Workplace Ergonomics

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ABSTRACT: The main purpose of ergonomics is to fit the task to the individual, not the individual to the task. Practicing suitable ergonomics obtains developed productivity, improved safety and health of workers; increases job acquiescence and ameliorate compliance with government regulations. The general ergonomics doctrine that should be employed to the workplace contain aiming for dynamic versus static work, optimizing work surface heights, avoiding overload of muscles and unnatural postures, and training persons to utilize the workplace, facility, and equipment properly. This paper further investigates the important components of ergonomics.

INTRODUCTION

Ergonomics is the scientific order concerned with the fundamental understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and techniques to design in order to optimize human well-being and overall system performance (Violante et al, 2000). Ergonomics applies information about human behavior, abilities and limitations and other features to the design of applications, machines, tasks, jobs and environments for safe, productive, comfortable and effective human utilization (Dul and Weerdmeester, 1993).

Ergonomic derived from the two Greek words: ergon (work) and nomos (laws) to characterize the science of work, ergonomics is a systems oriented order that develops across all aspects of human activity, and therefore improves a holistic approach to promoting the well-being of people at work. To reach this purpose, it considers the physical, social, cognitive, organizational and environmental aspects of work and the impact, both positive and negative, that these may have on the worker. Practicing Ergonomists must have a broad understanding of the full scope of the discipline and be able to apply the principles in practice to improve working conditions.

According to the wide expansion of ergonomics, in 2000 the International Ergonomics Association proposed the following three broad domains of specialization within ergonomics due to establish some clear recognition of the identified areas of the discipline.

Physical ergonomics: this area is related to human anatomical, physiological, anthropometric and biomechanical characteristics as they relate to physical activity. Relevant topics consist of working postures, repetitive movements, materials handling, heavy work, work-related musculoskeletal disorders, workplace layout, thermal conditions, noise and vibration, safety and health, as these relate to work.

Cognitive ergonomics: this area is related to mental processes, like perception, reasoning, memory and motor response, as they touch interactions among humans and other elements of a system.

Organizational ergonomics: this area is related to the optimization of socio-technical systems, containing their organizational structures, processes and policies.

The focus generally should be on simple, low-cost methods of characterizing and solving common problems in workplaces. Whenever the health and safety professionals’ emphasis is on preserving and developing workers’ health, safety and well-being, the application of ergonomics can achieve other advantages. These consist of: minimizing wasted effort, reducing damage to equipment, less wasting of product and improving productivity. In a well-designed workplace workers can obtain more output with fewer attempts and less risks to their health and safety.

Appropriate design often costs no more than poor design but, to be operative, it needs good organization and careful planning in consultation with the workers. The advantages of ergonomics can be obtained through:
Accommodate which adaptations local workers, analysis of individual task requirements, assessment of worker capacity and abilities, balancing task demands (both physical and mental) with worker capabilities, improved workplace design, enhanced overall organizational management.

**Ergonomic Principles That Contribute to Good Workstation Design**

The purpose for the design of workplaces is to design for as many individuals as possible and to have a perception of the ergonomic principles of posture and movement which play a central role in the provision of a safe, healthy and comfortable work environment.

![OBJECTIVES OF ERGONOMICS](image)

Posture and motion at work will be enforced by the task and the workplace, the person's muscles, ligaments and joints are involved in accepting posture, performing a movement and implementing a force (Stanton et al, 2014). The muscles obtain the required force to adopt a posture or make a movement. Poor posture and movement can arise from the local mechanical stress on the muscles, ligaments and joints, resulting in persecutions of the neck, back, shoulder, wrist and other parts of the musculoskeletal system (Wilson and John R, 2014). Ergonomic principles afford feasibilities for optimizing tasks in the workplace (Murrell, 2012). These principles are summarized in the figure below:
From fig.2, we can conclude that:
A: Joints including muscles and ligaments are stretched to the least possible extent in a neutral position.
B: in the event that the work is too far from the body, the arms will be outstretched and the trunk bent over forwards
C: The upper part of the body of an adult weighs about 40kg on average. The more the trunk is bent forwards, the harder it is for the muscles and ligaments of the back to keep the upper body in balance.
D: It is necessary to restrict the forward and sideways limitation reaches to avoid having to bend over or twist the trunk.
E: Neither posture nor movement should be kept for a long period of time. Protract postures and iterative movements are tiring.
F: Twisted postures of the trunk make unfavorable stress to the spine.
G: The hands and elbows have to be well below shoulder level when doing a task.
H: Restrict the weight of a load that is lifted.
I: Many lifting applications are available to help lift and move loads.
J: When just one hand is utilized to carry a load, the body is subject to mechanical stress.
K: There are a lot of applications like roller conveyors, conveyor belts, trolleys and mobile raising platforms, which omit or decrease manual handling.

