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Analysis Of The Work Posture Of Office Employees To Evaluate The Level Of Work Risk Using The *Rapid Office Strain Assessment* (ROSA) Method

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ABSTRACT

Office ergonomics is a branch of ergonomics that covers the entire work environment (workstations) and work tools (especially using computers and chairs) in offices. Computer users or office workers often experience health problems related to musculoskeletal disorders (MSDs). The Secretariat and P3T BUMD Gresik Regency use a computer/laptop as the main work tool. Secretarial employees use computers for 8 (eight) hours daily, while P3T employees use computers for about 5 hours daily. The method used in this study was the Rapid Office Strain Assessment (ROSA). Assessment of work posture using the ROSA method on six office employees at BUMD Gresik Regency is divided into three sections. Section 1 assesses the height of the seat, the outside of the backrest seat surface, and the chair's armrest. Section 2 conducts an assessment of the use of monitors and telephones. Section 3 assesses the use of mice and keyboards. Based on the calculation results using the ROSA method, the results obtained at the risk level value for each employee, namely, four employees have a high-risk level value or are at a dangerous/risky level and need to be repaired immediately. The other two employees indicate a safe / non-risky risk level.

Keywords: Computer, Office Ergonomics, Secretariat and P3T, BUMD, MSDs, ROSA

Introduction

Computers have been used in business applications since the mid-1950s, and hardware and software have evolved tremendously. The rapid development of information and communication technology (ICT) has reduced the use of pen and paper to a minimum (Yahfizam, 2019)[1]. Computer usage, considered non-ergonomic, can cause various problems, such as headaches, stress, muscle pain, and tension in the neck, back, arms, shoulders and other parts related to computer use [2]. Computer users or office workers often experience health problems related to musculoskeletal disorders, which can interfere with the functioning of muscles, tendons, nerves, blood vessels, bones, and ligaments due to a position considered uncomfortable. Serious consequences. (Ayu et al., 2020) [3], [4].

Computers are very important in working life, as well as in the office. The presence of computers is beneficial for office workers. Work is completed quickly and efficiently. The office is used by employees continuously during opening hours. Unnatural work positions and postures can cause fatigue and discomfort at work. Ergonomic risks for office workers are not considered significant. Ergonomic risks arise, including musculoskeletal disorders[5]. Work posture is a vital point when analyzing work performance. If the operator's working position is correct and ergonomic, then the operator will get a good result [[6][7]. Musculoskeletal disorders (MSDs) are disorders of the musculoskeletal system caused by work and work performance, such as unnatural posture, load, duration, and frequency, as well as individual factors (age, length of service, smoking habits, BMI, and gender) [8]. Office workers around the world commonly report musculoskeletal disorders. These diseases negatively affect the health and productivity of workers. Risk factors develop in such a way that the occurrence of TULE disease can be divided into individual factors, ergonomic factors, and psychosocial factors [9].

Office ergonomics is a branch of ergonomics that covers the entire work environment (workstations) and work tools (especially using computers and chairs) in offices. (Kroemer, et al., 2001) [5], [10]–[13]. Office ergonomics is the application of ergonomics that covers the entire work environment and work tools such as computer devices and chairs[14]. The focus of ergonomics is people and their interaction with products, equipment, facilities, procedures, and environments used in work and daily living[15]. The frequency with which computers are used extensively in work tasks without considering ergonomics can put users at risk of injury. Users experience the effects of excessive fatigue, such as muscle pain, headaches, stress, and some parts of the body, such as the neck, back, arms, shoulders, and parts directly related to computer work, experience tension.[10].

The Secretariat and P3T BUMD Gresik Regency use a computer/laptop as the primary work tool. Secretarial employees use computers for 8 (eight) hours a day, while P3T employees use computers for about 5 hours daily. A preliminary study was conducted at the secretariat with a sample of (four) people, 2 (two) male

employees and 2 (two) female employees, then 2 (two) male employees with an average age of 25-40 years. Then a Nordic Body Map (NBM) questionnaire was distributed with 28 questions.

Employee complaints can be minimized and prevented by determining the employee's posture when using a computer using the ROSA (Rapid Office Strain Assessment) method. The Rapid Office Strain Assessment (ROSA) is designed to measure the risks associated with computer work quickly and to establish a level of action for changes based on worker discomfort reports. ROSA proved to be an effective and reliable method for identifying risk factors for computer use related to discomfort [5], [11]–[14], [16]. By using the ROSA method, it can be seen whether the workplaces of several head office employees in one of the BUMD Gresik Regency are safe or unsafe while working work.

Research Methods

The method used in this study was ROSA (Rapid Office Strain Assessment). ROSA is an office ergonomic assessment method designed to measure the risk of computer use and determine the degree of change based on worker-reported discomfort[10], [11], [25], [17]–[24].

