CHAPTER 1

INTRODUCTION

1.1 GENERAL

Work related musculoskeletal disorders are recognized as leading causes of significant human suffering, loss of productivity and economic burdens on society. However, there are no reliable estimates of the number of work related musculoskeletal disorders (OSH 2005). The data available are limited and does not represent the magnitude of the problem because there is a great deal of under-reporting of these types of injuries by the library professionals.

Work related musculoskeletal disorders are a group of painful disorders of muscles, tendons and nerves. Carpal tunnel syndrome, tendonitis, thoracic outlet syndrome and tension neck syndrome are examples (Mekhora, K. and Liston, C., 2000). Work activities which are frequent and repetitive or activities with awkward postures (Figure 1.1) cause these disorders which may be painful during work.
1.2 MEANING OF MUSCULOSKELETAL DISORDERS

Musculoskeletal disorders are injuries that affect muscles, tendons, ligaments and nerves. These injuries can develop when the same muscles are used over and over again or for a long time without taking time to rest. The chance of getting the type of injury increases, if the force exerted is high and or the job requires an awkward posture. Musculoskeletal disorders include back pain, carpal tunnel syndrome, tendonitis and tenosynovitis. Preventing musculoskeletal disorders among library professionals requires recognition, assessment and control of the hazards.

1.3 MEANING OF TENDON

A tendon is a tough yet flexible band of fibrous tissue. The tendon is the structure in our body that connects muscles to the bones. The skeletal muscles in our body are responsible for moving our bones, enable to walk, jump and lift and move in many ways and the muscle contracts it pulls on a
bone to cause movements. The structure that transmits the force of the muscle contraction to the bone is called a tendon.

1.4 MEANING OF LIGAMENTS

Ligaments are sheet or band of tough fibrous tissues connecting bones or cartilages or supporting muscles or organs.

1.5 MEANING OF CARPAL TUNNEL SYNDROME

Carpal tunnel syndrome is the swelling and entrapment of the median nerve in the wrist. Almost all work in the libraries requires the use of the arms and hands. Therefore, most work related musculoskeletal disorder affects the hands, wrists, elbows, neck and shoulders. Work using the legs can lead to work related musculoskeletal disorder of the legs, hips, ankles and feet. Some back problems also result from repetitive activities performed by the library professionals.

1.6 SYMPTOMS OF MUSCULOSKELETAL DISORDERS

Symptoms associated with musculoskeletal disorders among library professionals may include:

- Pain from movement, from pressure or from exposure to cold or vibration.
- Change in skin colour from exposure to cold or vibration.
- Numbness or tingling in an arm, leg or finger, especially in the fingertips at night.
- Decreased range of motion in the joints.
- Decreased grip strength.
- Swelling of a joint or part of the arm, hand, finger or leg.
Fatigue or difficulty in sustaining performance, particularly of small muscle groups

The general term musculoskeletal disorder is not a medical diagnosis. Musculoskeletal disorders primarily affect muscles, tendons, ligaments, nerves and small blood vessels. Examples of specific types of disorders include myalgia muscle pain, chronic myofascial pain syndrome and chronic pain in the muscles.

1.7 OCCURRENCE OF MUSCULOSKELETAL DISORDERS

- Musculoskeletal disorder occurs from a single event or result from the build up of tissue damage from many small injuries or micro traumas.
- Take weeks, months or years to develop.
- Produce no symptoms or exhibit no findings on medical tests in their early stages
- Associated with contributing factors present in work tasks and in home or recreational activities.
- Differ in symptoms and severity from individual to individual even though their work tasks or other activities are similar.

1.8 WORK RELATED MUSCULOSKELETAL DISORDERS

PROGRESS IN STAGES FROM MILD TO SEVERE

Early stage: Aching and tiredness of the affected limb occur during the work shift but disappear at night and during days of work. No reduction of work performance.
**Intermediate stage:** Aching and tiredness occur early in the work shift and persist at night. There is reduced capacity for repetitive work.

**Late stage:** Aching, fatigue and weakness persist at rest. There is also inability to sleep and to perform light duties.

Not everyone goes through these stages in the same way. In fact, it may be difficult to say exactly when one stage ends and the next begins. The first pain is a signal that the muscles and tendons should rest and recover otherwise, an injury can become longstanding and sometimes, irreversible. The earlier the library professionals recognize symptoms, the quicker they should respond to them.

