I'm telling you, the next big thing is going to be ergonomics.

CHAPTER - I

INTRODUCTION
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Beauty culture has been the right hand of the Glamour industry. Today in India, beauty parlor field also offers jobs in small towns and older city areas. This is because even the housewife wants to look good for her family and for herself. Women from conservative families find no objection to work in this area, as they meet and handle only women. The work does not always require the worker to go out in public and work; women can have their own set-up right inside the home.

Looking the best has never been easy. It requires the perfect hairstyle, exquisite nails or the proper make-up to accent one’s coloring. Hair has been a center of attention since people first began to care about once appearance. Throughout history, a great deal of effort has gone into acquiring a fashionable hairstyle. Beauticians generally work in clean, pleasant surroundings with good lighting and comfortable temperatures. Their work is arduous and physically demanding because they have to be on their feet for hours at a time and work with their hands at shoulder level. Many Beauticians work more than 40 hours a week, including weekends, when beauty salons are busiest.

Task carried out by the beauticians are repetitive with bad postures for a long time. This can result in risks to the health & safety. Injuries associated with these risks may be unnoticed. Repetitive work is linked to problems of the neck, shoulder, elbow, wrist and hand.

Shute and Starr (1984) studied the effect of advanced furniture designed for VDT workstation. The study showed that there was a significant improvement of comfort and discomforts due to improvement in design that reduces risk at (Musculo-Skeletal Disorders) the neck, shoulder, upper arms, wrists and other parts
of the body. Further, repetition may interact with other risk factors (force, posture) to cause work-related Musculo-skeletal disorders (MSDs.)

Work Related Musculoskeletal Disorders (WRMSDs) are now recognized as a major occupational health problem and are linked to jobs that are repetitive, require high focus and require continuous or repeated extreme or bad postures (Jones, 1998).

Meyer et al., (1999), Miles et al., (1997) observed small-scale fresh vegetable market growers had of risk Musculo-skeletal injury associated with intensive manual labor. Work-related Musculo-skeletal disorders are the most widespread occupational health hazard facing all developing nations.

Osborn et al., (1990) surveyed prevalence of MSDs among dental hygienist and found that 68 per cent had pain for 12-month prevalence as compared to pain among 60 per cent of general dentists (Shugars et al., 1987). Kuorinka et al., (1987) found that the number of musculoskeletal symptoms was high among the operators as compared to other industrial workers. A notable result was that among 37 women working in the Down factory, 70 per cent reported symptoms of Carpal Tunnel Syndrome since the past 12 months in wrists / hands and 16 per cent women out of 37 has been operated under the diagnoses of Carpal Tunnel Syndrome (CTS). Ramazzini B. was the worldwide recognized “Father of occupational medicine”, (Rosen, 1993). He gave a wide personal contribution to the field by collecting his observations in the “De Morbis Artificum Diatriba” (Diseases of workers), (Franco, 1999).

Various occupations have associated occurrence of MSDs. A glance at Table I.1 gives a picture of the occurrence of MSDs in various occupations.
Table 1.1 Syllabus of workers whose diseases are covered in the "De Morbis Artificum Diatriba" (bold character identifies occupations associated with the occurrence of Musculoskeletal disorders)

<table>
<thead>
<tr>
<th>Apothecaries</th>
<th>Athletes</th>
<th>Bakers and millers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bathmen</td>
<td>Blacksmiths</td>
<td>Brick-makers</td>
</tr>
<tr>
<td><strong>Carpenters</strong></td>
<td>Cheese-makers</td>
<td>Chemists</td>
</tr>
<tr>
<td>Cleaners of cesspits</td>
<td>Confectioners</td>
<td><strong>Coppersmiths</strong></td>
</tr>
<tr>
<td>Corn-sifters and measures</td>
<td>Corpe-workers</td>
<td>Farmers</td>
</tr>
<tr>
<td><strong>Fishermen</strong></td>
<td>Fullers</td>
<td>Gilders</td>
</tr>
<tr>
<td>Glass-makers</td>
<td>Healers by inunction</td>
<td>Hemp flax, and silk-workers</td>
</tr>
<tr>
<td><strong>Horsemen</strong></td>
<td>Hunters</td>
<td>Laundresses</td>
</tr>
<tr>
<td>Lutestringers- makers</td>
<td>Mid-wives</td>
<td>Miners</td>
</tr>
<tr>
<td>Nurses</td>
<td>Oilmen</td>
<td>Painters</td>
</tr>
<tr>
<td>Plasterers and lime-workers</td>
<td>Porters</td>
<td>Potters</td>
</tr>
<tr>
<td><strong>Printers</strong></td>
<td>Razor and lancet grinders</td>
<td>Runners</td>
</tr>
<tr>
<td>Sailors and rowers</td>
<td>Salt-workers</td>
<td>Sedentary workers</td>
</tr>
<tr>
<td>Soap-makers</td>
<td>Soldiers</td>
<td>Starch-makers</td>
</tr>
<tr>
<td>Stone-cutters</td>
<td>Sulphur-workers</td>
<td>Tanners</td>
</tr>
<tr>
<td><strong>The learned</strong></td>
<td>Tinsmiths</td>
<td>Tabacco-workers</td>
</tr>
<tr>
<td>Vintners and brewers</td>
<td>Voice-trainers and Singers</td>
<td>Weavers</td>
</tr>
<tr>
<td><strong>Well-diggers</strong></td>
<td>Workers on minutes</td>
<td>Workers who stand objects</td>
</tr>
<tr>
<td>Writers and notaries</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Beauty parlor workers stand for long hours and work and thus their occupation is identified as occupation associated with occurrence of MSDs. An ergonomic approach is to obtain an adequate balance between worker's capabilities and work requirements.

