

Reduction of musculo-skeletal disorders through application of work surveillance programme in forestry sector

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■ **ABSTRACT** : MSDs occur in certain industries and occupations which rate up to three or four times higher than the overall frequency. Musculo-skeletal disorders generally are generally common among the forestry workers who perform very high labour demanding activities. The main purpose of this review article is to create awareness among the workers to reduce their MSD's level by appropriate use of ergonomic medical surveillance programmes.

■ **KEY WORDS** : Ergonomics, Medical surveillance programs, Musculo-skeletal disorders, Forestry workers

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The term “musculoskeletal disorders” denotes health problems of the locomotors apparatus, *i.e.* of body's muscles, joints, tendons, ligaments, bones and nerves. Most work-related MSD and WRULD are cumulative disorders, resulting from repeated exposure to high or low intensity loads, from repetitive movements and from vibrating tools utilisation over a long period of time: however, MSD and WRULD can also be acute traumas, such as fractures, that occur during an accident. Different groups of factors may contribute to develop these pathologies, including physical or biomechanical factors and organisational and psychosocial factors (Waters, 2004). High manual work load can therefore cause MSDs amongst the loggers (Ashby *et al.*, 2001). This pathology risk increases with the component ‘vibration’ induced by chainsaws, tractors, skidders, harvester and other machineries (Bovenzi, 2003). In fact, both the WBV (Whole body vibration) and the HAV (hand arm vibration) have been detected as important risk factors which may cause MSDs and they must be strictly controlled. Also upper limb movements need attention: the odds ratios for neck and shoulder symptoms were between 2.3 and 4 among 215 forest machines operators. Moreover, a study conducted over 909

forest workers showed that 16 per cent had some kind of diagnoses in the locomotor system (Lewark, 2005). The same study showed that musculo-skeletal disorders in loggers tend to cause longer sick leaves than accidents.

Work-related musculo-skeletal disorders (WMSDs) have become a major problem in many industrialized country (Hagberg *et al.*, 1995) including India. These disorders have caused a considerable human suffering and are also economically very costly, because of reduced working capacity and lessened production. The Scientific Committee for Musculo-skeletal Disorders of the International Health (ICOH) recognized WMSDs as a wide range of inflammatory and degenerative disease, and disorders that result in pain and functional impairment and may affect the body's soft tissues, including damage to the tendons, tendon sheaths, muscles and nerves of hands, wrists, elbows, shoulders, neck and back.

Musculo-skeletal disorders include all forms of ill – health ranging from light, transitory disorder to irreversible, disabling injuries. Work-related musculo-skeletal disorder is the disorder to which the work environment and the performance of work contribute significantly and that are made worse or longer

lasting by work conditions. MSD's which are generated through different factors are also known as cumulative trauma disorders, repetitive trauma disorders, repetitive strain injuries, occupational cervicobrachial disorders, overuse syndromes, work related disorders, musculo-skeletal pain/symptoms. Main symptoms which are present among the workers are numbness or a burning sensation in the hand, reduced grip strength in the hand, swelling or stiffness in the joints, pain in wrists, forearms, elbows, neck, or back followed by discomfort, reduced range of motion in the shoulder, neck, or back, dry, itchy, or sore eyes, blurred or double vision, aching or tingling, cramping, loss of color in affected regions, weakness, tension stress headaches and related ailments. Exertion of high intensity forces, handling of heavy loads for long period of time, frequently repeated manipulation of objects, working in unfavourable postures; static muscle load, muscular inactivity, monotonous inactivity, psychosocial factor etc. are the factors which are contributing WMSDs.

A work place surveillance programme is an ongoing systematic collection, analysis and interpretation of health and exposure data in the process of describing and monitoring occupational disease and cumulative trauma disorders. A work place surveillance programme can be used to determine when additional monitoring or evaluation such as ergonomic analysis or biological monitoring may be warranted. It may be further used to assist in establishing intervention priorities.

The characteristics or components of a work place surveillance programmes are:

- Case initiated surveillance,
- Data-initiated surveillance and
- Proactive surveillance.

A components of surveillance are essential to the development and perpetuation of a workplace surveillance programme. Discovering to what extent workplace illnesses and injuries exist, what their magnitude and the risk factors associated with their development is the hallmark of the programme. Work place surveillance programmes can be built into the day to day structure of an organization, through health, safety, medical or administrative management. By integrating them into existing programmes, their utilization and success will be maximized.

The components of a workplace surveillance programme are:

- Employee reports of symptoms, concerns or recommendations (case-initiated surveillance).
- Analysis of existing records and surveys (data-initiated surveillance).
- Job surveys or new equipment review (proactive job/design phase surveys).

Case-initiated report :

With a case-initiated or employee report surveillance

programme, information is gathered through employee reports. This is an ongoing process and is performed case by case.

Sources of employee reports may include :

- Medical or first aid visits,
- Injury /illness reports,
- Employee report of pain or discomfort and
- Health surveys.

The purpose of the data collection is to identify medically determined cases as they occur and to identify employees with early symptoms of work-related illness or injury.

