



A STUDY TO IDENTIFY THE IMPACT OF WORK STATION LAYOUT ON POSTURE

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Article Received on
27 Feb. 2018,

Revised on 20 March 2018,
Accepted on 09 April 2018,

DOI: 10.20959/wjpps20185-11321

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ABSTRACT

Ergonomics deals with the relationship between man, the machine made by man and the environment which man inhabits. The objectives of these machines are to create an environment in which man-machine system becomes more efficient and injurious effects of machinery on man are avoided. One of the major injurious effects on office workers ergonomically is the musculoskeletal disorders. Thus a need was felt to study the ergonomics in office environment. For this study 100 Rashtrasant Tukadoji Maharaj Nagpur University's office workers were selected as samples. A pre coded interview schedule was

prepared for the survey. Simple random sampling without replacement was done for the survey. Out of the all respondents, 86 percent of the office workers spent more than 6 hours on their workstations every day. It was found that majorly the workstation layout affected the upper body structure of the office workers. An ergonomically wrong workstation layout affects the physiology and psychology of the respondents. Irritation and dissatisfaction was observed in many respondents.

KEYWORDS: Ergonomics, Musculoskeletal disorders, man-machine-environment system, awkward posture, workstation layout.

INTRODUCTION

Ergonomics is concerned with relationship between man and machine. He has created with the objective of creating an environment in which man machine system becomes more efficient and the injurious effects of machinery on man are avoided. It attempts to fit the job to the man rather than to fit the man to the job. There should be an ideal relationship between the work, the worker and working conditions for the maximum work output. When imbalance between the here occurs, it automatically increases the cost of work. Most people spend 50

percent of their lives within indoor environment which greatly influences their mental status, actions, abilities and performance (Sandstorm, 1994). Thus it can be assumed that the workstation layout in offices have an impact on office workers. This impact can be physically or psychologically. Both of which may affect the worker's health and in turn his productivity. Government employees work for approximately 6-7 hours. When an employee spends many hours in ergonomically wrong workstation, his muscles experience minor tears consistently. Minor tears can occur along with subsequent scarring in the soft tissues-this is the gristly knotty bit you can feel in a tight muscles. Surrounding muscles often tighten to protect the injury site and, before you know it, a large part of the muscles has shortened, tensed up and you have a large and painful knot protecting the original injury. Workstation in government offices usually consists of a desk and chair, desktop computer which normally have fixed motions, a keyboard, a mouse, registers, documents and some stationary among other things. Only few of these workstations have separate space for keyboard and mouse. The desks are rarely large enough to accommodate all the essential things. There are certain problem areas while working on a workstation in a government office.

Physical Perspective

The basic ergonomic principles that should be kept in mind while designing a product should be done while considering worker's dimensions:

1. Human Capability: the product should be designed keeping in the mind worker's dimensions.
2. Product Reliability: this can be achieved through a design i.e., from shape, size, ease of operation and consideration of human facilities and limitation.
3. Remove unnecessary parts which do not add to efficiency.
4. Guard against chargers, hazards and unsafe things.
5. Warn about the possible dangers while using the product hazards.
6. Train by giving instructions about its safe use.

Psychological perspective

The physical factors of ergonomic risk can often be easily identified in the workplace. High force and awkward postures can be observed, as well as potentially harmful; effects they have on workers (Pain, Work related musculoskeletal disorders, lost time injuries). However there is another side of ergonomics worth noting: the psychological effects.

Purpose of Study

This study has been taken for research purpose because the workstations used in government offices have some limitations and disadvantages. Some precautions and measures must be taken to reduce avoidable musculoskeletal issues. To consider an example, a work station without an armrest, back rest or hip rest chair will often result in pain in arm, elbow, back, neck, hip and knee. This will in turn affect the work output along with long term musculoskeletal problems. Hence, it is vital that we make an attempt to reduce these avoidable risks.

Objective

1. To identify the effect of work station layout on posture.

Limitation:

1. The study shall be focused to Nagpur city only.
2. The study was restricted to non teaching staff of some selected departments of university campus.
3. The sample size for the study was limited to 100 samples only.

