

## APPLICATION OF ERGONOMICS TO IMPROVE HEALTH AND WORK PRODUCTIVITY IN CLASS A MEDAN SEARCH AND RESCUE OFFICE

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### Abstract

Ergonomics is a science that studies human behavior about the work carried out, ergonomics is also an applied science which is an interaction that explains the interaction between humans and their workplace. Ergonomics includes examining the physical capabilities of workers, the workplace environment, and the tasks being completed and applying this information to the design of tool models, equipment, and work methods required for overall task safety. A safe, healthy, and comfortable work environment can increase worker productivity. Therefore, K3 plays an important role in increasing productivity, safety, and comfort of workers, precisely at the Medan Class A Search and Rescue Office, it is necessary to apply ergonomics in all areas of work, both indoor workers and workers in the field.

**Keywords:** Ergonomics, Workplace, Productivity.

### Introduction

An office is a place where a group of people carry out organizing activities. Kator has several capacities, such as receiving data, monitoring data, and ensuring resources or production. Office activities generally consist of activities related to structuring, organizing, coordinating, and administering which are often called POAC, namely Structuring, Organizing, Mobilizing, and Controlling. In office layout is a way to decide the implementation of the duties of the position, by examining the variables that affect the achievement of the goals of the position. One of these plans includes building arrangement, office layout, lighting, ventilation, installation, office equipment, and furniture. This must be balanced with the safety and comfort of workers in the office. Stability and safety can be balanced with office ergonomics. With the implementation of an ergonomic office, it is hoped that employees will feel safe and comfortable it will create good performance for employees.

Ergonomics is broadly speaking the thought of creating a healthy, safe, and comfortable framework. And work security is the most calculated thing in a company, especially to implement the framework. The reason for actualizing this ergonomic framework is to make Step K3 work to run well, safely, and comfortably. A safe, healthy, and comfortable work environment can make work more useful, and proficient and ensure the quality of work.

At this time, all fields of work are required to be aware of Work-related Welfare and Security, known as K3. Therefore, K3 must be advanced to reduce potential hazards and risks that can arise due to fatigue and work connections.

According to (Niu, 2010) and (Pramono et al., 2021) Abnormal work posture and repetitive movements can cause occupational diseases, one of which is musculoskeletal disorders (MSD, s). This occupational disease attacks the muscles, nerves, tendons, cartilage, and spinal cord. Many other risks

will occur if you do not apply ergonomics to office work. Reiko factors in office work related to using computers to complete work include; Chairs, computer desks, telephones, keyboards, and mice, each of these equipment must meet ergonomic requirements so that employees can use it comfortably. Therefore, the application of work ergonomics in the company is very important and must be considered, especially for workers who work facing the computer.

Based on the Regulation of the Head of the National Search and Rescue Agency Number 16 of 2017 concerning the Organization and Work Procedures of the Search and Relief Office, the Medan Class A Search and Relief Office is one of the Technical Implementation Units in the Field of Search and Relief which is under and responsible to the National Search and Relief Agency. The Medan Class A Search and Rescue Office has the task of carrying out standby, training, operations, management of communications, facilities, and infrastructure, technical guidance, manpower and potential, and Search and Rescue corrections. Medan A Class Search and Rescue Office has several Subdivisions / Sections that assist management in realizing the vision and mission, namely:

1. General Subsections
2. Search and Rescue Operations and Alert Section,
3. Search and Rescue Resources Section; and
4. Functional Position Group

The condition of work attitude that is not ergonomic is still often found in the Medan Class A Search and Rescue Office, especially in doing work in the office room

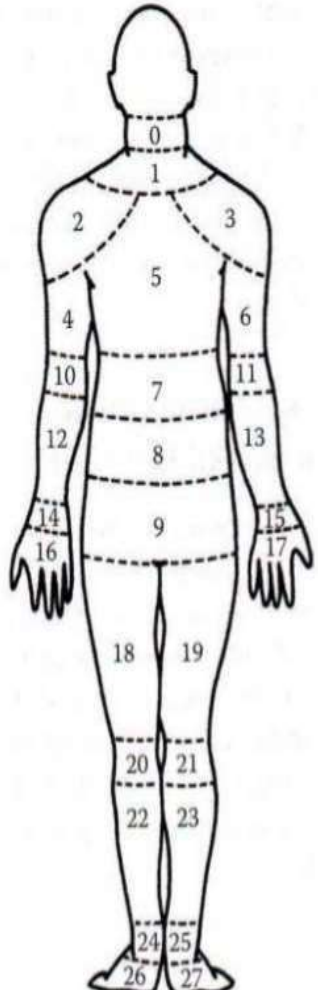
## **Research Methods**

Data Collection: by conducting surveys, interviews, questionnaire distribution, and observation of workers and the work environment. The goal is to obtain data about the behavior and conditions of the work environment