**The Impact of Ergonomics on Workplace Design**

Ergonomics provides maximum productivity with minimal cost; in this conception cost is presented as the health or physiological cost to the worker. In a workplace setting there are sometimes a large number of tasks that exceed the authorities of most of the work force. There may be jobs that will include a special task which needs
developed reaches or overhead work that cannot be permanent for long periods, by using Ergonomic principles to design these tasks; a lot of people have to be able to perform the job with no risk of injury.

Ergonomics has already been described and its basic focus is on the design of work activity that suits the person in that it takes account of their possibilities and restrictions. Matching the necessities of a job with the capabilities of the worker is the approach to be adopted for decreasing the risks of musculoskeletal injuries resulting from handling materials manually.

Proactive Ergonomics enforces the preservation of work subordinate musculoskeletal disorders through recognizing, anticipating and decreasing risk factors in the planning stages of new systems of work or workplaces. In effect, to design operations that supply proper choice and utilize of tools, workstation layouts, job methods and materials which impose no extra stress and strain on the worker. Further costs are incurred in redesigning or developing work processes since it is more cost effective to decrease risk factors at the design stage (Guild and Johnston, 2001). A proactive approach to Ergonomics will ensure that:

Designers will receive training in ergonomics and have suitable information and guidelines as to risk decreasing.
Decision-makers planning new work processes should know about Ergonomics principles that chip in the decreasing or discarding of risk.
Design strategies underline fitting job demands to the possibilities and limitations of workers. For example, for tasks which require heavy materials handling, use of mechanical assist devices to decrease the manual handling requirement would be designed into the process.
Other aspects of design have to be considered containing load design, layout of the workplace to allow for ease of access when utilizing mechanical aids and discarding undue lifting activities.

**Healthy Work Practices**
Setting up your chair, work surface, keyboard platform and keyboard/mouse to keep a neutral position. Sit in a cuddly vertical position with your feet flat on the floor (or on a footrest), thighs fully supported by the chair seat, with no pressure on back of the knees. Change tasks entire the work shift (stop using keyboard, lean back and proofread your work, retrieve work from printer, file documents, make phone calls). Wherever you can, alternate or distribute tasks between left and right hands and alternate between use of keyboard and mouse. Alternate your posture frequently overall the day (Salvendy and Gavriel, 2012). When typing on the keyboard, use minimal force. Locate a document holder around your computer screen at approximately the same angle and height of the screen. Decrease vibration from keyboard and other office equipment. Monitor sound levels to be sure that communication can fall out with no great deal of interference from external noise.

**Workspace Exercises**
Take orderly breaks for simple, brief exercises (shoulder shrugs, ankle rotations, neck rolls, leg extensions, overhead stretches, handshakes, finger spreads). Arise every 45 minutes and give your muscles stretch. Every 20 minutes, refocus your eyes away from the computer screen to an outside window or other object at least 25 feet away.

**CONCLUSIONS AND RECOMMENDATIONS**
Good ergonomics practicing obtains expansion productivity, improved health and workers safety, higher job compliance and better satisfaction with government regulations. The comprehensive ergonomics doctrines that should be implemented to the workplace include aiming for dynamic against static work, optimizing work surface heights, avoidance overload of muscles, avoidance unnatural postures, and training persons to use the workplace, facility and equipment properly.

The aim of this article was to outline the ergonomics study conducted during the workstation operations. It has become a challenge to give ergonomics higher review during the design of products.
REFERENCES