Musculoskeletal disorders occur as a result of poor ergonomic conditions for both women and men in libraries. Women often work in conditions associated with musculoskeletal disorders. Work requiring awkward postures, monotonous and repetitive tasks, inappropriate work methods and organization and more often commonly recognised heavy lifting were the causes for musculoskeletal disorders among library professionals.

1.9 LIBRARY TASKS AND EQUIPMENT FOUND TO CONTRIBUTE INJURIES

- Repetitious handling of heavy books carrying, lifting and check out of materials
- Extensive use of the computer and keyboard
- Unnecessary handling of tasks such as relocating books to different shelves, when shelves are overfull
- Taking a heavier load than necessary when moving or recovering materials
Carrying a load of books in one hand and using the other hand to shelve

Using equipment that is difficult to operate, such as book trucks that are hard to push and bookends that do not slide easily

Excessive reaches and awkward postures, due to poor equipment design and crowded work area

1.10 MUSCULOSKELETAL DISORDERS IN THE OFFICE TRENDS

Men and women both are susceptible to injury, women develop carpal tunnel syndrome (CTS) three times more often than men according to a Mayo Clinic women’s publication (Mayo Clinic Health Information News, April 10, 1998). The reason is unknown but, researchers believe hormonal changes may be partly to blame oral contraceptives or going through menopause may make women more susceptible to injury.

How many office workers suffer from musculoskeletal disorders is certainly the question everyone wants answered, but it seems no two researchers agree on a number. Estimates for individual companies run from as low as zero percent of all office employees to as high as 40 percent. The true figure for the total office worker population is no doubt somewhere in the middle, probably well below 10 percent. With almost any kind of illness, there is a background rate of occurrence in the general populations. In other words, a certain number of people get musculoskeletal disorders for non work reasons, because of predispositions, activities such as sports, weekend carpentry, gardening, driving or perhaps even because of the position of their hands when sleeping. Thus, any company can expect a certain number of musculoskeletal disorder cases among their employees even if all
musculoskeletal disorder risks are eliminated at work. Background rates are important in assessing other health risks as well.

1.11 CAUSES OF WORK RELATED MUSCULOSKELETAL DISORDERS

Research is still far from complete on exactly what causes work related musculoskeletal disorders among library professionals. Organizations with work related musculoskeletal disorder problems are finding that they may occur in one section but not in another, even when both sections have the same furniture, job activities and electronic equipment. Musculoskeletal disorders are caused by a complex set of conditions having to do with job activities, individual physiology, the work environment, technology, management and sociology, as well as nonworking activities and environments.

1.12 LIBRARY TASKS RESEMBLES THOSE OF INDUSTRIAL WORK

It may be a surprise to all that library professionals carry out many library tasks that resembles those of industrial work. Library work features elements of heavy lifting, pushing and pulling, repetitive hand, arm and shoulder motions, skilled decision-making, concentrated interactions with technology and requirements for communication with the public. The weight and volume of materials that are manually handled can be likened to combine assembly and warehousing functions.

In the past, libraries were designed more for their aesthetic and service functions, rather than with an industrial process in mind. Given the increasing demand for information in today's world, library design is forced to embrace tile technologies and materials flow considerations. Libraries seek to
move materials as quickly and efficiently as possible by utilizing new technologies and processes and helping to reduce the physical stresses and strains experienced by employees.

1.13 IDENTIFICATION OF THE AREAS WHERE JOB DESIGN IMPROVEMENTS WERE MOST NEEDED

It was important to first obtain information from library staff, through questionnaire analysis, about pain, fatigue and injury in various tasks and jobs. This was useful for identifying the areas where job design improvements were most needed. A series of focus group sessions with library staff from different areas of the library yielded further information about job stresses and started seeking of solutions through a brainstorming process. Staff became further involved in the study through the formation of small groups. The groups along with the researcher were given the task of evaluating solutions and making recommendations to the management. A major outcome of the work was a series of design specifications to be used by architects when planning new libraries.

Library professionals performing tasks that have elements of high repetition, forceful motions or awkward postures are prone to muscular injuries especially ones that affect to the back, hands, wrists and arms.

