SAFETY GUIDELINES FOR MANUAL MATERIAL HANDLING

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Manual handling is any transporting or supporting of a load by one or more workers. It includes activities such as lifting, holding, putting down, pushing, pulling, carrying or moving of a load. Manual handling can also be called as 'manual material handling' (MMH).

The structure of the back allows it to support our head, to provide anchor points for the rest of our skeleton and provide flexibility when we move.The vertebral column is formed of 33 bones, called vertebrae. It has four curves, two of which, thoracic and pelvic, are concave and are formed before we are born. The other two, cervical and lumbar, are convex and are formed when we begin to sit up and walk.Human spine can support a load of only 2 kg placed on top of first thoracic vertebrae. Shape of spine changes when manual handling of any task is done. Spine together with trunk muscles and other soft tissues is weight bearing unit and both abdominal muscles and thoracic muscles play a major role in stabilizing spine during manual handling. Erect standing with spine in natural curve is least injurious for lifting, carrying, pulling, pushing and unloading. Therefore, there will be least strain on your back if you do manual handing activities with your back in this position.

Activities in the home, at the office, in industry and agriculture and in other areas almost inevitably bring with them the problem of musculoskeletal disorders (MSD). Since India has a largely labor-intensive economy, the MSD problem may in fact be acute, but insufficient awareness and a lack of proper documentation make it very difficult to quantify.Body movements involve a number of factors, including force, balance, gravity and motion. The main moving parts of our body include the solid bones, the joint tissues that link bones together, and the muscles that attach to our bones. Our body has about 206 bones and more than600 muscles. These parts all work together to help us move throughout the day. Joints are one of the most common sources of problems and pain. Certain joints such as the shoulder can move in many directions, but others, like the knee joint, can only bend one way. Any movements outside a joint's natural range might cause injury.

More problems and injuries occur due to lack of knowledge of correct method of handling manual tasks both in home and outside. We often lift a box, pass work materials to a co-worker, or carry something heavy from one place to another without giving it much thought. But those seemingly harmless actions can often cause significant musculoskeletal disorders (MSDs) such as back or shoulders injuries. MSDs are often associated with manual material handling tasks (lifting, pushing, pulling, carrying, etc.). It is important for any worker, whether in an office, on the road, or on a worksite, to understand the hazards that increase our risk of developing an MSD. Although technology has advanced industrial production techniques, but manual handling of materials has remained essentially the same. Manual handling of loads may cause cumulative disorders due to gradual and cumulative deterioration of the musculoskeletal system through continuous lifting / handling activities, e.g. low back pain. It can also cause acute trauma such as cuts or fractures due to accidents.

There are several factors that make manual handling hazardous, and increase the risk of injury. These are called risk factors. The risk factors, particularly for back injury, are related to 4 aspects of manual handling: the load, the task, the environment and the individual.

1. The load

The risk of back injury increases during lifting, carrying, pushing and pulling of loads, if the load is:

- **Too heavy**

There is no exact weight limit for manual handling. A weight of 20 to 25 kg is heavy to lift for most people, especially if the load is handled several times in an hour.

- **Too large**

The arm muscles cannot produce force when arms are open to reach and hold large load as effectively as with the arms held in close. Thus, the muscles will get tired more rapidly when handling a large bulky load.

- **Difficult to grasp**

  Loads that are difficult to grasp can result in the object slipping. Providing the objects with handles or using aids for gripping reduces the load on the worker.

- **Unbalanced, unstable or if the contents can move**

  With unbalanced objects, it is difficult to hold the centre of gravity of the load close to the middle of the body. This leads to uneven loading of muscles, and fatigue. Unstable or moving content, such as a liquid, causes uneven loading of the muscles and sudden movements of the load can make workers lose their balance and fall.

- **Difficult to reach**

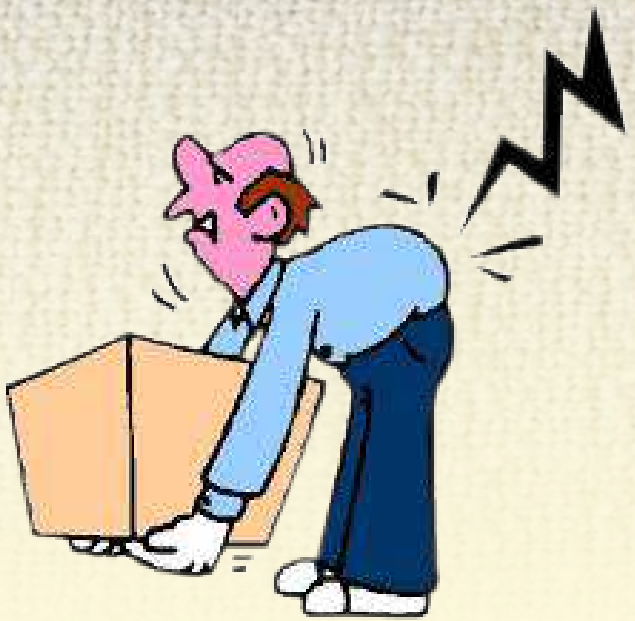
  Loads that can only be reached with outstretched arms, or by bending or twisting the trunk, require more muscular force. The spine may easily be hurt if the trunk is bent or twisted while lifting.