This study aimed to determine the relationship between occupational factors and individual factors of musculoskeletal complaints of the secretariat and P3T BUMD workers of Gresik Regency according to individual factors (gender, physical activity, length of work, and age) and employment factors.

Data collection in this study was focused on the Secretariat and P3T of BUMD located in Gresik Regency with interviews and observations. Interviews were conducted with workers to obtain information on respondents' profiles and the duration of the action using work tools. Observation activities aim to get information about the work process and an overview of the work environment in the operational department and to analyze the interaction of workers with work equipment such as chairs, telephones, and a set of computers.

Part A : assessment of the use of work chairs, including, seat height, outside the surface of the backrest seat, and seat armrests. The completed Part A observation form is in figure 1.

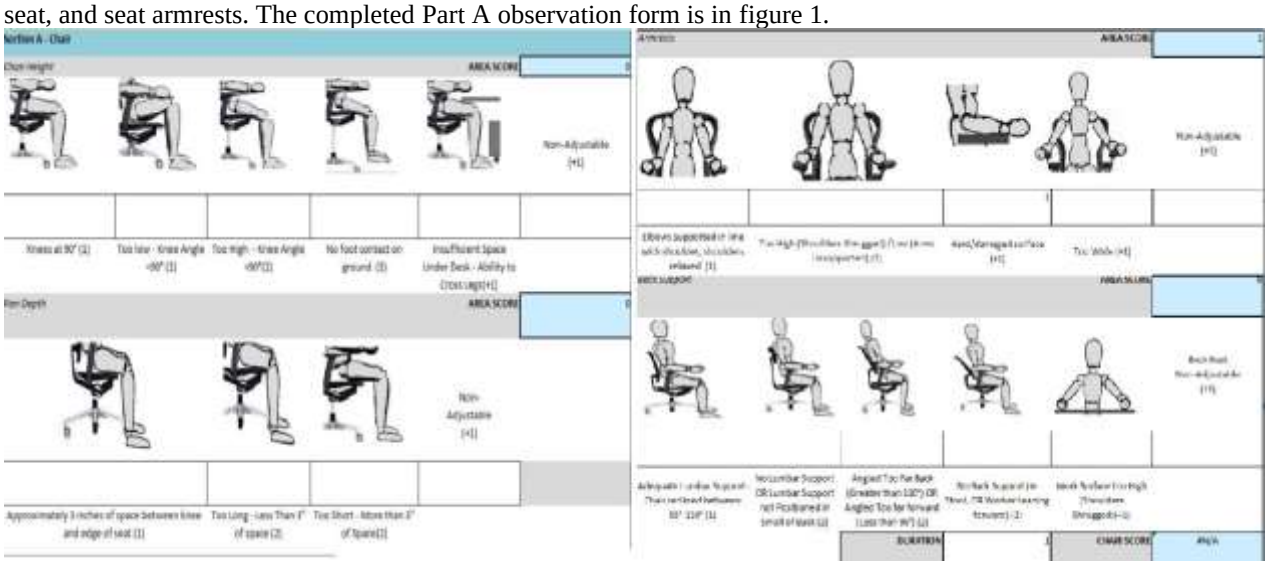

Figure 1. Part A Observation Form

Part B : assessment of the use of monitors and telephones by workers, including the distance of the monitor and mata, the light setting of the monitor, the range of the telephone, and the way the phone is glued. The observation form filled out is in figure 2.