1.14 ERGONOMIC IMPROVEMENTS

Many libraries suffer from ongoing budget restraint and financial strain, sometimes making ideal ergonomic design difficult. However, simply by understanding the job stresses and seeking systematic methods for reducing them, many ergonomic improvements can be realized without major financial outlay. With the pace of today's work, it is necessary to apply ergonomics to daily tasks. Poorly designed jobs result in employee stress,
injuries, accidents, inefficiencies, productivity losses and errors, all of which cost the individual, the organization and the society.

When library building to be constructed or expanded, it is the ideal and most cost-effective time to consider ergonomic improvements early in the design stage. Even if this is not the case, however, there are many ways these guidelines can help to make improvements to equipment design, work methods and work organization within the library. All these details are of real help to library professionals.

Figure 1.2 Ergonomic workstation
Source: www.health.com/health/library

1. The top of the monitor screen is at eye level.
2. A telephone headset helps library professionals to avoid awkward positions while talking and doing other tasks, such as typing.
3. A wrist pad at the bottom of the keyboard helps keep the wrists in a neutral, almost straight position during brief rests from typing.

4. If the feet do not rest flat on the floor when you sit in your chair, a footrest raises the feet to reduce pressure on the lower back.

5. Armrests are adjusted so that the elbows are close to the side of the body and bent at an angle between 90 and 100 degrees.

6. An adjustable chair has a height adjustment to allow the feet to rest on the floor or on a footrest. Also the back of the chair adjusts for different positions

1.15 REPORTING MUSCULOSKELETAL DISORDERS IN THE EARLY STAGES

The media’s attention to musculoskeletal disorders has made many employers nervous about preventing an outbreak at their organization. Library professionals have certainly become more aware of musculoskeletal disorders, too. A few sceptics say this “hyper-awareness” has resulted in paranoia or even abuse of the system, with people reporting musculoskeletal disorders at the first sign of simple work related fatigue. Others applaud the publicity, noting that when employees have good information on the causes and symptoms of musculoskeletal disorders, they could end up saving everyone money and hassle by reporting musculoskeletal disorders in the early stages.
1.16 IDENTIFICATION OF HAZARDS OF MUSCULOSKELETAL DISORDERS

Musculoskeletal disorder hazards (force, posture, repetition, duration, etc.) must be identified in the work place and the tasks or jobs with these elements must be documented. Workplace in the library should be reviewed and workers and management about the work processes must be interviewed. Attention must be paid while designing the workstation, equipment and tools, manual material handling, environmental factors, work organization and documentation of previously reported hazards.

1.17 FACTORS CONTRIBUTING TO MUSCULOSKELETAL DISORDER

1.17.1 Workstation design

- Work surface heights that are not at appropriate height for workers in the library
- Excessive reaching (chest level, above shoulder or below waist), possibly while applying force
- Inappropriate seating

1.17.2 Equipment and tools

- Use of awkward or static body postures
- Hard to reach controls that require force to operate
- Constant or excessive hand-arm or whole body vibration
- Awkward grip
- Wrist in bent position while using tools
- Weight of tool or equipment
- Trigger requires force to operate
- Use requires force

1.17.3 Environmental factors

- Cold temperatures
- Uncomfortable or harsh lighting

1.17.4 Work organization

- Large volume (especially in cases of piecework)
- Inadequate or infrequent breaks
- Lack of control by individual over speed of work
- Lack of task variation
- Inadequate training on safe work procedures and proper use of tools/equipment

1.18 DOCUMENTATION OF PREVIOUSLY REPORTED HAZARDS

- Complaints made by library professionals or health office visits may signal a problem area
- Workplace inspections

1.18.1 Assessment of the degree of hazard

Determination of the degree of hazard by assessing the following activities in the Institution:
- Repetition - frequency, speed and duration of the repetitive task of the library professionals
- Posture - neutral, awkward, duration of static postures
- Force - what is the force required to perform the task and the duration the force exerted before a break

1.18.2 Control hazards, preferably at their source

- Mechanize a repetitive task or process
- Design workstations and work processes using ergonomic principles
- Use well maintained tools and equipment that decrease force or awkward position
- Provide lifting devices to eliminate heavy lifting
- Ensure that all employees receive comprehensive training on how to do their job safely.

