wrist(0.24%),left wrist (0.12)%,left forearm (0.12%). the risk factors for low back pain is obesity (body mass index above 30) odds ratio OR 3.3 (95% CI:2.16-5.03)followed by duration of symptoms more than 10 years OR 3.04(95% CI:2.16-5.13).and the age more than 40 years OR 2.9(95% CI: 1.67-5.04). ***Conclusion:*** There was no regular weekly exercise to keep the workers fit which will leads to reduce obesity that helps in weight reduction which is a major contributor in MSDs development. There was. no periodic workers medical examination is which will help in early detection of early signs of MSDs. There was no ergonomic intervention for making the work station suitable for the work performed, There was no health education session delivered for MSDs awareness. No flexibility in changing duty station if requested by workers. Increased staffing ,enforced break time and reasonable quotasThere was no work environment improvement through periodic inspection by safety department or clinic doctor. Increase the awareness of MSDs burden through schools health education, for adopting healthy life style from childhood period, through mass media, and national awareness campaigns.

Introduction

The term musculoskeletal disorders (MSDs) refers to conditions that involve the nerves, tendons, muscles, and supporting structures of the body.Specific attention is given to analyzing the weight of the evidence for the strength of the association between these disorders and work factors According to the Bureau of Labor Statistics (BLS) of the U.S. Department of Labor ***(International journal of occupation, safety and ergonomics, 2009)***.

Musculoskeletal disorders (MSDs) remain the most common occupational disease in the European Union and workers in all sectors and occupations can be affected ***(Vanwonterghem, 1996).***

At present, MSDs are one of the most important problems ergonomists encounter in the workplace all over the world. In many countries, prevention of work-related musculoskeletal disorders (WMSDs) has become a national priority ***(Spielholz et al., 2001).***

The estimated rate of musculoskeletal disorders caused or made worse by work across the North West was not significantly different to the England average (1,700 and 1,810 respectively per 100,000 people working). This equates to an estimated prevalence of 474,000 people across England in 2007/08 who said that they were suffering from a musculoskeletal disorder ***(http://www.hse.gov._uk/msd/index.htm, 2009).***

A good posture is one that is comfortable and in which the joints are naturally aligned — the neutral body posture. Working with the body in a neutral position reduces stress and strain on the muscles, tendons, and skeletal system, and therefore reduces the risk of workers developing MSDs.

Manual handling of loads (MHL) includes lifting, holding, putting down, pushing, pulling, carrying and moving a load. It is one of the major causes of musculoskeletal disorders (MSDs).Work-related neck and upper limb disorders (WRULDs) are impairments of bodily structures such as to a tendon, nerve, muscle, joint, bursa or the localized blood circulation system. Principally, they are caused by the performance of work and by the effects of the immediate environment where that work is carried out ***(European Agency for Safety and Health at Work, 2008).***

The growing hotel, restaurant and catering sector (HORECA) employs more than 7.8 million, mostly young and low skilled people in the European Union. Typically, employees work long, irregular hours doing physically demanding work. The risks to workers' safety and health are many and varied, resulting from prolonged standing, carrying and lifting, exposure to high noise levels and working in too hot or cold environments. Workers also suffer cuts and burns, trips, slips and falls, and come into contact with dangerous substances. The work can be monotonous, stressful and draining. Nevertheless, employers and employees can work together to improve workplace safety and health .

Being responsible for occupational health clinics in some Egyptian five stars Hotels, the daily review of staff medical records, it has been observed that musculoskeletal disorders, is affecting large number of the staff, of both genders and all ages. Yearly reports revealed prevalence of 30 % of musculoskeletal disorders .in the medical clinic of Sheraton Cairo hotel among the working staff ***(Joanne, 2007).***

Despite the fact that Musculoskeletal disorders are preventable diseases, but in fact MSDs cases are progressively increasing and seldom chronic cases showing regression .this could be prevented if there is a program aiming to track the

number of workers who get sick or injured at the job. Identification of the kind of job that may cause health problem. finding of practical solution and makes recommendation to improve job safety. Fail to share new finding and recommendation between top management, human resources, workers, employer groups and health care providers ***(Joanne, 2007).***

Aim of the Study

1- To study the frequency and pattern of work related musculoskeletal disorders among five stars Egyptian Hotel workers.