2. The Task

The risk of back injury increases if the task:

- **Is too strenuous**

Continuous lifting or carrying for long distances, or activities where the working speed is imposed by a process which cannot be altered by the worker are some of the very strenuous tasks which may be very demanding.



- **Involves awkward postures or movements**

Working with a bent and/or twisted trunk, raised arms, bent wrists, a bent neck and turned head increases the risk of back injury and should be avoided, as should twisting, turning and bending movements of the trunk, overreaching, sudden movements and repetitive handling.

3. The environment

The following characteristics of the work environment may increase the risk of back injury:

- **Space available**

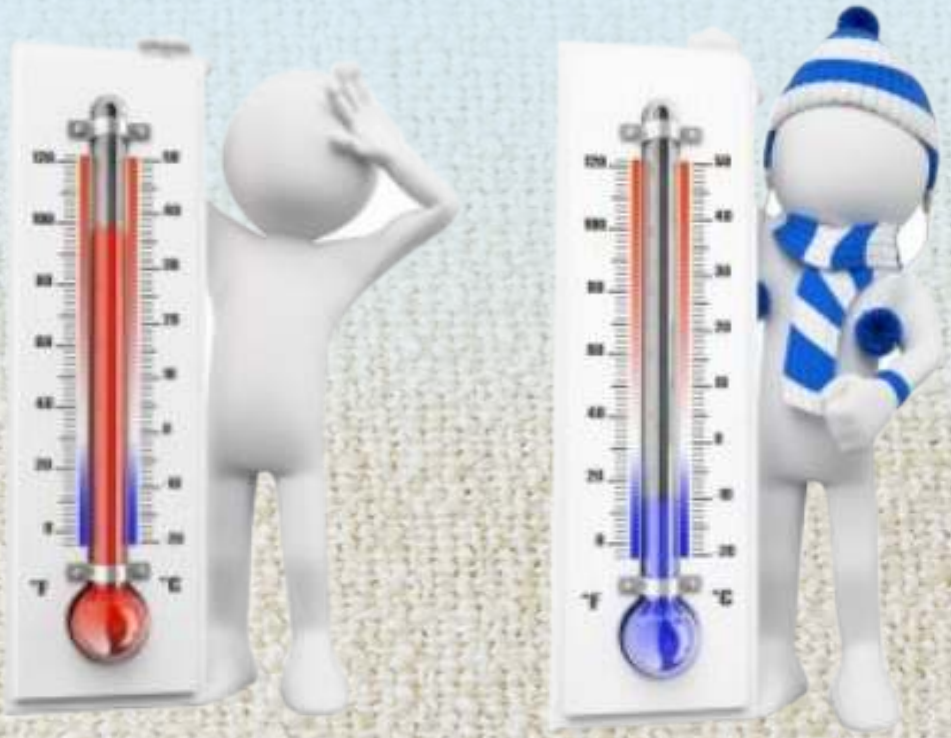
A lack of space to carry out manual handling may lead to inappropriate body postures and dangerous imbalance in the loads.

- **Floor**

Handling loads on different working levels or on floors that are slippery, uneven or unstable (such as working platforms or fishing boats) may increase the risk of accidents and back injury.

- **Climate**

The physical climate (temperature, humidity and ventilation) may affect the risk of back injury. Heat makes you feel tired, and sweat makes it hard to hold tools, requiring more force. Cold can make your hands numb, making it hard to grip.



- **Lighting**

Insufficient lighting may increase the risk of accidents when handling loads. It may also make you work in awkward positions to see clearly what you are doing.

4. The individual

There are also some individual factors that can influence the risk of back injury:

- Experience, training and familiarity with the job (for example, new episodes of low back pain are common in the first year of employment)
- Age (the risk of low back disorders increases with the number of years at work: the first episode of low back pain occurs in most people by the age of 30)
- Physical dimensions and capacity (length, weight, strength, etc.)
- Personal lifestyle (smoking may, for example, increase the risk of low back disorders)
- History of back disorders (this is a predictor of future back injuries)
- Willingness to use personal protective equipment (for example, clothing and footwear).