1.19 STRESS SYMPTOMS

Stress at work is so common that almost anyone who is employed is affected by workplace stress. Stress at work happens when the library professional has to meet several demands and he is unable to meet those demands due to his personal constraints or unrealistic nature of demands. In simple words, when the demands of the job do not match with an individual's delivery system, then he or she has to suffer from stress.

The consequences of workplace stress are the same as of any other stress. They result in negativity on both physical and emotional planes. Every individual has different capacity and resources to combat stress. Therefore the
response to pressures at workplace also varies from individual to individual depending on their internal stress-handling systems.

**1.20 CAUSES FOR WORK RELATED STRESS**

Work stress can result from a variety of situations. Heavy workload can make library professionals feel that too much of work is being passed on to him. This will make him hold grudges against his superiors and co-workers and he feels that he is exploited.

When less work is assigned to him may make him feel unimportant and his role may not be meaningful to the organization. In this case, the worker may keep working in constant fear.

Work shift timings may not agree with the library professional’s biological system, social lifestyle or family commitments. Having many supervisors/managers in the same department can generate conflicts. This ultimately leaves the worker confused.

Status quo at the workplace for several months may make the library professionals feel that the organization is going nowhere and he will be stuck in the same position and that he has no scope for improvement. The management style also plays a part in contributing to worker stress. For example, if the management follows a hire-and-fire policy, then it dampens the morale of any worker.

A library professional may be sensitive to the weather conditions. Even such external factors can cause stress to the worker as he goes about doing his job. Physical or psychological ailments given below can also make a worker's performance lead to stress.
1.21 SYMPTOMS AND EFFECTS OF WORKPLACE STRESS

1.21.1 Physical symptoms

Headaches, shortness of breath, increased metabolic rate, high blood pressure, indigestion, constipation, fatigue, increased cholesterol, increased stomach acids, stomach ulcers, etc are the symptoms of physical stress among library professionals.

1.21.2 Psychological symptoms

Anxiety, feeling of helplessness, irritability, depression, lack of concentration, mood swings, extreme sensitivity, etc. are the symptoms of psychological stress among library professionals.

1.21.3 Behavioural symptoms

Appetite loss, procrastinating attitude, impatience, increased smoking, alcoholism, absenteeism, poor personal hygiene, problems in interpersonal relations with co-workers and superiors and similar drawbacks fall under this category.

1.22 STRESS MANAGEMENT AT WORKPLACE

Library professionals contribute directly to the service of an institution and in order to be service provider they should not be stressed. Chances are that a stressed worker will contribute negatively to institutions fame and a group of stressed workers can result in erosion of service oriented hence, stress management at workplace assumes a significant role.

Management should have plans and strategies to help library professionals to manage stress. One of the biggest causes of workplace stress is the job itself. The management should make sure to reconcile the job
profile with the employee's profile. Job rotation, matching with the worker's physical and emotional capacity and resources will go a long way in reducing stress.

1.23  WORK TASKS INVOLVE MOVEMENT AND PHYSICAL EXERTION

- When repeated movements, forceful exertions and other aspects of work tasks in library may lead to fatigue, symptoms of musculoskeletal disorders and injuries
- When workplace problems are occurring (i.e., the reasons or root causes)

1.24  AWARENESS OF WORKPLACE AND PERSONAL FACTORS CONTRIBUTING TO MUSCULOSKELETAL DISORDERS

Contributing factors are aspects of work tasks which can lead to fatigue, musculoskeletal disorder symptoms and injuries or other types of problems among library professionals. These factors may be present in one or more of the tasks employees must perform to accomplish their jobs. The contributing factors for musculoskeletal disorders include:

- Awkward postures
- Repetitive motions
- Forceful exertions
- Pressure points (e.g., local contact stress)
- Personal factors
There are also environmental factors associated with the workplace which can cause problems. Extreme high temperatures can increase the rate at which the body will fatigue. Alternatively, exposure of the hands and feet to cold temperatures can decrease blood flow, muscle strength and manual dexterity. These conditions can also cause excessive grip force to be applied to tool handles or objects. Another problem may be caused by tools or equipment that exhausts cold or hot air directly onto the operator. In addition, the lighting in a workplace may be too dark or too bright for the work task. This may result in employees assuming awkward postures to accomplish work tasks and a loss of product quality.