## **Results and Discussion**

In this study, research was used on fatigue suffered by operators/workers with ergonomic evaluation to determine the relationship between physical stress and the risk of skeletal muscle complaints. This measurement is through *the Nordic Body Map Standard Questionnaire*. Through this questionnaire, it can be known the parts of the muscles that experience complaints with complaint levels ranging from Not Sick (TS), Somewhat Painful (AS), Sick (S), and Very Sick (SS). By looking at and analyzing the body map as shown in Figure 1. And Standard Nordic Body Map Questionnaire as shown in Table 1. So it can be estimated the type and level of skeletal muscle complaints felt by workers.

**Table 1. Standard Nordic Body Map Questionnaire**

No	Location	Pain level				Body Part Map
		A	B	C	D	
0	Pain/stiffness in the upper neck					 <p><i>Picture 1 Body Part Map</i></p>
1	Pain in the lower neck					
2	Left shoulder pain					
3	Right shoulder pain					
4	Pain in the left upper arm					
5	Back pain					
6	Pain in the right upper arm					
7	Pain in the waist					
8	Buttock pain					
9	Pain in the buttocks (bottom)					
10	Pain in the left elbow					
11	Pain in the right elbow					
12	Pain in the left forearm					
13	Pain in the forearm right					
14	Pain in the wrist left					
15	Pain in the wrist right					
16	Pain in the left hand					
17	Right-hand pain					
18	Pain in the left thigh					
19	Pain in the right thigh					
20	Pain in the left knee					
21	Pain in the right knee					
22	Pain in the left calf					
23	Pain in the right calf					
24	Pain in the ankle left					
25	Pain in the ankle right					
26	Pain in the left leg					
27	Pain in the right leg					

In this study, the method used to identify the initial gijala to fatigue suffered by operators/workers due to improper posture in doing work, thus causing physical stress with the risk of skeletal muscle fatigue due to activity is the Nordic Body Map Questionnaire Standard method. After the questionnaire was distributed to 8 workers as samples for each division in the Medan Class A Search and Rescue office who were given the Nordic Body Map Questionnaire Standard questionnaire, the results of the work posture were as follows:

- no worker does not feel pain
- 70% of workers feel a bit of pain
- 30% of workers are sick
- No worker felt much pain

**Table 2. Standard Recapitulation of Nordic Body Map Questionnaire on Workers in Medan Class A Search and Rescue Office**

Sensation	Work Station								Instalment- Installment
	Sub General		Resources			Operation		Functional Position	
	But	Hr	Go out	Mr	Oa	Bs	Mz	Ss	
No Pain (TS)	12	22	1	16	26	17	2	22	
Agak Sakit (AS)	4	3	1	11	2	9	8	2	
Pain(S)	11	2	26	1	-	2	16	4	
Very Sick (SS)	-	-	-	-	-	-	2	-	
SS%	12	22	1	16	26	17	2	22	15
AS%	8	6	2	22	4	18	16	4	10
S%	33	6	78	3		6	48	12	27
S%	-	-	-	-	-	-	8	-	8

From the results of the table.2 almost 80% felt the sensation of work posture on the neck, shoulders, back, and waist. Disorders of this system are often called skeletal musculos disorders that can affect the function of ligaments, muscles, nerves, joints and tendons, and the spine. The factors that cause the occurrence of skeletal musculos are:

- Overuse or abuse of a group of muscles or bones for a long time without rest
- Static repetitive motion
- Wrong posture during activities.
- Wearing equipment that is not by or the limbs that carry out these activities.

For this reason, every industry/company is required to pay attention to its workers because workers are company assets that must provide their best performance for the company. If humans work in ergonomic conditions, it will directly improve their performance which will ultimately increase company productivity and reduce company costs. Conversely, if humans work in conditions that are not ergonomic, it will reduce company productivity. Work structures that are not ergonomic are often caused by poor work systems or due to human negligence.