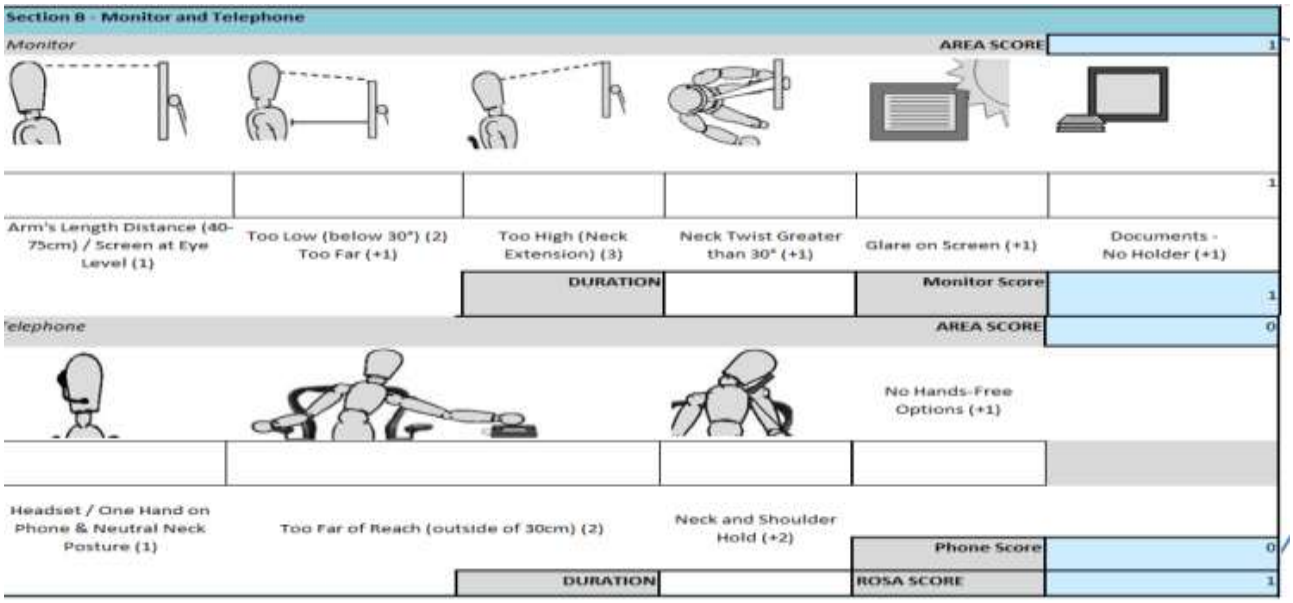

Figure 2. Part B Observation Form

Part C: Assessment of the use of the Mouse and keyboard, including the position of the Mouse and keyboard when working and the role of the hands in the operation of the Mouse and keyboard. The observation form is in figure 3.

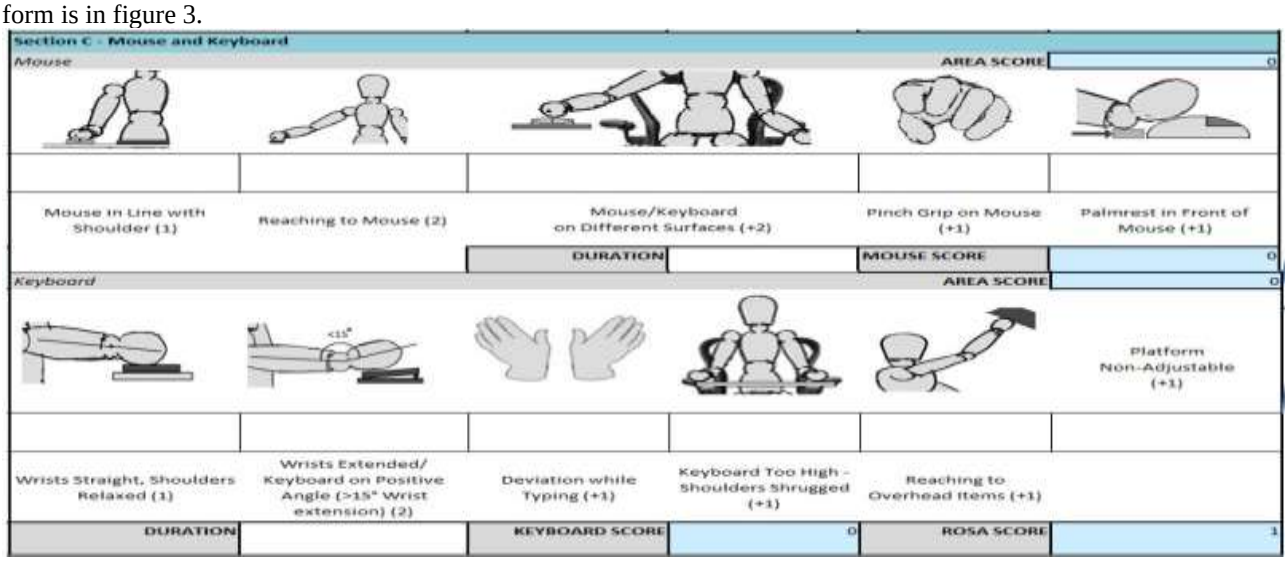

Figure 3. Observation Form Part C

The final score assessment is done by summing the scores of parts B and C, that is, the mouse and keyboard parts and the monitor and phone parts. The assessment results of parts B and C (Monitor and Peripheral) will be combined with the assessment of part A (chair) as the final score of ROSA. The following figure is the final assessment flow of the ROSA method.