The amount of time in a workday that library professionals spend performing physically demanding or repetitive tasks (i.e., the duration of tasks) is of concern. Both the total time per work shift and the length of uninterrupted periods of work can be significant in contributing to problems. As repetitive motions, forceful exertions and other contributing factors increase in work tasks and the recovery time needed to help reduce fatigue and prevent injury.

1.24.1 Awkward postures

Awkward postures can make work tasks more physically demanding, by increasing the exertion required from smaller muscle groups and preventing the stronger, larger muscle groups from working at maximum efficiencies. The increased exertion from the weaker, smaller muscle groups impairs blood flow and increases the rate of fatigue.

Awkward postures typically include repeated or prolonged reaching, twisting, bending, working overhead, kneeling, squatting and holding fixed positions or pinch grips. They may affect various parts of the body such as the hands, wrists, arms, shoulders, neck, back and knees. The
effects of awkward postures are worse if work tasks also involve repetitive motions or forceful exertions. Awkward postures may be caused by using poorly designed or arranged workstations, tools and equipment and poor work practices in the library.

1.24.2 Repetitive motions

In repetitive work the same types of motions are performed over and over again using the same muscles, tendons or joints. The amount of repetition can be affected by the pace of work, the recovery time provided and the amount of variety in work tasks. The pace of work may be controlled by the employee performing the task, machines, other employees or administrative procedures. Examples of jobs involving machine-controlled pace include working on assembly, packaging or quality-control lines. Work tasks linked to performance or incentives are examples of administratively controlled pace.

The risk of injury is greater when repetitious jobs involve awkward posture or forceful exertions. Injuries may also develop when highly repetitive jobs are combined with low-force exertions, such as in light assembly tasks involving the hands, wrists, elbows and shoulders. For example, having to grip a cutting or trimming tool throughout the entire work task without being able to set it down momentarily to rest the hand.

1.24.3 Forceful exertions

Force is the amount of muscular effort expended to perform work. Exerting large amounts of force can result in fatigue and physical damage to the body. The amount of force exerted when moving or handling materials, tools or objects depends on a combination of factors, including the:

- Load shape, weight, dimensions and bulkiness
Grip type, position and friction characteristics

Amount of effort required to start and stop the load when moving it (i.e., how physically demanding it is to accelerate or decelerate the load)

Length of time continuous force is applied by the muscles (e.g., the amount of time the load or object is held, carried or handled without a muscle relaxation break)

Number of times the load is handled per hour or work shift

Amount of associated vibration

Body posture used

Resistance associated with moving the load (e.g., over rough flooring or with poorly maintained equipment)

Duration of the task over the work shift

Environmental temperature

Amount of rotational force (e.g., torque from tools or equipment)

1.24.4 Pressure points

Pressure points result from the body pressing against hard or sharp surfaces. Certain areas of the body are more susceptible because nerves, tendons and blood vessels are close to the skin and underlying bones. These areas include the sides of the fingers, palms, wrists and forearms, elbows and the knees.

1.24.5 Personal factors

Personal factors, such as level of physical fitness, weight, diet, habits and lifestyle, may also affect the development of musculoskeletal
disorders. Various medical conditions may predispose individuals to musculoskeletal disorders or make the disorders worse. Examples include:

- Arthritis
- Pregnancy
- Bone and muscle conditions
- Previous trauma
- Contraceptive use
- Thyroid problems
- Diabetes mellitus

In addition, psychosocial factors may have an impact on musculoskeletal disorders. These factors include:

- Level of stress
- Level of job security and satisfaction
- Amount of autonomy on the job (e.g., degree of control over the arrangement of work areas or the pace of work)

1.25 ERGONOMIC JOB ANALYSIS METHODS

There are different types of ergonomics job analysis methods. These methods consist of various techniques for taking a systematic look at jobs and work tasks (www.doa.state.wi.us/docview.asp). They help to decide which jobs and specific tasks may contribute to problems. If the problem is identified through the symptoms, it is easier to come up with ideas for making improvements. Some methods are relatively simple and others require detailed analysis and sophisticated equipment. Checklists are generally a simpler, less comprehensive type of ergonomics job analysis method. More comprehensive methods break jobs down into specific movements or use
other complicated techniques. Ergonomics job analysis methods also vary according to what types of work activities they address.