2- To determine the risk factors of work related musculoskeletal disorders among a five stars Egyptian Hotel workers.

Chapter 1
Background of Musculoskeletal disorders

Musculoskeletal disorders are not a recent problem. Bernardino Ramazzini (1633-1714), an Italian physician who is considered as the father of occupational health investigated the role of work in determining diseases ***(Franco, 2004).***

I. Definition

Musculoskeletal disorders is a broad umbrella term that including a wide variety of disorders involving the bones joints and the soft tissues involved in moving those joints. It involves the muscles, ligaments, tendons and joints. The term includes such diverse problems as low back pain, repetitive strain injuries of various sorts and joint injuries***(.Silman 1996).***

Work-related musculoskeletal disorders (WMSDs) are a group of painful disorders of muscles, tendons, and nerves. Carpal tunnel syndrome, tendonitis, thoracic outlet syndrome, and tension neck syndrome are examples. Work activities, which are frequent and repetitive, or activities with awkward postures cause these disorders, which may be painful during work or at rest. ***(Canadian Centre for Occupational Health and Saftey,2005).***

Almost all work requires the use of the arms and hands. Therefore, most WMSD affect the hands, wrists, elbows, neck, and shoulders. Work using the legs can lead to WMSD of the legs, hips, ankles, and feet. Some back problems also result from repetitive activities.

WMSDs are very difficult to define within traditional disease classifications. These disorders have received many names, such as:

- Repetitive motion injuries

- Repetitive strain injuries
- Cumulative trauma disorders
- Occupational cervicobrachial disorders
- Overuse syndrome
- Regional musculoskeletal disorders
- Soft tissue disorders

(www.ccohs.ca,Canadian Center for Occupational Health and Safety 2005)

II. Public Health Concern

Musculoskeletal disorders are considered a major health problem affecting employees as well as employers.

MSDs affect the workers' "quality of life" ***(Woolf & Pfleger, 2003)*** by feeling discomfort, ill health condition and psychological impact in terms of low morale, dissatisfaction and reduced productivity ***(Miller & Haslam, 2009).***

The rates of MSDs have escalated over time, creating a public health concern. There was a rapid rise in injuries during 1980s to mid 1990s. This rise was due to increase in manufacturing and service jobs. It was also due to increased productivity expectations of workers within those jobs. During this same period of time, there was also an increased awareness of the signs and symptoms that are commonly associated with MSDs by workers and medical staff. This increased awareness contributed to an increase in the reporting of muscloskeletal disorders cases ***(Michelson 2004).***

IIa. Incidence of musculoskeletal disorders

One approach to quantifying the population disease frequency during a specific time interval is to compute the number of newly occurring or incident cases during the interval of study per number of person-year of observation.

The quantity is a disease incidence rate e.g. the annual incidence rate for low back pain is estimated to be around 1-5% ***(Hashemi et al. 1997).***

IIb. Prevalence of musculoskeletal disorders

Prevelance measures denote the number of cases of disese that exist in the population e.g. Lifetime prevalence rates of low back pain up to 85-90% have been reported ***(Von Korff et al. 1988).***

IIc. Chronicty,cost and quality of life affection

The differing socioeconomic factors of populations in different countries influence the results of the magnitude of various work related musculoskeletal disorders. (***Andersson 1998).***

Traditionally the cost of occupational diseases has been based on the direct cost (health care and indemnity costs). The indirect costs are usually estimated as part of the direct cost. This is true in developed countries where systematic information is available. However, in the developing countries such information is hard to obtain and to estimate.***(Weahrer G. 2005).***

Waehrer, Leigh, and Miller 1997 have proposed three categories for calculating the cost of occupational injuries and illnesses that could be used to calculate the cost of work related musculoskeletal disorders.

