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ERGONOMICS: A SOLUTION FOR SUSTAINABLE DEVELOPMENT OF APPAREL MANUFACTURING WORKERS

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Introduction

India has made a name for itself as an apparel manufacturing centre of global renown. The textile and apparel industry accounts for 26% of all Indian exports around 45% of this comes from garment exports alone. The Textile and Apparel industry is India's second largest industry after IT Industry. At present, it is amongst the fastest growing industry segment and is also the second largest foreign exchange earner for the country. The apparel industry provides employment to 3.5 million people across the country. The work in the apparel units are highly repetitive in nature, require prolonged hours of standing or sitting in forward bending posture, requiring a combination of both static and rhythmic muscular activity. When such tasks are repeated several times in a day, leads to disorders. Moreover the work postures and environment in the apparel manufacturing units is unhealthy and unsafe for the workers, resulting in several health problems. Parimalam et al. (2006) revealed that the congested work area, improper ventilation, dust, unergonomically designed workstation, excessive noise were the main constraints faced by the workers in garment manufacturing units. The workers face a variety of ergonomic and work environment problems on a daily basis which are common throughout the apparel units such as lower back pain, neck pain, shoulder pain, improper tools and machinery, fixed or awkward postures, forceful hand exertions, vibration from hand tools inadequate seating and standing arrangements for workers, and the improper

lifting/ movement of heavy loads. All this lead to strains on the body with the result the workers are often sick or their productivity is drastically reduced.

Ergonomic interventions focus on ergonomically-designed seating, appropriate posture and effective training to workers in low-risk methods. Ergonomics solutions helps in improving efficiency by reducing unnecessary or awkward postures and almost cut unnecessary time and effort it takes to complete a task. Body motions, visibility, workload, and other important ergonomic parameters also affect the quality of work and the quality of work product. When a work is in balance with the ability of the worker, they make fewer errors and produce less waste.

After identifying and analyzing the health discomfort of apparel manufacturing workers in different units it was cleared that the unorganized and mismanaged workplace area, inadequate and improper workstations and absence of personal protective tool and equipments were the major obstacles faced by the workers in the apparel manufacturing unit of Jaipur. Based on the study, ergonomic interventions and some safety aspects have been suggested for workers to overcome ergonomic related problems which could be utilized on a larger scale. The interventions will be beneficial as it will be helpful in improving the conditions, comfort and efficiency of workers.

Objectives of the study are as follows:

- To study the ergonomic related problems of workers in apparel manufacturing units.
- To suggest minor/major tools to increase the comfort and efficiency of the workers in workplace.

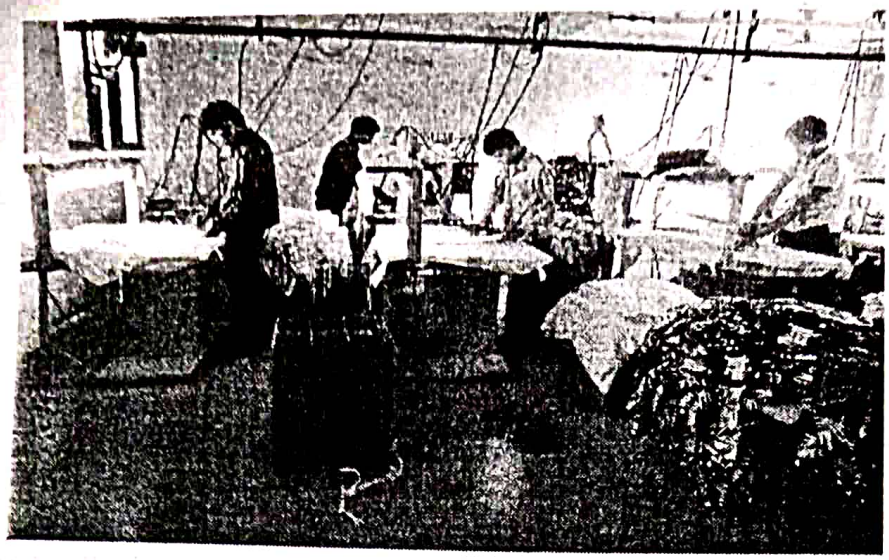
Materials and Methods:

The study was conducted in 10 apparel manufacturing units located in Jaipur city. A total of 200 workers from these apparel manufacturing units formed the study sample. The workers were employed in four different sections namely cutting; stitching, finishing and packaging were interviewed. The workers age ranged between 22 and 60 years and the length of the job was from 2 to 18 years. Various methods like interview with the workers; video recording, analysis of work environment; hazard identification and risk assessment were used to collect information about the work, work environment and workers' health problems. By the combination of these techniques, several gaps were identified in the work environment and facilities provided to the workers. Task analysis, NIOSH manual material handling checklist and ergonomic checklist was used for data analysis. Based on the study, ergonomic interventions have been suggested which will help to improve the work environment and also to overcome the health problems of apparel workers, thus improving comfort, efficiency, quality and productivity of apparel industry.