Health effects of Manual Material Handling (MMH)

Immediate effects:

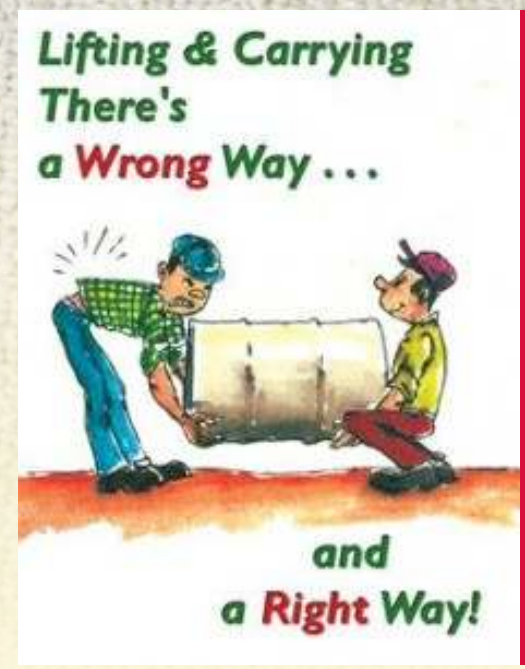
Include accidental injuries and fatigue. Fatigue is a common and expected effect of MMH. Where the pace of work in not too high, workers can find enough time between tasks to recover their energy, but when working at fast pace the time between the task is short and does not allow the workers to restore energy. As a result workers who try to maintain such a fast pace may become increasingly tired as the shift progresses. Fatigue not only causes instant and obvious discomfort but its effects add up over time. These injuries can later develop into chronic conditions that can become difficult to treat effectively. Additionally, fatigue decreases worker's alertness, making them more likely to act without due caution. This, in turn, increases their risk for accidents.

Long term effects:

One of the most common is "chronic back pain" and can result from various causes. The most common causes are strains and cramps in the back muscle. A worker can sustain a back injury from a single episode such as lifting too heavy load, slipping and falling, or receiving a blow to the back. However, most often is not the single episode that causes back injuries, it is the repetition, as in manual handling, that contributes most to the occurrence of injuries. Recovery from back injuries can take long time and further injury may occur, making the problem worse.

Controlling manual material- handling hazards

Work-related musculoskeletal disorders due to manual handling of loads may have serious consequences to workers, and may restrict their ability to undertake a wide range of work and leisure activities for the remainder of their lives. Therefore, prevention is vital.



Safe Lifting

i. Check the object before you attempt to lift. Push the object lightly with hands or feet to see how easily it moves. Remember, a small size does not always mean a light load. Think about the weight, size and shape of the object and the distance you will be moving it. Think about the route you'll be taking: any stairs, doors, obstacles? If the load is too heavy for you to lift or move get assistance. Ask another employee for help. Use an appropriate mechanical aid (pallet jack, forklift, hand cart, dolly, etc.).

ii. Wipe off greasy, wet, slippery or dirty object before trying to handle them.

iii. Keep hands free of oil and grease.

iv. When lifting lighter loads, get as close to the load as possible. Have feet shoulder width apart, whit the load between them. One foot slightly in front of the other for balance. Have the object close to the body and put less force on the low back. Avoid rapid, jerky movements.

- Keep yourself in an upright position while squatting to pick up. Squat down, bending at the knees (not your waist).
- Tightening the stomach helps support the spine. Do not hold your breath while tightening the muscles. Get a firm grasp of the object before beginning the lift. Use both hands, the whole hand, no just fingers.
- Legs are the strongest muscles in the body, so use them. Avoid back flexion. Never bend, lift and twist at the same time.
- Once lift is complete, keep object as close to your body as possible, keep the object in your power zone. Set load down if you're losing your grip. Keep back as straight as possible.

- Pivot with your feet, not your back. Avoid twisting, your feet, knees and torso should always be in the same direction. When twisting you add strain to the back's disc, muscles, ligaments and tendons.
- Keep fingers away from pinch points especially when putting materials down.
- Don't forget to wear proper PPE/PPC.
- Take rest breaks.

v. Reduce the frequency of lifting and the amount of time worker perform lifting tasks either by rotating workers in lifting tasks with other workers in non-lifting tasks or by alternating lifting tasks with non-lifting tasks.

vi. Never overexert yourself when lifting. If the load is thought to be more than you can handle, ask another person's help to perform the job.