**POSTURE:**

Posture and Movement play a key role in ergonomics. Poor posture or movement causes a variety of musculoskeletal disorders and illnesses. In recent years, Ergonomists have attempted to define postures, which minimize unnecessary static work and reduce the forces acting on the body.

Unnatural postures are considered to be the cause of disease among cobblers and tailors. Furthermore, copper smiths become humpbacked besides, from that continual stooping over the work” and the same occurs to gold smiths who hammer gold into the finest possible leaf”.

Dresen et al., (1995) studied the daily workload of 116 Dutch refuse collectors working with different methods and found that use of mini-containers, which were two wheeled devices, involved stressful postures with the trunk-flexed to an angle sometimes greater than 45° when pushing, or bent backwards although to a lesser extent when pulling. Trunk rotation and lateral bending also occurred when maneuvering the mini-container.

Back pain is a serious problem in the sedentary society, and researchers now believe that poor sitting posture is a major contributor to low back pain. Beyond back pain, physicians also believe that posture is an important factor in general health.
A National Health Interview (1988) survey reported that the agriculture fishing occupation group was the most likely to report daily exposures to all types of musculoskeletal injury hazards. When individuals working in production agriculture were separated from the agriculture forestry and fishing group, their back pain was in the top ten of all U.S. industry sub sectors (Guo et al., 1999).

Data from another NHIS follow-up study by Leigh and Fries (1992) reported that farming was the occupation most often associated with disability in females and the second most often in males.

Posture has long been thought of in terms of standing and sitting, but posture should really be considered as the sum total of positions and movements of the body throughout the day and throughout life (Journal of American Medical Association, 1946). There are two important principles to remember about correct posture.

- Posture has to allow one to relax and to be comfortable,
- Posture has to allow one to remain alert and aware.

Correct posture starts with a conscious effort to hold the posture of the body in a straight line. Studies have shown that even little deviation from neutral posture sustained for long period affects the recovering process of muscles that often may lead to pain and dysfunction (Larsson et al., 1988).

The spine should be straight all the way up the back and up through the top of the head. The head should be parallel to the sky. It may help to visualize a string coming down from the ceiling that attaches to the top of the back of the head like a puppet, which allows their shoulders and back muscles to relax and hang down from
the spine. This visualization is only a technique that may be helpful in discovering a straight posture.

Studies have shown that sitting for extended period of time can lead to creep and strain of low back tissue. (Mc. Grill and Norman, 1992)

Feffer (1988), Joyce (1988), Kelsey (1982), and Tramposh (1989), have reported that the most commonly affected areas are spine followed by lower and upper extremities.

Keeping the back straight does not mean that to force the back into a straight position; however, it does mean to let the back find its own upright position.

When worker has a poor posture, the body’s proper vertical position is out of alignment and the back’s natural curves become distorted, for example: ► **Head forward or Slouched posture** a person has rounded shoulders, head forward, rounded upper back, arched lower back, protruding buttocks, chest flattens, (Seen often in women who have Osteoporosis in later years). ► **Military posture** is characterized by head pulled back; shoulder blades tightly pulled back, arched lower back, knees locked (straight). ► **Slumped sitting posture** is identified with upper back humped or too rounded head forward, rounded lower back, (Often starts in teenage years).

"The back is the power house for the whole body, supporting the trunk and making the movements of legs and arms possible. The ‘S’ shaped spine has to be extremely strong not only to hold the weight of the entire upper body, but to absorb the force and shock of movements, says Dr. Soonawalla 2003, (consultant orthopedic and spinal surgeon at Breach Candy and Jaslok hospitals, Mumbai).
MUSCULOSKELETAL PROBLEMS:

The term Musculo-skeletal disorder identifies a large group of conditions that result from traumatizing the body in either a minute or major way over a period of time. It is build up of trauma that causes the disorder.

The disorders occurs when the body part is called on to work harder, stretch farther, impact more directly or otherwise function at a greater level then it is prepared for. The immediate impact may be minute, but when it occurs repeatedly the constant trauma cause damage.

The main purpose of the proposed Occupational Safety Health Association (OSHA) Ergonomics Standard is to prevent the occurrence of Work-related musculoskeletal disorders. WRMSDs are a group of painful disorders of muscles, tendons, and nerves. Carpal tunnel syndrome (CTS), tendonitis, thoracic outlet syndrome, and tension neck syndrome are examples.