Results and Discussion:

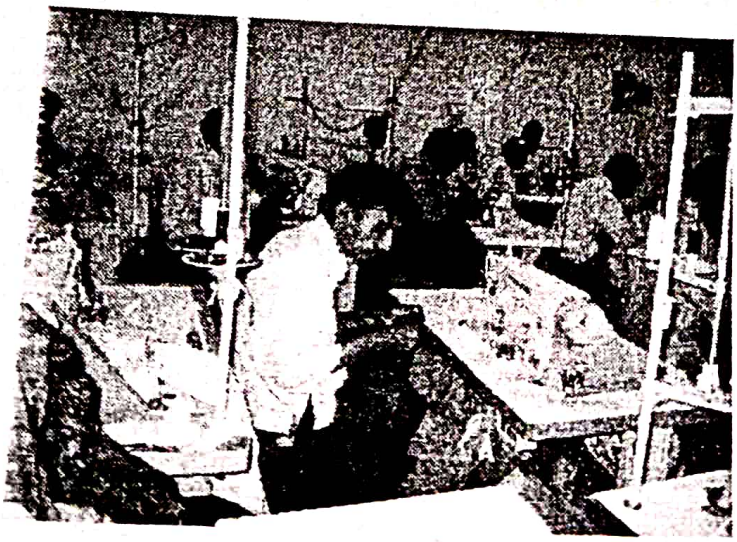
The results of the study revealed that there had been several gaps in work environment, tools and equipment that affect the health and safety of workers at the work site.

Some of the observations made are as follows:



The furniture used in the apparel manufacturing units was either above or below the recommended levels and the strained posture had to be maintained throughout the work day, which could have been responsible for the development of pain in the shoulders, upper arm and the forearm. The high stool forced the workers to bend their trunk and head toward the table to have a clear view of the work they are doing. As a result of excessive bending, majority of workers complained of pain in the lower back, mid back, shoulders and neck. The stools used by the workers were not padded for their comfort. None of the work stools had a backrest to provide support to the back. The workers working in finishing department work on a table of similar heights irrespective of their own heights and without any backrest support.

Sewing machine workers have limited legroom because of drawers and/or trash chutes attached to the underside of the table.

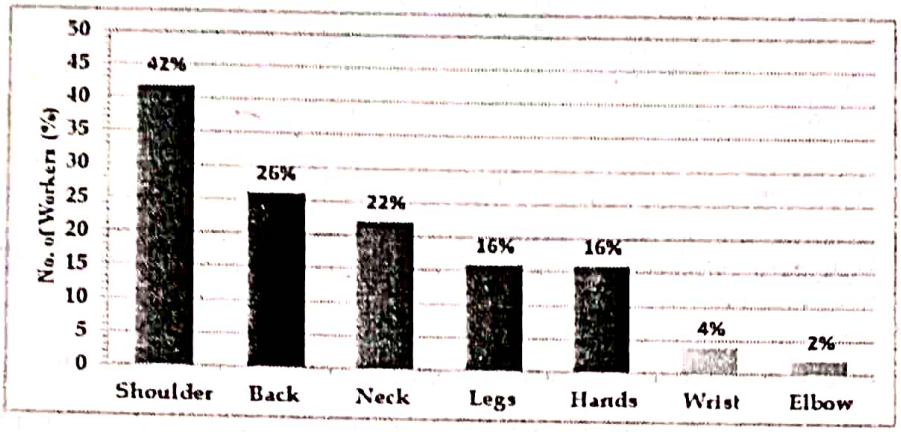


There was lack of safety devices in the workplace. None of the workers operating cutting machine use any personal protective equipment like metallic gloves for safeguarding the hands from possible mechanical injuries. The risk of cuts in fingers can be easily avoided with the

simple device.