Data-initiated programmes :

- In data-initiated surveillance programmes, review of existing records is the source for information regarding work-related illnesses and injuries.
- The purpose of this process is to identify and prioritize jobs for further analysis and to identify common risk factors.
- A review of existing records of work related illnesses and injuries should be conducted at the onset of the surveillance programme and periodically thereafter.
- If there is no existing system that permits the ongoing analysis of work-related illnesses and injuries, then employers need to establish a record keeping system.
- Caution should be used when reviewing existing records.
- Information from this source may not be reliable.

Proactive job/design surveys :

In surveillance programmes that use proactive job/design phase surveys, the surveillance information is obtained through job surveys.

Information for a job survey can be collected in the following ways :

- Employee and supervisor interviews,
- Risk factor checklists or team problem solving approaches.

The goal of the proactive survey method is to identify specific jobs and processes that may put an employee at risk of developing work-related illnesses or injuries and to intervene before injury or illness occurs. Job surveys are an ongoing process and can be incorporated into existing programmes such as regular facility, safety, health, team problem solving or quality inspections.

Job surveys, as a component of the workplace surveillance programme should be performed under these circumstances:

- When new work related illnesses or injury cases are reported.
- If risk factors exist across similar jobs.
- If jobs use similar equipment, tools or processes.
- When there is an unexpected high rate of turnover for a

- specific job.
- For an initial determination of risk factors and for comparison of future surveys.
- When a job, task or process substantially changes.
- When reliable health data is not available.
- When new jobs, tools or processes are introduced.
- When new tools, equipment or work processes are planned, purchased or installed, they should be reviewed for potential work injury and illness risk factors.
- The information collected through the work place surveillance programme is useful in establishing priorities for appropriate intervention.

When establishing priorities consider :

- Jobs where work-related illnesses or injuries have been identified by an individual case.
- Jobs where the incidence or severity rates of illness or injury are higher compared to other shifts, departments or facilities.
- New jobs, equipment or work process are introduced.
- Those jobs where proactive job surveys have suggested a further job analysis or medical monitoring and possible intervention.

Occupational health medical surveillance programme :

The purpose of the occupational health surveillance programme is to help assure the health of employees who:

- Have workplace exposure to particular health hazards (e.g., high noise levels, animal allergens) known to pose risk for a potentially serious health condition, illness, or injury;

Or

- Perform specific work tasks (e.g., respirator use, driving commercial vehicles) that require a certain degree of health and fitness to assure employee and/ or public health and safety.
- Participating employees typically undergo a medical work history and in some cases, medical examination by a licensed physician at the health Centre.
- These screenings are used to establish an initial baseline of the employees' health and then used to monitor their future health as they pertain to potential occupational exposures to hazardous agents.

Workplace ergonomics programme-Worksite analysis/risk assessment :

- Injury/illness records and employee reports are reviewed periodically to identify ergonomic concerns with jobs and workstations.
- Ergonomic risk assessments are performed before changes are made to workstation layouts, tools, equipment, furniture and processes.

- Ergonomic risks are identified and prioritized by department and communicated to management.
- Ergonomic risk assessments and employee discomfort surveys are performed periodically.

Workplace ergonomics programme - Hazard prevention and control :

Documented processes to perform ergonomic hazard analysis and to implement acceptable controls are part of the programme.

- Ergonomic assessments include the evaluation and documentation of known ergonomic risk factors by both objective and subjective measures. Multiple control strategies are evaluated, with an emphasis on engineering controls.
- Administrative controls are designed to control specific ergonomic risks and monitored to ensure that they are followed.
- Design standards for tools, equipment, and furniture are applied to vendors, as well as internally.

Workplace ergonomics programme evaluation list :

Compare your workplace ergonomics programme activities with the following list to identify opportunities for improvement of your workplace ergonomics programme and those activities that are not currently being accomplished systematically in your organization.

Workplace ergonomics program - Medical management :

- Prevention, recognition and control of ergonomics-related injuries and illnesses are part of a trained health care provider service that has managed protocols.
- A qualified health care provider administers the medical management programme.
- Periodic health surveillance is conducted for employees assigned to jobs with recognized ergonomic risks.
- Treatment protocols follow established practices for conservative care.
- Trends are monitored through comprehensive recordkeeping.
- Early reporting of signs and symptoms of cumulative trauma disorders is encouraged.

Workplace ergonomics programme - Training and education:

- Training programs are designed to fit the needs of different levels of personnel.
- Ergonomic awareness training is given annually to employees exposed to ergonomic risks.
- Solutions training addresses retrofitted interventions and preventive measures for new workplace design.
- Maintenance and facilities management personnel understand and apply the issues affecting ergonomic

improvements.

Workplace ergonomics programme - Process management:

- Goals and objectives drive your ergonomics activities.
- An ergonomics plan with measurable goals and defined resources is generated annually.
- Internal customers (*i.e.*, employees, supervisors and managers) are stratified and the satisfaction level of each subset is monitored independently.
- Improvement projects have clearly defined goals and timelines.
- Key ergonomics processes, including ergonomics team activities, are monitored and their performance checked against metrics.