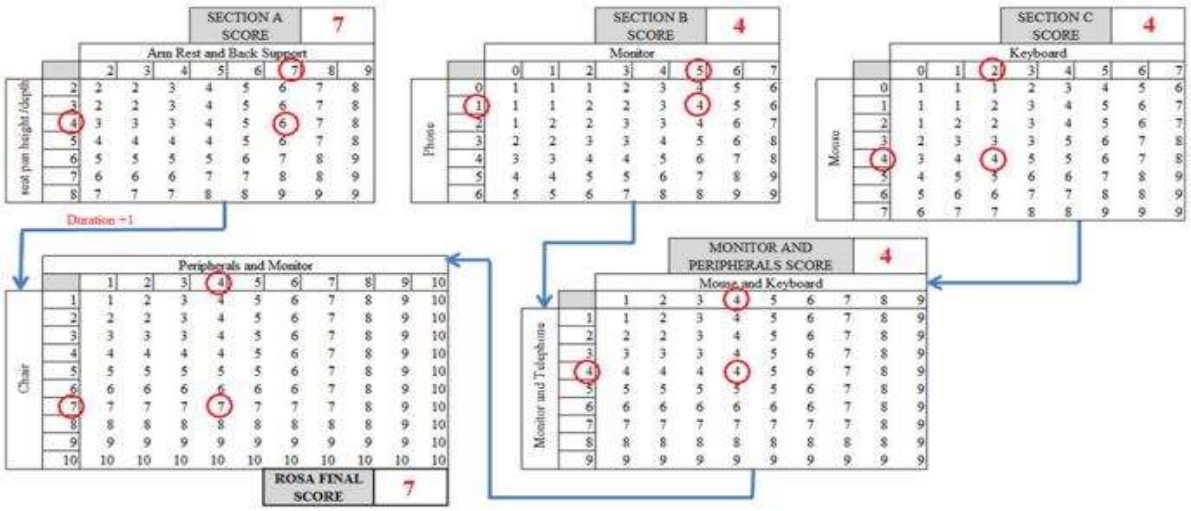

Figure 4. Final Assessment of Rosa Method

Results and Discussion

Assessment of Working Posture Using the ROSA Method

Assessment of work posture using the ROSA method on 6 office employees at BUMD Gresik Regency which is divided into 3 sections, so that the following values can be obtained:

- *Section A*

a. Seat Height Data

Table 1. Recapitulation of seat height data

No	Employee	Measurement Results	Formed Foot Angle	Seat Height Adjustment	Score
1	Employee 1	109,86°	≥ 90°	Non-Adjustable	3
2	Employee 2	58,69°	≤ 90°	Non-Adjustable	3
3	Employee 3	60,67°	≤ 90°	Non-Adjustable	3
4	Employee 4	105,96°	≥ 90°	Non-Adjustable	3
5	Employee 5	92,6°	≥ 90°	Non-Adjustable	3
6	Employee 6	87,98°	≤ 90°	Non-Adjustable	3

b. Seat Depth Data

Table 2. Recapitulation of seat depth data

No	Employee	Measurement Results	Formed Leg Angles	Seat Height Adjustment	Score
1	Employee 1	109,86°	≥ 90°	Non-Adjustable	3
2	Employee 2	58,69°	≤ 90°	Non-Adjustable	3
3	Employee 3	60,67°	≤ 90°	Non-Adjustable	3
4	Employee 4	105,96°	≥ 90°	Non-Adjustable	3
5	Employee 5	92,6°	≥ 90°	Non-Adjustable	3
6	Employee 6	87,98°	≤ 90°	Non-Adjustable	3

c. Armrest Data

Table 3. Recapitulation of armrest data

No	Employee	Armrest Position on the Chair	Armrest Arrangement	Score
1	Employee 1	No Armrest on the seat	Non-Adjustable	3
2	Employee 2	No Armrest on the seat	Non-Adjustable	3
3	Employee 3	No Armrest on the seat	Non-Adjustable	3
4	Employee 4	No Armrest on the seat	Non-Adjustable	3
5	Employee 5	No Armrest on the seat	Non-Adjustable	3

6	Employee 6	No Armrest on the seat	Non-Adjustable	3

d. Backrest Data

Table 4. Recapitulation of backrest data

No	Employee	Backrest Position	Table Surface Position	Backrest Arrangement	Score
1	Employee 1	Part of the Back	Tall	Non-Adjustable	4
2	Employee 2	Part of the Back	Not High	Non-Adjustable	3
3	Employee 3	Part of the Back	Not High	Non-Adjustable	3
4	Employee 4	Part of the Back	Not High	Non-Adjustable	3
5	Employee 5	Part of the Back	Not High	Non-Adjustable	3
6	Employee 6	Part of the Back	Not High	Non-Adjustable	3