Health Problems of Garment Workers:

Cutting Department: 10 Apparel Manufacturing Units, n = 50 male workers

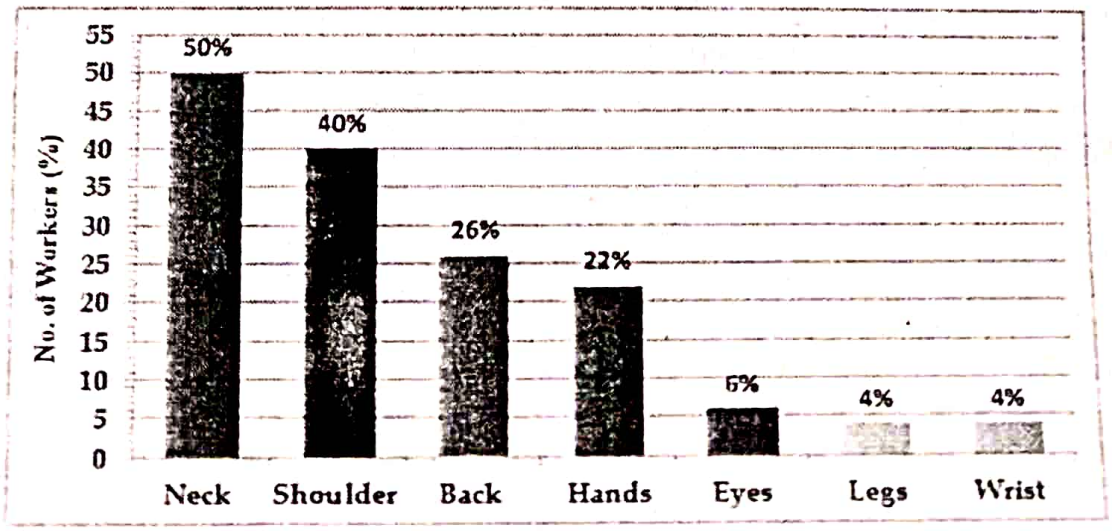


Discomfort/ Strain Areas

Graph:1.1 showing the discomfort/strain areas of body among cutting workers in apparel manufacturing units of Jaipur

The result reveals that in the cutting section majority of the workers i.e; 42% expressed shoulder strain followed by back (26%), neck (22%), legs and hands (16%) discomfort and few responded stress in wrist (4%) and elbow (2%)

Stitching Department: 10 Apparel Manufacturing Units, n = 50 male workers

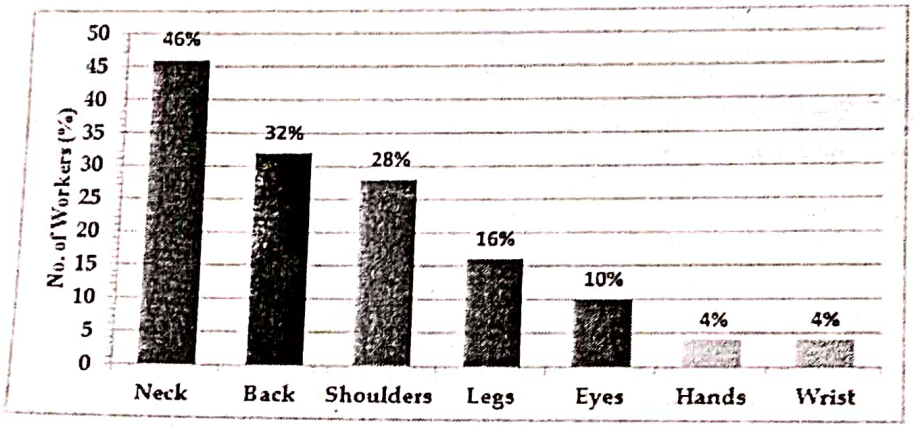


Discomfort/ Strain Areas

Graph:1.2 showing the discomfort/strain areas of body among sewing workers in apparel manufacturing units of Jaipur

Majority of the workers i.e; 50% expressed neck strain followed by shoulder (40%), back (26%) and hands (22%) discomfort, few of the workers responded for stress in eyes (6%) legs and wrist (4%)