Methodology

Research design is a plan that specifies the source and information relevant to the research problem, approached for gathering an analysis of data. The workplace affects the worker's efficiency and productivity in the work so there are many variables which directly or indirectly affect the workers capacity. The precoded personal interview schedule was constructed to elicit the information from the government office workers of Nagpur University Campus. Psychological scale was also developed to test the job satisfaction. Observation sheets were also developed to record the pain and discomfort due to wrong work station layout. A total of 18 departments from RTMNU, campus, Nagpur were purposively selected for the present study. Simple random sample design without replacement was used. For descriptive data, sample size of 100 was selected.

RESULTS

Anthropometric dimensions and workstation dimension: The anthropometric dimensions and work station dimension are measured to understand the relation between the worker and his workstation. The specific features of the workstation determine the pain and discomfort on various body parts.

- **Height of the respondent:** Anthropometric data of the respondent such as height helped us to know the comfortable height and width of the work station required by the respondent. Proving the Indian height standards, 87 percent of the respondents were between the height of 5.1 feet to 6 feet and none was in the 5th percentile i.e. below 4 feet. Subjects with the height of 4.1 feet to 5 feet were 11 percent and only 2 percent were 6.1 feet.
- **Weight of the respondent:** sedentary lifestyle causes obesity thus, the majority i.e. 59 percent subjects weighted 61 kilograms and only one percent weighed below 40 kilogram.
- **Workstation Dimension of the respondents:** the workstation dimensions of the respondents commonly consisted of a table and a chair. The workstation has a major effect on the musculoskeletal system of the worker. The dimensions were measured to know the physical conditions of the respondents.
 - ❖ For table: after measuring the work table dimensions of each respondent, it was found that the height of the table from the floor ranged between 71 cm to 120 cm, the length was between the range of 77 cm to 187 cm and the breadth ranged from 42 cm to 77 cm.
 - ❖ For chair: the chair of the workers varied greatly. Individually measuring of the chair's dimensions revealed that the seat height from the floor was between 40 cm. To 68 cm, arm rest height ranged from 9 cm to 68 cm and the back rest height from the seat was between 46 cm to 185 cm.
- **Features of the workstation:** The detailed features of the workstation were considered to know the problem areas specifically, the pain and discomfort experienced and the solutions acquired.
 - ❖ Foot rest in the table: more than half of the subject i.e. 62 percent, had a foot rest and maximum of them had a thin wooden rod as a foot rest. Pain and discomfort was the highest because of this.
 - ❖ Back rest in the chair: Back rest was provided to almost all of the respondents but very few were adjustable, comfortable or had cushions. 96 percent of the respondents had a back rest. Only one respondent experienced pain and discomfort due to this.
 - ❖ Arm rest in the chair: 96 percent of the respondent had arm rest and the rest 4 percent of the respondents did not have any.
 - ❖ Thigh rest in the chair: it was seen that 81 percent of the respondents had sufficient thigh rest whereas 19 percent of the respondents had insufficient thigh rest.

- ❖ Lower back support in the chair: from the total 100 respondents only 38 percent had a lower back support and the rest 62 percent did not have lower back support.
- ❖ Need to stretch: it was observed that 67 percent of the respondents needed to stretch while working on their work station and 33 percent of the respondents did not had to stretch while working on their workstation.
- ❖ Need to bend: it was found that about 43 percent of the respondents needed to bend while working on their workstation. It was also seen that 57 percent of the people did not have to bend while working on the workstation.

CONCLUSION

It was found through the research survey that half of the respondents did not have a lower back support and needed to stretch forward a lot while working i.e. 62 percent and 67 percent respectively. Only 1 percent of the respondents exercised regularly. Pain and discomfort was caused due to workstation lay out and did not exist after a week away from work. The upper body structure was more affected majorly due to the workstation lay out. In the lower body structure knees were the most affected part of the body. It was also observed that the work space was not an interesting one to work in.

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