- *Section B*

a. Monitor Usage Data

Table 5. Recapitulation of monitor usage data

No	Employee	Monitor Position	Monitor Distance	Monitor Lighting	Paper Backrest	Score
1	Employee 1	Parallel	Enough	Enough	None	2
2	Employee 2	Too Low	Too Far	Enough	None	4
3	Employee 3	Too Low	Too Far	Enough	None	4
4	Employee 4	Too Low	Too Far	Enough	None	4
5	Employee 5	Parallel	Too Far	Enough	None	3
6	Employee 6	Too Low	Too Far	Enough	None	4

b. Phone Usage Data

Table 6. Recapitulation of phone usage data

No	Employee	When Picking Up the Phone	Phone Distance	Score
1	Employee 1	With One Hand	Away from the work area	3
2	Employee 2	With One Hand	Away from the work area	3
3	Employee 3	With One Hand	Away from the work area	3
4	Employee 4	With One Hand	Away from the work area	3
5	Employee 5	With One Hand	Close to work area	2
6	Employee 6	With One Hand	Close to work area	2

- *Section C*

a. Mouse Usage Data

Table 7. Recapitulation of mouse usage data

No	Employee	Mouse Position	Mouse Location	Palm Rest	Score
1	Employee 1	Parallel to the shoulders	One Table with Keyboard	None	1

2	Employee 2	Parallel to the shoulders	One Table with Keyboard	None	1
3	Employee 3	Parallel to the shoulders	One Table with Keyboard	None	1
4	Employee 4	Parallel to the shoulders	One Table with Keyboard	None	1
5	Employee 5	Parallel to the shoulders	Not One Table with Keyboard	None	3
6	Employee 6	Parallel to the shoulders	One Table with Keyboard	None	1

b. Keyboard Usage Data

Table 8. Recapitulation of keyboard usage data

No	Employee	Wrist Position	Keyboard Settings	Score
1	Employee 1	Straight	Non-Adjustable	2
2	Employee 2	Straight	Non-Adjustable	2
3	Employee 3	Straight	Non-Adjustable	2
4	Employee 4	Straight	Non-Adjustable	2
5	Employee 5	Straight	Non-Adjustable	2
6	Employee 6	Straight	Non-Adjustable	2

Determination of the Final Value Using the ROSA Method

1) Section A's assessment focuses on office furniture in the form of chairs. Observations were made on (*seat pan depth*), (*chair height*), (*Back Support*), (*arm rest*), and the duration of sitting in one day. Figure 5 is the result of the assessment in part A

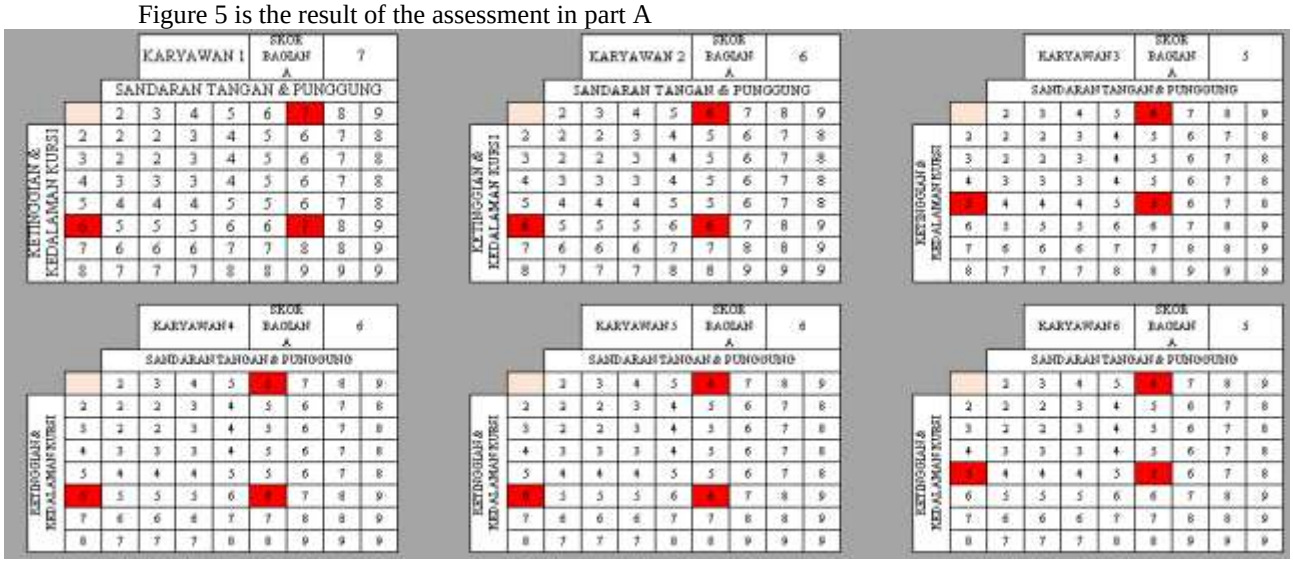

Figure 5. Part A Assessment

2) The assessment in part B is focused on the monitor, telephone and the area around the workbench. Detailed observations on the distance of the eye with the monitor, the light setting of the monitor, the backrest of the document, the telephone range of the worker, how to use the phone, as well as the duration of staring at the monitor and the use of the phone in one day. Figure 6 is the result of the assessment in section B.

