

# ANALYSIS OF RELATED FACTORS WITH SUBJECTIVE COMPLICATIONS MUSCULO SKELETAL DISEASES

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***Abstract- Occupational health is the right of every worker to be guaranteed by the business owner. Workers are free to choose the type of work so as to obtain fair and prosperous working conditions. In the scope of occupational health prosperous has a very broad meaning covers all aspects of life ranging from health, safety, tranquility, feasibility and comfort in work (PP No.50, 2012). One of the hazards of occupational health is the danger of ergonomics. The objective of the paper was to analyze factors related to subjective complaints of musculoskeletal disorder (MSDS) disease in insurance company workers. This research is a quantitative analytic research using cross sectional study design because in this research the data collection of dependent variable and independent variable is observed in the period of time together. The results showed that the description of the characteristics of work equipment factors is in accordance with the CSA standard but there are some elements that are not in accordance with the standard with the highest Y-type equipment distribution (36.7%). Relationship characteristics of work equipment factor "no significant relationship".***

***Keywords: subjective complaints, work equipment factors, ergonomic risk factor.***

## I. INTRODUCTION

The term ergonomics is known in Greek, from the ergos and nomos which have the meaning of "work" and "rule or rule", of the two words in a free sense in accordance with its development, that is a

rule or rules adhered to in the work environment. Judging from historical facts, ergonomics has blended with human culture since megalithic times, in the process of designing and manufacturing objects such as work tools and artificial goods in accordance with the needs of humans in his day [1]. Ergonomics is the study of the interaction between man and machine and other factors that influence it [2].

The International Ergonomics Association defines ergonomics as an anatomical, physiological, and psychological study of human aspects in the health, safety, and comfort of people at work, at home, and in a number of games. That, in general, requires the study of the systems and facts of human needs, machines and environments interconnected with the objectives of its adaptability.

According to U.S. Department of Labor Occupational Safety and Health Administration (OSHA), ergonomics can be defined simply as a study of workers. More specifically, ergonomics is the science of designing workers in accordance with the needs of workers rather than physically the body in accordance with its work.

The application of ergonomics in general is the activity of the design of the building (design) or re-design [3]. This may include hardware such as tools, benches, platforms, chairs, workhards, controls, displays, roads or aisles, doors, windows, etc. Ergonomics can act as an increase in occupational safety and health factors, such as the design of a work system to reduce pain and pain in human skeletal and muscular systems, work station design for visual aids. This is to reduce visual inconvenience and work posture, design a tool to reduce work fatigue. The application of ergonomic factors to products should be applicable to a limited number of specific populations without causing harm or risk in their use.

Work posture is closely related to ergonomics where in ergonomic science learned how to remind the physical and mental well-being through prevention efforts injury due to wrong work posture.

One of the key elements in ensuring that people can work comfortably and effectively is good posture. To create a good posture, many things to note include the design of the work area, body size, and most importantly the position of the limbs, such as the spine, upper limbs (arms, shoulders, palms, etc.), head, neck, and lower limbs.

Worker activities in the office are more done in a sitting position, especially workers who use computers. The working position sits better than the standing position, as described that sitting is a neutral posture of man. While sitting, blood circulation and other fluids accumulate in the leg [4]. Behind its advantages, sitting position also has some drawbacks that are limited in movement and pressure on some body parts. Working with a sitting position for a long time gives a bad effect for the body, especially for the spine. Therefore, a good posture when working with a sitting position is necessary for the body feels comfortable and is in a neutral condition.

A good sitting posture will form if the upper arm position is perpendicular to the floor and forearm so as to form an angle of 90 and thighs parallel to the floor and form the 90th angle with the lower leg [5]. Occupational Safety and Health provides three recommendations of sitting positions when using a computer. Upright sitting position, in this position the torso and neck are aligned in a straight line. The position of the thigh is horizontal and parallel to the other, supported by a rigid bottom straight vertical.

Skeletal muscle is a striated muscle attached to the bone that forms the flesh of the limbs. Muscle is an active tool of motion and bone structure is a passive movement tool. The muscle characteristics include a. Irritability is the ability of the muscles to receive and respond to various stimuli. b. Contractility is when the muscles receive stimulation, and then the muscle will have the ability to shorten. c. Extension is the ability to elongate both in passive and passive states of muscle. d. Elasticity is when the muscle in a shortened or elongated state, then the muscle has the ability to return as before when resting [6].

Physiology of skeletal muscles according to muscle cells can be chemically, electrically, and mechanically stimulated to give rise to the action potential delivered along cell membranes [7]. These cells contain contraction proteins and have mechanisms that are activated by action potentials. Approximately 40% of the total body consists of skeletal muscle. The contraction can be applied to all muscle types. Muscle Framework most of the muscles of the body attached to the frame, moving actively so that it can move the framework in a certain location(8). So skeletal muscle is a tool that controls active motion and maintains posture. In

resting circumstances it is not sagging at all, but has a slight strain called tonus. The vertebral segment consists of parts: a. Cervical Vertebra 7 segments. b. Thoracal Vertebra 12 segments. c. Lumbar Vertebra 5 segments. d. Sacral Vertebra 5 segments. e. Coccyges Vertebra 4 segments.