The goal of the workplace surveillance programme is to :

- Identify and prioritize jobs for detailed job analysis,
- Identify common risk factors,
- Identify employees with early symptoms of work-related illness or injury and
- To intervene before injury or illness occurs.

Discovering to what extent workplace illnesses and injuries exist, what their magnitude and the risk factors associated with their development, is a critical step in work place safety and prevention.

Factors to be considered in prevention :

The ideal balance :

A weighted balance between activity and rest is necessary. Rest pauses are prerequisites of the recovery from load-induced strain and for preventing accumulation of fatigue.

The principles of ergonomics :

The basic principle is to create an appropriate balance between the requirements of the work and the capacity of the working person by either adapting the work to the person by design of the respective work, or by developing the capacity of the human to work by training and vocational adjustment.

Work performance strategies :

MSDs also result from the method of performing the work by the worker. There are risky and less risky strategies to execute the task. An example is lifting heavy objects having the center of gravity near the body. To fulfill this demand, heavy object should be lifted, whenever possible, by bending the knees instead of bending the back. Further measure to reduce overloading risk are avoiding twisted and laterally bent postures, working continuously at a moderate pace and not during short time period with high time pressure. The workers must be informed about those possibilities and should be motivated to use them.

Avoid accidents and injuries :

Injuries to head, hand and foot can be avoided by using protective helmet, gloves and shoes.

Guidance on main risk factors: Handling of heavy loads :

Advice to the employee:

- Lift loads close to the body.
- Lift with both hands, symmetrically to the mid - sagittal plane; bring the load as possible to the body.
- Lifting heavy loads with an upright trunk by extending the initially flexed legs and avoid manipulation of loads in unfavorable posture (e.g. lateral bending or twisting).
- Use cranes, lifters, dollies, hoists, pallet jacks, mobile elevators or similar devices, if available, for lifting and transporting heavy loads.
- Carry heavy and or/ unwieldy loads with two persons.

Advice to the employer :

- Avoid manual handling tasks, especially of heavy loads, manual handling is still necessary, introduce ergonomic measures to minimize the resulting risk.
- Avoid moving loads over obstacles.
- Avoid carrying over uneven or slippery routes, over steps or stairs.
- Avoid high or frequent handling procedures.
- Avoid large masses (e.g. instead of one heavy sack use two sacks of smaller weight)
- Provide aids (hoists, or similar devices).
- Mark heavy loads.
- Mark non-symmetrical load distribution within the object.
- Suggest and carry out training on “handling”

Risk factor: Work with high force exertion :

Advice to employee :

- Carry out pushing and pulling in such a way that the force acts close to the body.
- Avoid pushing or pulling with only one hand.
- Avoid pushing or pulling with strong lateral bending and/or twisted trunk.

Advice to employer :

- Provide conditions for secure standing.
- Provide wheeled vehicle, trolleys, dollies, or similar devices.
- Avoid pushing and pulling in confined rooms because of constrained postures.
- Avoid obstacles and uneven ground.

Risk factors: Working in unfavorable body postures :

Advice to employee :

- Bring body close to the position where the object must be handled, or where force application is performed.

- Avoid strong lateral bending or twisting of the trunk
- Approach the working area and body close enough to enable carrying out the task within reach.
- Change posture often to activate different muscles alternately while carrying out tasks; consider alternating between standing and sitting postures.

Advice to employer :

- Offer adjustable equipments.
- Supply rooms of sufficient size to avoid constrained postures.
- Arrange tools within reach
- Set time-limits when constrained postures are unavoidable and / or alternate tasks of different nature.
- Avoid giving tasks that require a kneeling, lying, crouching, or squatting position.

Risk factor : Monotonous repetitive tasks :

Advice to the employee:

- Avoid for changes in motion in order to avoid identical muscular activation patterns.
- Change body posture frequently in order to reduce static loading.
- Use rest pauses.

Advice to employer :

- Provide for organizational changes, such as job rotation, job diversification or job enrichment, to reduce the extent of task repetition for individuals.
- Enable autonomous decisions about the timing of breaks.
- Mechanize unavoidable monotonous tasks with load.

Risk factors: long lasting loadings

Advice to the employee:

- Move instead of holding a static position.
- Use tools for holding objects.
- Strive for frequent change in body position.
- Strive for frequent upright positions from inclined positions.
- Stand up from time to time when working in a sitting position, for example, making bricks.

Advice to employer :

- Provide tools for holding, which enable holding with low muscle force.
- Supply handles or grips which can be used with right as well as left hand.

- Place handle/grips to enable use in a neutral position of wrist and arm.

Conclusion :

Prevention of musculo-skeletal disorders can be achieved by engineering controls and appropriate organizational arrangements. The first-mentioned aspect involves the whole working environment and deals with the ergonomic design of tools, workplace and equipment. The latter concentrates upon factors such as training, instruction and work schedule. The primary aim of ergonomic work surveillance programme is the adaptation of the working conditions to the capacity of the worker/ it is supplemented by a secondary way, which is based on the development of the person's capacity to the working requirements by training and vocational adjustments.

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