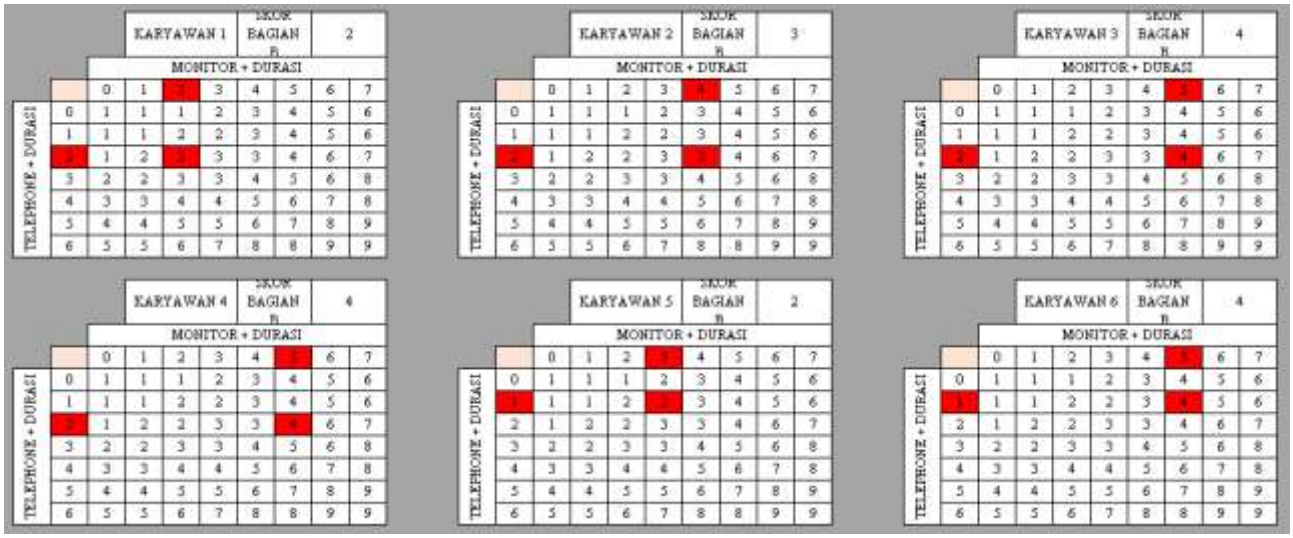

Figure 6. Part B Assessment

3) The assessment in section C is focused on the *Mouse* and *keyboard*. The observations in this section are focused on the location of the Mouse and keyboard on the workbench, the position of the wrist when operating the Mouse and keyboard, and the duration of mouse and keyboard use in a working day. The following are the assessment results in part C contained in Figure 7.