1.26 MANAGEMENT OF STRESS

- The job design should place reasonable responsibilities on the worker's. The job should not be over-demanding and vice versa.

- The worker should be entrusted with a variety of works so that he does not feel bored.

- The worker should be entrusted with some form of decision-making because that will make him feel that he is playing a significant role in the organization.

- The job should have potential for growth.

- A scheme for productivity awards or incentives should be in place to motivate the workers.

- The workplace should not be noisy.

1.27 GUIDELINES FOR LIBRARY PROFESSIONALS TO REDUCE MUSCULOSKELETAL DISORDERS

- Before approaching a task, the library professional should plan the flow of work and organize himself before starting the actual work.

- Laughter is said to be the best medicine. Library professional should try to see the humour element in any situation and
laugh it off rather than allowing an unpleasant situation to get to them.

- When a library professional feels stressed he should try out some deep-breathing exercises.
- Library professionals should keep themselves fit. A fit body leads to an agile mind that can easily cope with stress.
- An unbalanced diet causes health problems among library professionals that may percolate to the workplace. Intake of vitamins and minerals will also help.
- The situation that is causing stress must be analysed and new solutions must be tried.

Jobs are made up of tasks. Tasks are the things library professionals must do to accomplish their jobs. Some jobs may contain only a single task, but many jobs are made up of multiple tasks. The different tasks performed by the library professionals and design guidelines for libraries will be helpful for the effective functioning of the libraries. The major design concern, design concept and the mechanisms with specific examples are as follows:

The major design concern for inefficient flow of material is to carefully plan the layout of the equipment and sequences of tasks, the specific examples are materials can be rough sorted immediately and automatically using optical character recognition, when they are returned to the library. For arrival of new materials and movement of material between branches, consider mechanical aides, such as computerised tube system, electric track
vehicles, vertical and horizontal conveyors, automated guided vehicle systems and rollers.

The excessive handling of books and other materials by library professionals can be planned by reducing the number of steps involved in a process for example combining bar-coding and sensitizing of materials into one step, automated sorting of books upon their return should be linked to a mechanical materials moving system, placing barcode on the outside of books and have patrons. Pick up due date information to eliminate the opening and closing of books and consider the option of patron’s self-checkout.

Lack of space for both storage and movement of materials can be avoided by providing adequate space and flexibility for a variety of tasks and for the growth of the collection and number of users. Leave one waist height shelf 1/3 empty in each bay for book returns throughout the life of the building, and by providing space at the end of bays for trucks or bins.

Long periods of time being spent in awkward static work postures, lack of opportunity to vary postures and excessive reaching and bending can be avoided by designing the workstations to accommodate a range of adult males and females and allow for the accommodation of various positions, foot rests and task lamps should be provided.

Areas of the library and library materials should be easy to locate and identity for both patrons and staff this can be achieved by placing the directional information as well as sorting information on collection materials, location of signs and information displayed on signs should facilitate directions to areas and facilities.
Careful consideration must be given to the type of work performed in each work area and when especially dealing with the public, the work station should be private and free from noise and disturbances.

1.27.1 **Job design**

Library professionals may ensure an optimal level of variety within jobs by:

1. Using a flexible scheduling system to bring in additional casual staff during peak load periods, avoiding prolonged periods of intensive materials handling.

2. Regularly rotating usually assigned tasks among staff during each shift (task rotation).

3. Regularly rotating tasks normally performed by library staff in a different category and assigning them to other staff members (job rotation).

In all cases, consideration of effective training and the wishes of the workers involved are of paramount importance.

1.27.2 **Flexible scheduling**

Peak load conditions create extreme increases in material flow. Libraries where full time staff members are responsible for the materials handling work should consider budgeting for additional casual staff to handle seasonal peaks. Libraries using primarily part-time or casual staff are better able to schedule around peak loads.

Library professionals may be scheduled to work during non public hours, such as early morning or late night, to perform concentrated tasks such
as computer work or shelving tasks, since the absence of patrons will make the work more efficient.

1.27.3 Task rotation

An ideal job description will encompass a wide range of tasks to allow for job variety and reduction of physical loads due to any single repetitive task. Task rotation can break up long periods of routine book handling in the library, for example.