These categories are:

- Direct cost

  which includes payments for hospital, physician, and allied health services, rehabilitation, nursing home care, home health care, medical equipment, burial cost, insurance administrative

cost for medical claims, mental health treatment, police, fire emergency transport, coroner services, and property damage.

- Indirect cost

(a) Victim productivity losses, which include wage losses and household production losses.
(b) Employer productivity losses, which include recruiting and training replacements for injuries workers.
(c) Administrative cost, which includes administering a workers' compensation program.

Unfortunately, productivity losses are very hard to calculate and include productivity losses due to absenteeism (interruption of the production process) and the temporary or permanent replacement of workers. Therefore, it is important to include the decline in attractiveness for customers and for new personnel.

Presenteeism :One important indirect cost that is usually forgotten is the "presenteeism" which is defined by Berry, Mirabito, and Berwick as "when the employees are present for work but are less productive because they are ill" . ***(Berry L. et al., 2004).***

In some multinational and big companies in the USA, presenteeism is the largest health related economic cost, ahead of absenteeism, health insurance, and workers' compensation. Unfortunately, it is hard to identify and calculate this cost at workplaces.

- Quality-of-life cost

i.e., value attributed to pain and suffering by victims and families. Usually the indirect cost of occupational diseases and injuries is estimated as part of the direct cost, and the quality-of-life cost (social cost) is excluded from the estimates and calculations.

III. Structure and Function of the Musculoskeletal System

III. The basic composition and function of the musculoskeletal system. The skeletal system includes the bones of the skeleton and the cartilages, ligaments, and other connective tissue that stabilize or connect the bones. In addition to supporting the weight of the body, bones work together with muscles to maintain body position and to produce controlled, precise movements. Without the skeleton to pull against, contracting muscle fibers could not make us sit, stand, walk, or run.

1. Bones

There are 206 bones in the adult body. The bones of the body perform five main functions.

- **Provide support for the body —** The skeletal system provides structural support for the entire body. Individual bones or groups of bones provide a framework for the attachment of soft tissues and organs.

- **Store minerals and lipids —** Calcium is the most abundant mineral in the body. (Ninety-nine percent of the body's calcium is found in the skeleton.) The calcium salts of bone are a valuable mineral reserve that maintains normal concentrations of calcium and phosphate ions in body fluids. The bones of the skeleton also store energy reserves as lipids in areas filled with yellow marrow.

- **Produce blood cells —** Red blood cells, white blood cells, and other blood elements are produced in the red marrow, which fills the internal cavities of many bones.

- **Protect body organs —** Many soft tissues and organs are surrounded by skeletal elements. For example, the rib cage protects the heart and lungs, the skull protects the brain,

the vertebrae protect the spinal cord, and the pelvis protects the delicate reproductive organs.

- **Provide leverage and movement —** Many bones function as levers that can change the magnitude and direction of the forces generated by muscles.

2.Joints — These are where two bones interconnect. Each joint reflects a compromise between stability and range of motion. For example, the bones of the skull are very stable but immobile, whereas the shoulder joint allows for a full range of motion but is a relatively unstable joint.

3.Tendons — These attach muscle to bone.

4.Ligaments — These attach bone to bone.

5.Skeletal muscles — These muscles contract to pull on tendons and move the bones of the skeleton. In addition to producing skeletal movement, muscles also maintain posture and body position, support soft tissues, guard entrances and exits to the digestive and urinary tracts, and maintain body temperature.

6.Nerves — Nerves control the contraction of skeletal muscles, interprets sensory information, and coordinates the activities of the body's organ systems.

7.Cartilage — This is a type of connective tissue. It is a firm gel-like substance. The body contains three major types of cartilage: hyaline cartilage, elastic cartilage, and fibrocartilage.

(www.Cleveland Clinic, 2009).

III.ii. Mechanical concepts and principles that underlie human movement.