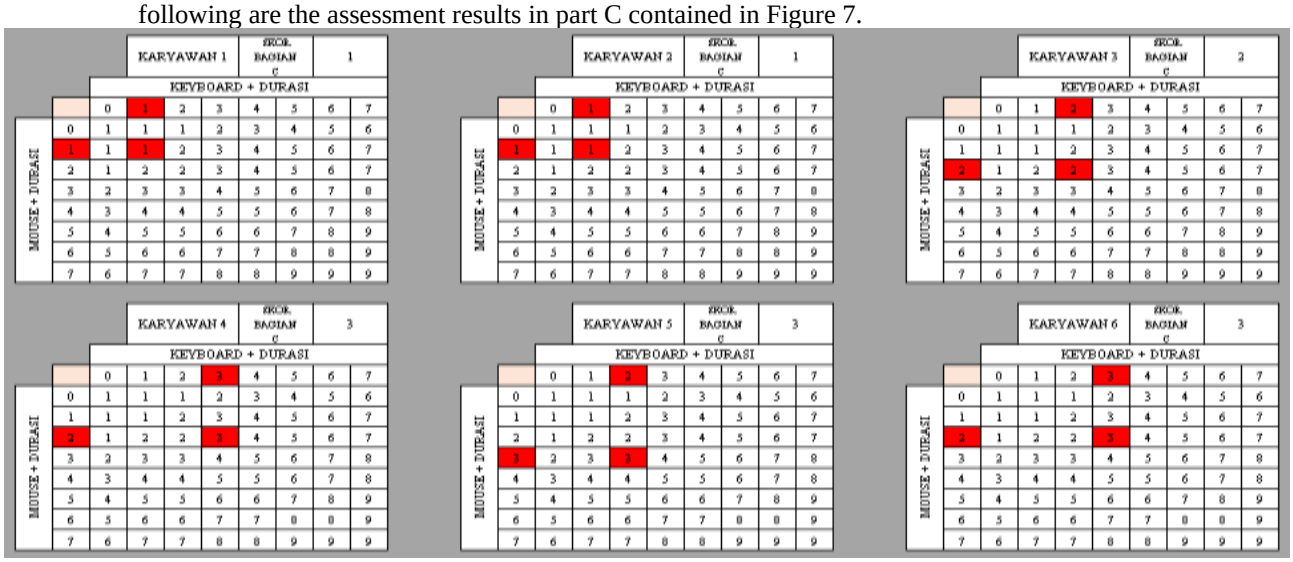

Figure 7. Part C Assessment

4) Rosa final score determination through Part A score calculation with *monitor and peripheral score* as described in figure 2. The monitor and peripheral score is obtained from the total of the monitor and telephone scores in part B and the *mouse* and *keyboard* scores in part C. The following figure is a determination of the monitor *and peripheral score.*

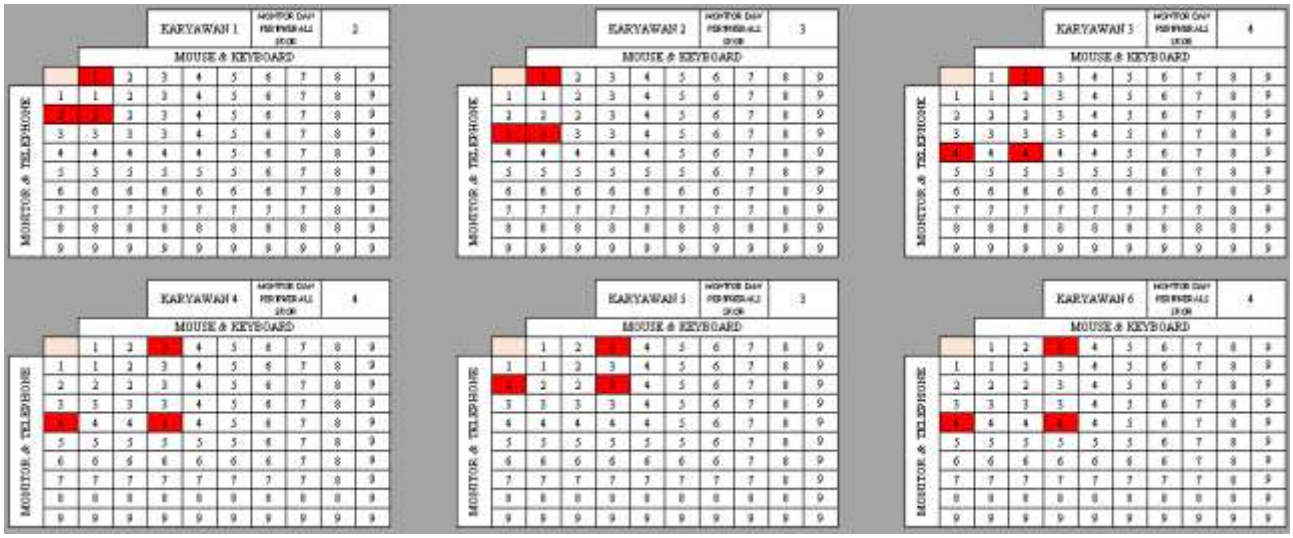

Figure 8. Monitors and Peripherals Scores

5) Rosa's final score is obtained from comparing part A (seat score) with *the monitor and peripheral score*. The following figure results from a final assessment of ergonomic risk with ROSA.