1.27.4 Job rotation

Job rotation is advised for library professionals whose only tasks are those identified as potentially straining, such as shelving, extended computer use, circulation check-in and checkout and sorting and filing books. In a unionized environment, this may require specific negotiation regarding pay grades and job classifications.

A proper system of rotation involves careful design of tasks to ensure that subsequent tasks do not stress similar muscles and joints. Apart from a reduction in risk of injury and fatigue, rotation has other benefits:

- Decrease in mental monotony
- Increase in variety of work content
- Better knowledge and understanding of other operations
- Break in exposure to environmental factors such as draught and noise
- Increased job security, since workers are trained in several jobs
Recommendations for well-designed rotation include:

- Extensive discussions between all parties involved prior to job rotation
- Gradual increase in range of tasks
- Provision of adequate training in the various jobs
- Design of the rotation cycle geared toward the type of work and wishes of the workers involved

For some library workers who spend extended amounts of time with the users and report high levels of perceived job stress, a variety of tasks away from the users should be considered.

1.27.5 Pace of work

Pace of work determines the amount of time available for rest and recovery of the body between cycles of a particular task. The faster the pace, the less time is available and the higher the risk for work related musculoskeletal disorder. With higher stress level muscle tension arises causing fatigue and again increased risk for work related musculoskeletal disorder. Controlling the pace of work externally denies the worker the flexibility to determine their own work speed. It is a human characteristic to work at varying rates at different times of the day.

Work related musculoskeletal disorders do not happen as a result of a single accident or injury. Rather, they develop gradually as a result of repeated trauma. Excessive stretching of muscles and tendons can cause injuries that only last a short time. But repeated episodes of stretching causing
tissue inflammation can lead to long-lasting injury or musculoskeletal disorders.

1.28 LEGISLATION AND OCCUPATIONAL SAFETY

Legislation requires employers to protect their library professionals from hazards in the workplace. This includes hazards that could lead to musculoskeletal disorders. Employers also have an obligation to train their library professionals to perform their job safely. Workers have the right to know about those hazards and the right to participate in workplace health and safety efforts to prevent and eliminate those hazards.

1.29 NEED FOR THE STUDY

Work related musculoskeletal disorders are recognized as leading causes of significant human suffering, loss of productivity and economic burdens on society. Library professionals develop musculoskeletal disorders related to overuse of weak or improperly stretched muscles, tendon or ligaments. Strenuous daily vocational activities such as lifting or prolonged typing can cause musculoskeletal pain through constant stress on the musculoskeletal system. However, there are no reliable estimates of the number of work related musculoskeletal disorders in general and for the library professionals in particular. The data available are limited and does not represent the magnitude of the problem because there is a great deal of under reporting of these types of injuries. This study would be an eye opener in this direction; hence the present study was undertaken.
1.30 OBJECTIVES OF THE STUDY

The Study was undertaken in view of the following objectives:

- To find out the general health status of library professionals
- To identify the symptoms associated with work related musculoskeletal disorders among library professionals
- To find out the severity of the work related musculoskeletal disorders among library professionals
- To analyze the risk factors such as work station, work environment, body posture, job control, job demand, break time and other work related individual psycho social factors leading to musculoskeletal disorders among library professionals
- To suggest measures to overcome the musculoskeletal disorders among library professionals.

1.31 SCOPE AND LIMITATIONS OF THE STUDY

The scope of the study is limited to the identification of the symptoms for musculoskeletal disorders among professionals who are engaged in repetitive tasks and its aim is to bring awareness about musculoskeletal disorders among library professionals and methods that could be adopted to avoid them. The study is limited to the professionals who are working in Engineering College libraries affiliated to Anna University, Chennai. Public libraries, Special libraries and Arts and Science College libraries were not taken into consideration. However, the results can be
generalized since the nature of work remains same with all the library professionals.

1.3.2 ORGANISATION OF THE DISSERTATION

The first chapter dealt with the introduction about the topic and theoretical background including need for the study, objectives and scope of the study. Review of literature was the subject matter of the second chapter. Research design was dealt in the third chapter. The fourth chapter dealt with the analysis and interpretation of the data. Summary of findings and the conclusion of the research study were given in the last chapter.

The literature related to the present study is reviewed in the literature review.