Musculo Skeletal Disease (MSD) is a complaint on the parts of skeletal muscle felt by someone ranging from very mild to very sick complaint. If the muscles receive static loads repeatedly and over a long period of time, they can cause complaints of joints, ligaments and tendons. Complaints to this damage are commonly termed with complaints or injuries to the musculoskeletal system. Broadly speaking muscle complaints can be grouped into two namely: a. A transient (reversible) complaint, a muscle complaint that occurs when a muscle receives a static load, but such a complaint will disappear immediately if the loading is stopped. b. Persistent complaint, i.e. persistent muscle complaints. Although work load has been stopped, but muscle pain still continues.

Skeletal muscle complaints generally occur due to excessive muscle contraction due to overloading of heavy workloads with long duration of loading. Conversely, muscle complaints are unlikely to occur when muscle contraction is only between 15-20% of maximum muscle strength. But if the muscle contraction exceeds 20%, then the blood circulation to the muscle is reduced according to the level of contraction that is influenced by the amount of power required. Oxygen supplies to the muscle decreases the metabolism process of carbohydrates inhibited and as a result occur accumulation of lactic acid causing muscle paine [8].

## II. METHODS

This research uses REBA (Rapid Entire Body Assessment) method. REBA is an ergonomic measurement method used to evaluate work, workload and posture (neck, back, arms, wrists and feet). In addition, this method is also influenced by coupling factors; external burden is supported by the body and work activities during work. Assessment using the REBA method that has been done by Dr. Sue Hignett and Dr. Lynn McAtamney through the stages dividing into 2 groups (A and B) as follows: a. Taking posture data of workers by using video or photo assistance. b. Determination of the corners of the worker's body part.

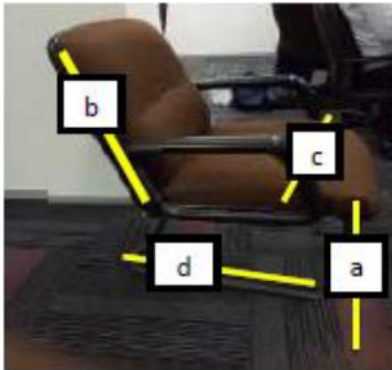
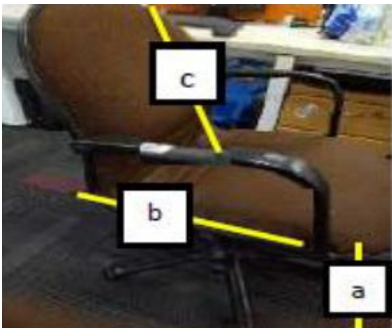
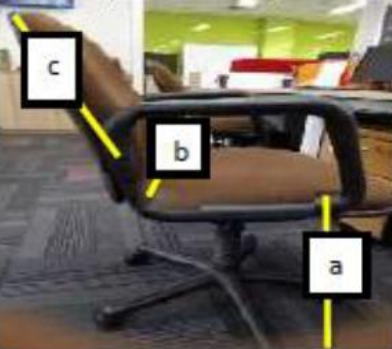
**III. RESULT**

**a. Characteristics of Equipment Factors Features**

The calculation of conformity of work equipment with CSA standard, the result of work seats of type X, Y and Z according to CSA standard. However, there are some inappropriate elements that can be seen in table 1.

**TABLE 1. ELEMENT OF UNWORKING EQUIPMENT WITH CSR STANDARDS IN PT. INSURANCE**

**JASINDO YEAR 2017**

No	Work equipment type	f	%	Unsuitable Elements
1	<p>Type of work chair X</p> 	19	31.7	<p><b>In the X work chair type, inappropriate elements include:</b></p> <ul style="list-style-type: none"> <li>a. Seat height from the floor to the seat plate obtained by the measurement 360 mm.</li> <li>b. The width of the seat holder which obtained measurement results 410 mm.</li> <li>c. The height of the chair seat obtained measurement results 410 mm.</li> <li>d. The legs of this work chair found no bifurcated 5 (five).</li> </ul>
2	<p>Type of work chair Y</p> 	22	36.7	<p><b>In the Y work chair type, inappropriate elements include:</b></p> <ul style="list-style-type: none"> <li>a. Seat height from the floor obtained results 410-485 mm.</li> <li>b. Length holder seats obtained results 380 mm.</li> <li>c. High backrest obtained result 410 mm.</li> </ul>
	<p>Type of work chair Z</p> 			<p><b>In a Z- work chair type, inappropriate elements include:</b></p> <ul style="list-style-type: none"> <li>a. Seat height from the floor obtained results 340-415 mm.</li> <li>b. The width of the seat holder work got results 390 mm.</li> <li>c. The height of the seat back seat obtained results 420 mm.</li> </ul>