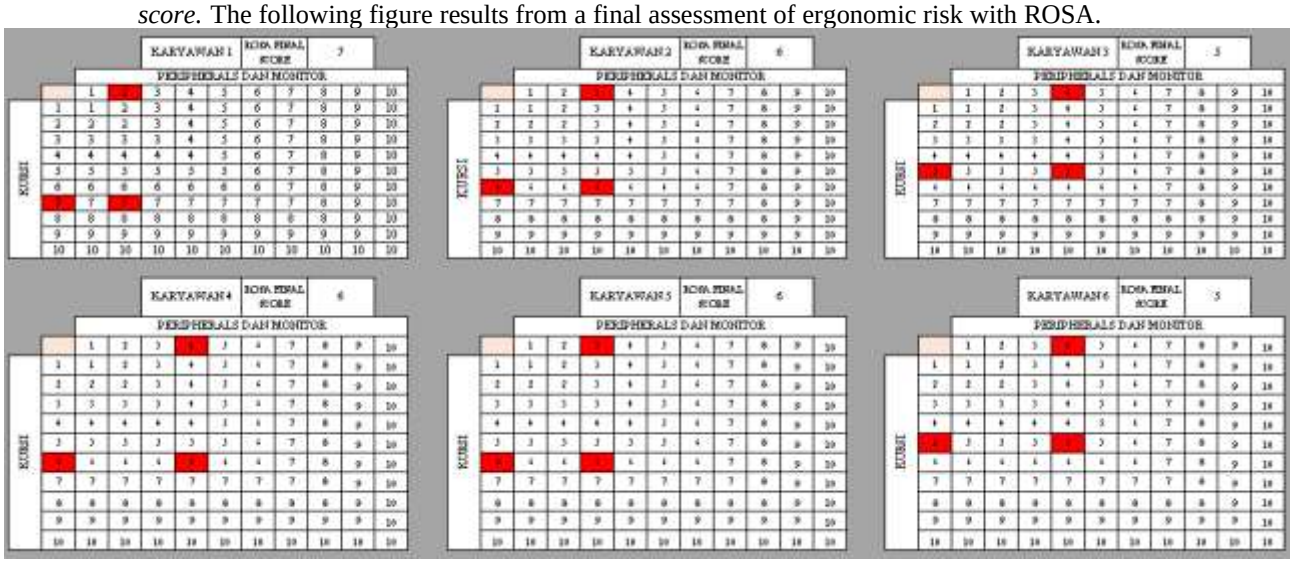

Figure 9. Rosa's Final Score

6) Risk Level Classification

After obtaining the final results of each sample at the time of data processing, a risk level classification is carried out based on the final score obtained, regardless of whether the job is risky or not. If the score is less than 5 (five) it is considered not risky, while if it is above 5 (five), it is considered risky, and an evaluation of the employee and workplace should be carried out. Table 2 shows the classification of risk levels.

Table 9. Classification of risk levels of MSDs.

NO	Employee	Gender	Age	Part	Value	Risk Level
1	Employee 1	Man	42 Years	P3T Section Employees	7	Risky
2	Employee 2	Man	27 Years	Employees of part Secretariat	6	Risky
3	Employee 3	Woman	26 Years	Employees of the Secretariat Section	5	No Risk
4	Employee 4	Woman	25 Years	Employees of the Secretariat Section	6	Risky
5	Employee 5	Man	34 Years	P3T Section Employees	6	Risky
6	Employee 6	Man	28 Years	Employees of the	5	No Risk

Of the highest risk factor value of 10, there is one employee who has the highest value, namely, 7 (seven) in employee 1 in the P3T section. Then three employees have a value of 6 (six). Then the lowest value is 5 (five) in the 3rd and 6th employees in the Secretariat section. From the value obtained, it can be seen that some employees have a dangerous risk because the value is more than 5, so it must be improved soon

Problem Cause Analysis

Once you know the final value for each sample, the next step is to determine the cause of the problem. Identifying the cause of the problem is to reduce the risks felt by employees. The high-risk value is caused by 2 (two) main factors, namely the premise that does not support workers' ignorance in using good and correct facilities. Some of the causes of this research problem are as follows.

1. At the seat height of 6 (six) employees, all employees have not felt comfortable using the chair while working because the use of the chair is too high and too short. The seat height also cannot be adjusted so that the employee sits with a knee position of less than 90° or more than 90°.
2. The depth of seating cannot be set for all workers. This can affect the comfort of employees during work. Used seats are uncomfortable because they are too small, and the depth of the seat cannot be adjusted. Adjusting the chair depth is necessary if the worker wants to be in a safe and comfortable position so that the worker can change his body to the table he uses during work. On the backrest, all employee seats are unmanageable; only Part of the back has cushions, not all over the back.
3. On the monitor, some employees are still using laptop work tools. The position of the screen on the laptop that is too low causes the head to lower slightly to see the screen more clearly.
4. On the use of Mouse and keyboard, all employees are already good at using it. However, there is one employee for there is a difference on the surface between the keyboard and Mouse that can cause risks employees will feel, and there are also some employees who use a laptop *touchpad* which is considered to cause a risk of pain in the wrist.

Conclusion

Based on the results of the analysis of the employee's working posture, to find out and analyze the level of risk of work posture of each employee who works using a computer using the appropriate method. The following conclusions can be known in this study:

1. Based on the calculation results using the ROSA method, the results obtained at the risk level value for each employee, namely, four employees have a high level of risk or are at a dangerous/risky level and need to be corrected immediately. In comparison, the other two employees indicate a safe/non-risky level of risk.
2. The cause of the high-risk score is that the space workers use less support, including chairs without armrests and other devices on used chairs, tables that are too high, and screens that are not placed correctly in front. The eyes and keyboard are too high. Then the duration of computer use that is too long is 6-8 hours a day. The control carried out can be in the form of substitution, namely replacing chairs that are no longer ergonomic, engineering control with repairs/modifications of workstations/work tables following Permenkes No. 48 of 2016 concerning Occupational Safety and Health Standards of.

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