Finishing Department: 10 Apparel Export Units, n = 50 female workers



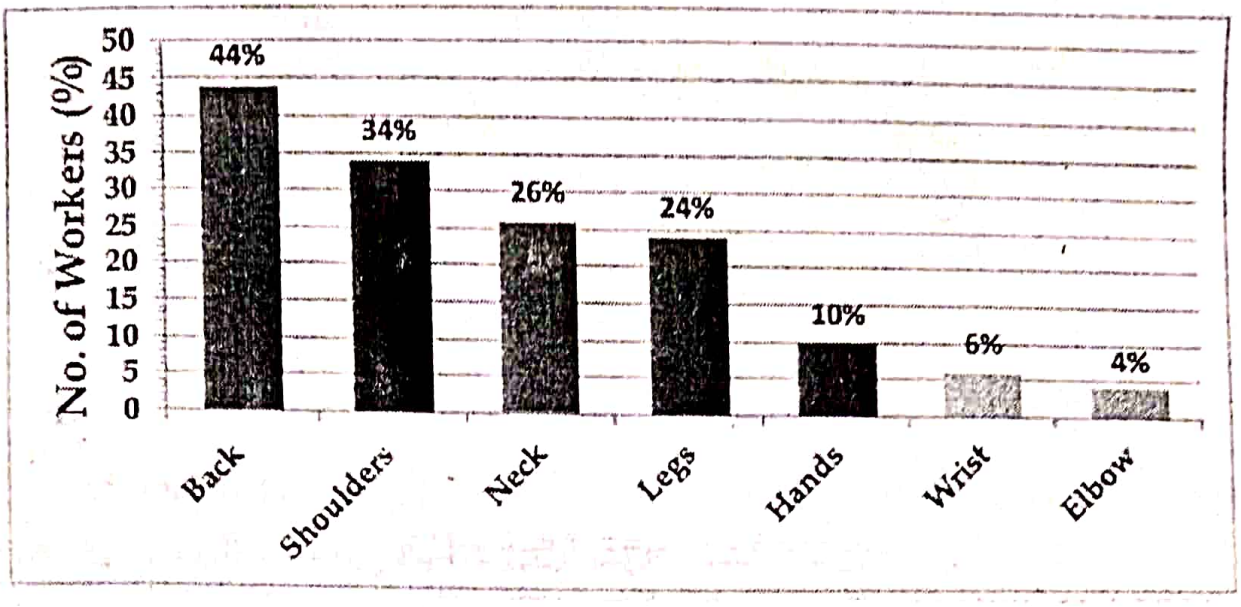
Discomfort/ Strain Areas

Graph:1.3 showing the discomfort/strain areas of body among finishing workers in apparel manufacturing units of Jaipur

Maximum number of workers i.e; 46% expressed neck strain followed by back (32%), shoulders (28%) and legs (16%) discomfort, few of the workers responded for stress in eyes (10%) hands and wrist (4%)

4. Packaging Department:

(10 Apparel Export Units, n = 50 male workers



Majority of the workers i.e; 44% expressed back strain followed by shoulder (34%), neck (26%) and legs (24%) discomfort, few of the workers responded for stress in hands (10%) wrist (6%) and elbow (4%)

Suggestions to improve work environment:

To prevent ergonomic injuries workers should be encouraged to rotate tasks or take frequent, short breaks to stretch and relax muscles. Work stations should allow enough space for the task, have appropriate working height, and provide proper seating. Manufacturing tools and machinery should incorporate ergonomic design and should not require an excessive amount of force to operate. With proper training and instruction, machine guarding, personal protective equipment, and ergonomically designed work systems, garment workers can manufacture products in safe and healthy workplaces.

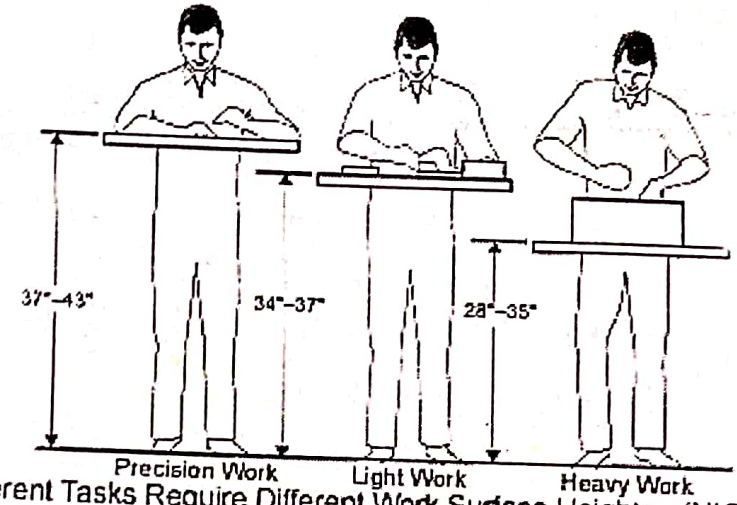
The National Institute for Occupational Safety and Health recommends using the following

guidelines in manual handling:

- Minimize the distance between the load and the body.
- Lift loads from knuckle height.

- Keep the travel distance for the lift to less than 10 feet.
- Minimize twisting.
- Provide good handles for grasping loads.

It is also important that work tools and equipment be ergonomically designed. Most hand tools are designed for only occasional use, not for repetitive use over prolonged periods.