Source: Primer Data 2017

b. Relationship Characteristics of Work Equipment Equivalents

**TABLE 2. RELATIONSHIP CHARACTERISTICS FACTORS FITNESS APPLICATION WORK EQUIPMENT WITH SUBJECTIVE COMPLAINTS COMPLETE SUCCESS STANDARDS MSDs DISCUSSION DIVISION HR, NETWORK, BUDGET ACUTHANCE, BANKING AND SENIORS IN PT. INSURANCE JASINDO YEAR 2017**

No.	Type of work equipment	Ignored		Low		Medium		High		Total		P-Value
		F	%	F	%	F	%	F	%	F	%	
1.	Type X	2	10,5	3	15,8	7	36,8	7	36,8	19	100	0,784
2.	Type Y	0	0	3	13,6	11	50,0	8	36,4	22	100	
3.	Type Z	2	10,5	2	10,5	7	26,8	8	42,1	19	100	
	<b>Total:</b>	<b>4</b>	<b>6,7</b>	<b>8</b>	<b>13,3</b>	<b>25</b>	<b>41,7</b>	<b>23</b>	<b>38,3</b>	<b>60</b>	<b>100</b>	

Source: Data Primer 2017

The results of table 2 obtained statistical test results obtained p-value 0.784 with the highest type of work equipment on type Y with moderate severity category (50%).

#### IV. DISCUSSION

a. Characteristics of Equipment Work Factors Features

The distribution of work equipment factors with CSA standard, the results of X, Y and Z work seats are in accordance with the standard. However there are some elements of these three types of work chairs that do not conform to CSA standards. In the X-type work chairs the unsuitable elements include: seat height, seat width, seat height and seat legs. As for the type of workstation type Y elements that are not appropriate include: seat rest height, seat holder length, and seat height. And for the type of seat Z elements that are not appropriate include: seat rest height, seat holder width and seat height. Some factors make these elements incompatible with the seat height and height of the chair because the non-adjustable chair type X chairs make the chair unable to adjust the worker's body size and for the Y and Z type chairs which are the adjustable chair type chairs do not fit with seat height and seat height adjustable chair when researchers try it cannot function as it should be.

The average type of seat does not conform to the CSA standard on the height of the backrest, the seat width and the absence of the arm support [8]. This is what can cause if the worker sits in a long duration and continuously makes the worker's posture

sit in awkward posture, because the height of the chair back is very important to be able to hold the S curve on the spine and keep the sitting posture normally.

The preventive measures that can be taken to reduce the factors of the work equipment include: if the worker has to sit in the work seat that is inconsistent with the anthropometry of the worker then the worker can add the bearings on the height of the chair back and the seat rest width so that the torso can comfortably sit in duration the old and if the body has felt a sense of stiffness or tingling immediately do the replacement of posture to workload static is reduced and for the company if you want to buy a new work chair it should consider the standard elements of work seats such as backrest, seat, armrest and buffer.

b. Relationship Characteristics of Work Equipment Factors

The statistical test result, the p-value value of the conformity factors of the work equipment obtained p-value 0.784, which means "no relationship" with the severity of MSDs disease subjective complaints with the highest distribution on the Y-type seats (50.0%) with moderate severity category.

This is because of the result of suitability of work seats with CSA standards for the three types of work chairs X, Y and Z are in accordance with CSA standards. However, there are some elements that have not met the CSA standard for the high-back

element that greatly affects the worker's posture while sitting and by adjusting the height of the seat so that slightly below the knee can make the height of the chair's seat in accordance with the anthropometry of the worker [9]. In addition, the height of the chair back is also an important thing to be considered. The backrest of the chair should be able to buffer the spine proportion perfectly. Therefore a good work chair should have a support dolphin to support the shape of the spine in the form of S. The seat height recommended by the CSA is still in the same handbook that is about 450-550 mm, with the width of the backrest greater than 350 mm. While the height of the lumbar support is 150-250 mm above the seat rest. For backrest X-type work seats, Y and Z do not meet CSA equipment requirements standards. (From elements not conforming to CSA standards) can be done by: a. workstation must meet the requirements of one of them (backrest) should be able to support the "S" curve of the natural contour of the back is easily adjusted. If the backrest does not conform to the existing standard, it will cause symptoms such as aches, pains, cramps and numbness of the back and waist of the respondent sitting in the working chair. If you want to buy a new work chair is expected to pay attention to the elements of the work chair: backrest, seat, armrest and buffer [10]. b. Working chairs should have 5-wheeled fork legs because these branches serve to accommodate the movement of the user and be able to support the work of the chair firmly and steady while sitting so that the seated worker can be stable and easy to move and reduce the pressure on the foot that must bent at work.

#### V. CONCLUSION

Research conducted at PT. INSURANCE JASINDO on the division of HR, Network, Budget Accounting, Banking and Agency then it can be drawn conclusions, among others: a. The description of the characteristics of work equipment factors is in accordance with the CSA standard but there are some elements that are not in accordance with the standard with the highest Y-type equipment distribution (36.7%). b. The relationship characteristic of work equipment factors "no significant relationship".

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