vii. Use team lifting as a temporary measure until a more permanent improvement can be found. If possible, try to find a co-worker of similar height to help with the lift. Team lifting can reduce the load in half. However, team lifting can also increase the risk of a slip, trip, or fall accident. So, discuss your lifting plan to avoid surprise movements.

viii. Use a scissors lift, load lifter, or pneumatic lifter to raise or lower the load so that it is level with the work surface. Then slide the load instead of lifting.

ix. Use a turntable. Rotate the turntable to bring the container closer. Always work from the side closest to the load. To promote stability when loading and unloading, rotate the turntable occasionally to avoid the build-up of the load on one side.

x. Store heavier or bulkier containers so that they can be handled within your power zone where you have the greatest strength and most comfort.

xi. Use angled shelving to improve access to containers.

xii. Add extra handles for better grip and control.

xiii. When pouring the contents of a sac into a container, use a screen over the opening to support the sack. Pour the contents through the screen.

xiv. Before lifting items, remove any obstacle that may be in the way.

Safe Carrying

i. Plan the workflow to eliminate unnecessary carrying.

ii. Slide, push, or roll instead of carrying, when appropriate.

iii. Reduce the distances that loads are moved to a minimum. If long trips are required, use equipment.

iv. For loads that are unstable and/or heavy, tag the load to alert workers and if possible, use mechanical devices or equipment to carry or move the load.

v. Reduce the weight of the load by putting fewer things in the container or using smaller and/or lighter weight containers or by dividing the load between two containers and carrying one in each hand.

vi. Repack the containers so contents will not shift and the weight is balanced.

vii. Use team carrying as a temporary measure for heavy or bulky objects.

viii. Reduce the frequency and amount of time workers carry materials either by rotating workers in carrying tasks with other workers in non-carrying tasks or by alternating carrying tasks with non-carrying tasks.

ix. Avoid carrying large or bulky loads that limit or obstruct your vision. Make sure you have a clear view of the path.

x. When there is a choice, push instead of pull.

xi. Carry only as much as you can safely handle by yourself.

xii. Try to avoid slopes, stairs, or other obstacles that make carrying materials more difficult.

xiii. Beware of and try to avoid slippery floors (e.g., liquids, ice, oil, and fine powders).

xiv. Keep loads close to your body.

xv. When carrying containers with one hand, alternate hands.

xvi. Whenever appropriate, use two hands to carry containers.

xvii. Don't change your grip unless load is sufficiently supported.

xviii. Don't block vision with the object you are carrying.

xix. Alternate heavy or forceful exertion tasks with less physically demanding tasks.

xx. Take rest breaks.

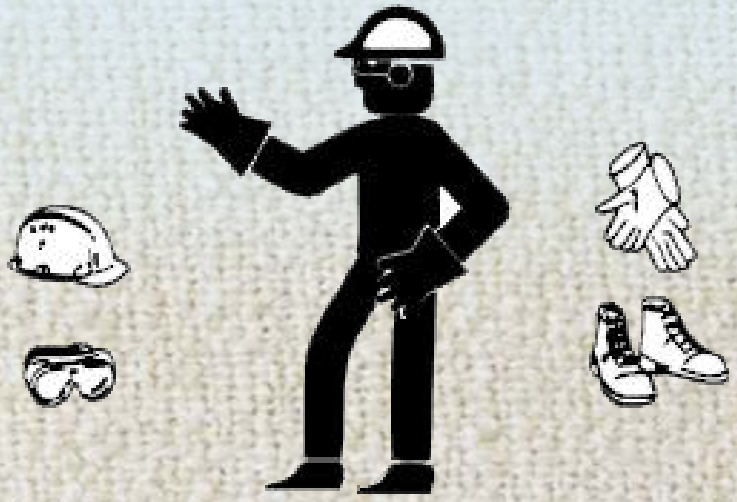
xxi. Redesign the container so it has handles, grips, or handholds.

xxii. Get co-worker assistance when necessary. Discuss your plan so you don't have surprise movements.

xxiii. Use equipment to carry materials whenever possible. If you must manually carry materials on your shoulder, reduce the weight of the load and use a pad to provide a cushion. Pad the shoulder. Support the container on one shoulder and alternate between shoulders.

xxiv. Choose equipment appropriate for the material(s) being handled, the layout and design of your workplace, and the work tasks being performed.

xxv. Train employees on proper equipment use and appropriate work practices



Safe Reaching

i. Store heavy items (e.g. bulky products such as bags of potatoes and flour) between the shoulder and knuckle heights and use mechanical devices to transfer products.

ii. Store infrequently used lighter items on upper shelves.

iii. Use tools such as step / ladder to avoid over-stretching of arms.