Huntin et al., (1980) and Maeda et al., (1980), carried out study on accounting machine operator, which revealed interesting relationship between certain constrained postures and incidence of musculoskeletal disorders. Fifty seven (57) females were selected for postural study and it was concluded that:

- Stiffness and pains in the neck increased with an increasing degree of forward bending of head.
- Stiffness and pain in right shoulder increased with increased opening of elbows and lowering of the right hand as no rest wrist support.
- Tiredness, pains and craps in the right hand increased with an increasing degree of lateral (ulnar) abduction of that hand.
Work activities, which are frequent and repetitive, or activities with bad postures cause these disorders, which may be painful during work or at rest.

Grandjean and Burandt (1961) studied the link between desk heights and musculoskeletal disorders and suggested that periodical break, relaxing on a well-constructed chair with proper backrest should be provided to prevent pain in neck and shoulder.

Almost all work requires the use of the arms and hands. Therefore, most work related musculoskeletal disorders affect the hands, wrists, elbows, neck and shoulders. Work using the legs can lead to work related musculoskeletal disorders of the legs, hips, ankles and feet. “Tailors are often subjected to numbness of the legs, lameness, and sciatica, because while they are sewing garments they are, out of necessity, obliged to keep one of the legs back against the thigh”. The responsibility of musculoskeletal overload is detected among potters who sit at the wheel and turn it to shape the vessels from excessive fatigue of the feet and they are often subject to sciatica. Some back problems also result from repetitive activities. Repetitive motions of shoulder may constitute a risk for rotator cuff tendonitis. An experimental study showed that women performing repetitive forward flexions of the shoulder developed shoulder tendonitis. Clinical signs of tendonitis were present up to two weeks after the experiments.

(WRMSDs 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 for a short time. But repeated episodes of stretching causing tissue inflammation can lead to long lasting injury or work related musculoskeletal disorders. Cumulative trauma, or repetitive motion disorders are diseases of the musculoskeletal and nervous system which may be

(Available at: [http://www.bmj.com/cgi/content/full/313/7054/419])
1968) has truly said – “The biggest problem in the world could have been solved when it was small”.

Fitting the job to the worker contributes to promoting the health and the well-being of the worker to make the work more attractive and to increase safety, efficiency and productivity.

Thus, it was decided to undertake the present study to assess the beauticians’ working postures adopted for the selected (Eyebrow, Hair-cutting / do’s, Facial and waxing) activities and develop guidelines for safe workstation design.

Several studies have been done on Visual Display Unit (VDU) operators caused or aggravated by repetitive motions, forceful exertions, vibration, mechanical compression (hard and sharp edges), sustained or awkward postures or by exposure to noise over extended periods of time (U.S. Department of labor, Bureau of labor statistics, 1984).

Hence, to avoid or reduce Musculoskeletal problems (MSDs) there is a need to evaluate workers’ working pattern (includes - postures), work-station and existing furniture.

**JUSTIFICATION OF THE STUDY:**

In ergonomic research the relation between the worker and his work is studied. Various factors of the total work situation are examined in view of an adequate adjustment to the worker, within the limits of his capabilities. It is very clear that bad working posture adopted by people during different occupational activities exerts many adverse effects on health. The postural position and stress often go unnoticed even though it is an important physical component of most of the jobs. Ergonomics removes barriers to quality, productivity and safe human performance by fitting products, tasks, and environments to people.

The employees (beauticians) spend eight hours in the beauty parlor learning, practicing and serving the clients. As they belong to a service industry, they
Role of engineers would be designing the hand tools, safety professionals and industrial hygienists for encountering lower-back pain from standing for hours without rest breaks or may suffer with pain in the arms and wrists due to bad positioning or repetitive motions.

Further, physical therapists and occupational therapists that routinely perform ergonomic evaluations for employees at the workplace as well as provide therapeutic services to patients recovering from occupational injuries.

R&D centers of furniture would be benefited from the present study by manufacturing the ergonomic furniture to increase the efficiency of the workers, interior designers who can design the workplace with the help of ergonomic principles to avoid workplace injuries and maintain good and healthy posture at work.

Last but not the least it would help the Beauticians for avoiding the workplace injuries and increase work output.

The findings of the present study might be of help to start a trend of furniture design studies from the “ergonomic” aspects, rather than limiting them to the medical research.
OBJECTIVES OF THE STUDY:

1. To identify the physiological problems faced by beauty parlor female workers.
2. To assess and evaluate various postures adopted by the ladies beauty parlor workers for selected activities.
3. To evaluate the existing work station from ergonomic point of view in various beauty parlors.
4. To suggest ergonomically safe workstation and furniture design for selected beauty parlors.

DELIMITATIONS OF THE STUDY:

1. Only ladies beauty parlors were chosen for the present study.
2. Selected respondents must have minimum of two years of work experience in the present parlor.
3. Well-equipped beauty parlors were chosen.
4. Healthy, normal, non-pregnant ladies were chosen as subject.

NULL HYPOTHESES:

1. There exists no association between pain experienced and age of the workers by respondents.
2. There exists no association between pain experienced and work experience and by respondents.
3. There exits no association between pain experienced and working hours of respondents.
4. There is no significant difference between the RULA scores before and after minor engineering changes.