## **Countermeasures (Development and Application of Ergonomics)**

### **4.1. Work Organization**

- All slouching or unnatural postures should be avoided. Flexion of the body or the direction of the head towards the side is more tiring than a slight bending forward. The posture accompanied by the least number of static muscle contractions is the most comfortable.
- Always try to get work done while sitting. A work attitude with the possibility of alternating sitting and standing one after another is also recommended.
- Both arms should move together or in opposite directions. If only one arm works continuously, the other muscles of the body will contract statically. Opposing movements also allow for more careful neural control of handwork activities. Work movements using the arms should be done rhythmically.

#### 4.2. Bench or Work Desk

Making poor benches and desks or machines is often the cause of static muscle work and body position that is not ideal. Then the requirements for the correct workbench are as follows:

1. The height of the work area should be appropriate so that work can be seen easily with optimal distance and a comfortable sitting posture.
2. Handles, handles, equipment, and other work aids must be placed in such a way on a desk or workbench so that the movements are most often performed in a state of flexion.
3. Static muscle work can be eliminated or greatly reduced by providing elbow, forearm, or hand support. The supports must be given soft material and can be set so that it is suitable for use.

#### 4.3 Ready to Work

##### 1. Seating

The seat must be made in such a way so that people who work with a sitting attitude get comfort and do not experience pressures on body parts that can interfere with blood circulation.

##### 2. Ker's limit

The height of the tabletop surface is elbow-high and adjusted to the posture of the body while working.

##### 3. Wide view

The clear field of view when the worker is upright measured from eye level is 0-30° Vertical downward, and 0-50° horizontal to the right and left.

##### 4. Work process

Workers can reach the craftsmanship equipment according to the position of working time and according to anthropometric measures. Should be distinguished from Western and Eastern anthropometric sizes.

#### 4.4 Workplace layout

##### 1. The display must be visible when carrying out work activities. Internationally accepted symbols are more widely used than words.

##### 2. Lifting weights

Various ways to lift weights are with the head, shoulders, hands, back, etc. Loads that are too heavy can cause injuries to the spine, muscle tissue, and joints due to excessive movement.

Factors affecting lifting and hauling activities are as follows:

- a. Load charged, carrying distance, and loading intensity.
- b. Working environment conditions are slippery, rough, ups and downs, etc.

##### 3. Work skills

##### 4. Work equipment and safety

Good ways of transporting and lifting must meet 2 kinetic principles, namely:

- a. The load is attempted to press on the outgoing leg muscles and as many weaker spinal muscles as possible are freed from the load
- b. The momentum of body movements is used to initiate movement.

Application:

- a. The handle must be precise
- b. Arms should be as close to the body and in a straight position
- c. Back should be straightened
- d. The chin is pulled as soon as the head can be erected again as at the beginning of the movement
- e. The position of the feet is made in such a way that it can compensate for the momentum that occurs in the lifting position

- f. The load is attempted to be as close as possible to the vertical line through the center of gravity of the body.
5. Carrying loads

#### **4.5. Good working and rest time for workers**

##### **1. Long working**

The length of a good day is generally 6-8 hours, the rest is for rest or life in the family and community. If the work period exceeds the existing provisions, it is necessary to arrange special breaks by organizing work and physical and spiritual freshness can be maintained.

##### **2. Take a break**

There are 4 types of rest, namely:

- a. Spontaneous rest is a short break after loading
- b. Stolen rest occurs if the workload is not balanced by workability.
- c. Specified rest is rest based on statutory provisions
- d. Rest because the work process depends on the working of machinery, equipment, or work procedures.

#### **Conclusions and Suggestions**

The application of ergonomics in the workplace aims to ensure that workers are always in good health, comfort, safety, productivity, and prosperity. Similar to the application based on Office Ergonomics Standards from the Regulation of the Minister of Health Number 48 of 2016 regarding the dominant work posture carried out in a sitting state, it is necessary to select appropriate office equipment. Suggestions in need of a little attention at the Medan Class A Search and Rescue Office to carry out ergonomic efforts are further improved, such as providing benches and office work equipment that are comparable to ergonomics, and minimize fatigue due to work can be done short breaks and stretches with the 20-20-20 method, which is every 20 minutes working on the front screen of the computer, Interspersed with 20 seconds of short breaks, looking other than the computer as far as 20 feet (6 meters), and every 2 hours of work should be interspersed for 10-15 minutes.

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