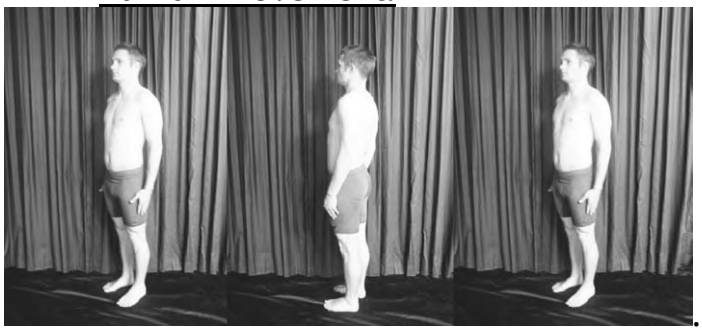

Figure A Cardinal planes and axes of movement: (a) sagittal plane and frontal axis; (b) frontal plane and sagittal axis;(c) horizontal plane and vertical axis. ***(Bartlett 2007)***

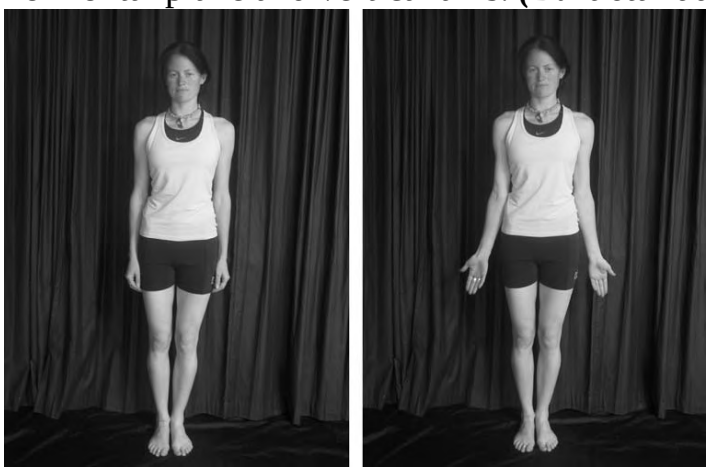

Figure B Reference postures (positions): (a) fundamental and (b) anatomical. ***(Bartlett 2007)***

Figure C Movement of the forearm about the elbow joint in the sagittal plane – flexion and extension. ***(Bartlett 2007)***

Figure D Abduction and adduction of the arm about the shoulder joint and the thigh about the hip joint. ***(Bartlett 2007)***

Figure E Medial (Internal) and lateral (External) rotation of the arm about the shoulder joint. ***(Bartlett 2007)***

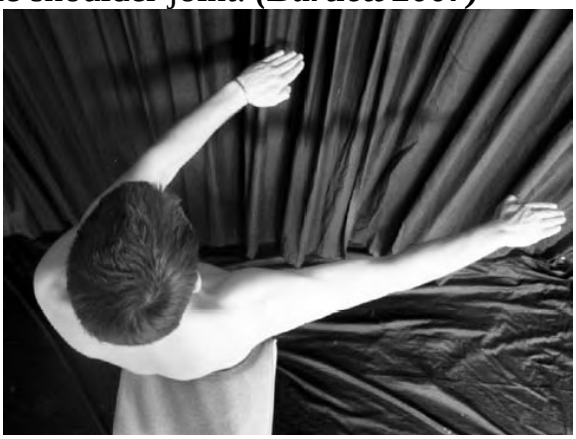

Figure F Horizontal flexion and extension of the abducted arm about shoulder joint. ***(Bartlett 2007)***

Movements of the human musculoskeletal system

The two positions used are the fundamental and anatomical reference positions. With the exception of the forearms and hands, the fundamental and anatomical reference positions are the same. The fundamental position is similar to a 'stand to attention'.

The forearm is in its neutral position, neither pronated ('turned in') nor supinated ('turned out').

In the anatomical position the forearm has been rotated from the neutral position so that the palm of the hand faces forwards. Movements of the hand and fingers are defined from