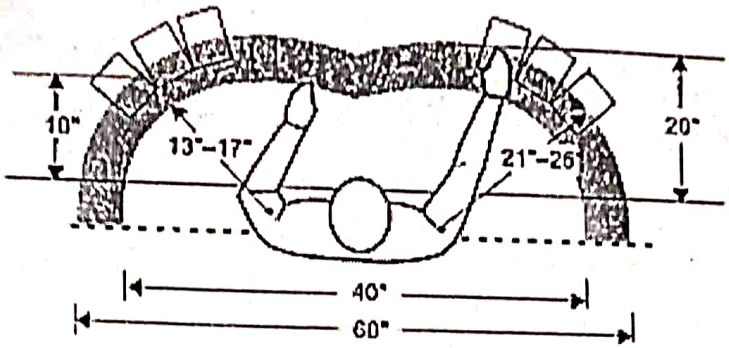


Different Tasks Require Different Work Surface Heights - (NIOSH)

If the work surface is not adjustable, provide a platform for shorter workers or pedestals on the work surface to raise the work up for taller workers.

Reaching:

Using the graph below, keep frequently used tools or items close to and in front of the body (up to the shaded area) and use the secondary area (lighter boxes) for less frequently used items



. From the National Institute for Occupational Safety and Health (NIOSH)

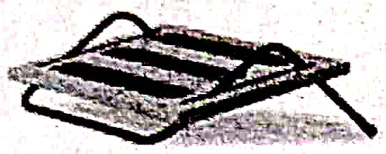
- Tools or parts which are to be frequently used above shoulder height, below knee height, or behind the worker.
- Items to be lifted should be kept between mid-thigh and chest height.
- Sloping work table should be used to tilt the work up reducing neck and trunk forward flexion.

Footrests:

At standing workstations, provide employees with either a sand-alone footrest or rail at least 4 to 6 inches high. Elevating a foot puts the arch (called "lordosis") back in the low back, combats fatigue, and helps in recovery.

The Webble Active Footrest

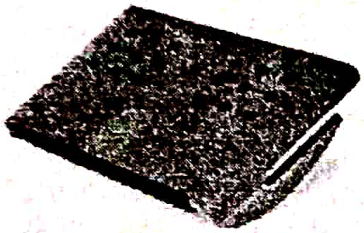
The Webble is a new kind of footrest that is about resting. It's about motion and activity while we work. Four casters, spring suspension, and a patented mesh membrane offer the ultimate comfort and flexibility.



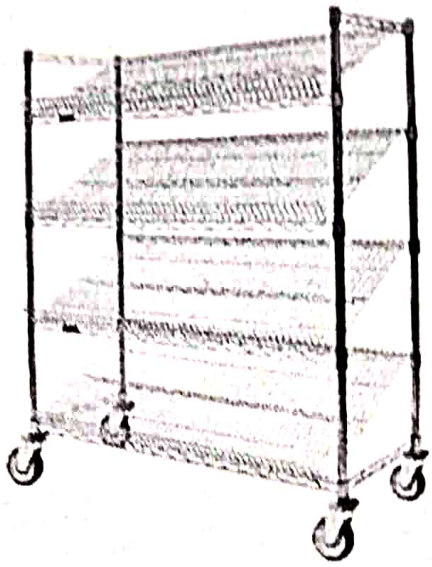
Tilting Foot Rest

The tilting foot rest gives a stable yet dynamically adjustable foot support. In addition, the non-skid surface ensures that feet will stay right where we want them - on the foot rest - to relieve pressure on the lower back.

Foot Machine The foot machine provides perfect support for the feet and legs to ease pressures on the lower back and improve circulation when sitting with curved supports to encourage health.



For too long, the ergonomic seating needs for individuals working at elevated surfaces have taken a back seat to those at standard work stations. Modern ergonomic design and comfort is taken into consideration for standard task chairs while designing specialized drafting-height chairs. These chairs feature the same great ergonomic benefits coupled with extended lift heights and footrings making them ideal for use at elevated work stations.



Use a step stool **Use angled shelving to improve access to containers**

Conclusion:

Workers in apparel manufacturing units perform repetitive action along with unnatural body position and improper working environment due to which strains and discomfort in various parts of body were prominent. Majority of workers complained of pain in the back, shoulders and neck. These occupational stresses can be decreased by using more suitable types of work organization, working tools and techniques, ergonomically designed workplaces, working postures and movements. Ergonomics interventions enhance worker's performance which leads to better quality, higher efficiency and sustainable growth of apparel industry.

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