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# *ERGONOMIC RISK ANALYSIS OF MUSCULOSKELETAL DISORDERS (MSDs) USING ROSA AND REBA METHODS ON ADMINISTRATIVE EMPLOYEES FACULTY OF SCIENCE*

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***ABSTRACT***
*In administrative tasks, computers really need help so they can get the job done quickly and efficiently. Computers in the administration department are managed by a job that runs continuously for eight hours. Improper work posture and posture can cause fatigue and discomfort at work. One of the influencing factors is the working posture and body posture during these activities. This study aims to reduce the level of risk gained by performing Rapid Office Strain Assessments (ROSA) and Rapid Entire Body Assessments (REBA) for clerical staff in engineering departments. Posture analysis data processing using the ROSA (Rapid Office Strain Assessment) method found that five of her employees surveyed were at risk levels and needed to be corrected immediately. The Rapid Entire Body Assessment (REBA) method shows that five employees are currently at risk of urgent needs and requirements.*
***Keywords :*** *Ergonomics, Musculoskeletal Disorders, ROSA, REBA*

## 1. Introduction

Administrative work is in dire need of computer assistance so that work can be completed quickly and efficiently(Vahdat, 2021). The computers in the administration department are staffed by a continuous eight-hour job. Improper work postures and postures can cause fatigue and discomfort at work. Ergonomic risks that can arise include musculoskeletal disorders. This hypothesis is due to the fact that the management of science and technology occurs mainly with monitors, keyboards, mice, tables and chairs. The work done by workers is generally repetitive and requires good physical fitness. Whenever working in an awkward position strains a body part and can cause injury, fatigue can lead to permanent disability can reduce the occurrence of injuries during work(Loske, et al., 2021).

One of the influencing factors is work posture and body posture when doing these activities. This is very important because the writing of student data letters is strongly influenced by employee behavior(Katano, et al., 2021). If one of the working positions used by workers is not ergonomic, they will tire quickly and their level of concentration and precision will be disturbed. The functioning of the faculty of science and technology is a necessary phenomenon, but in most cases the faculty does not pay attention to the needs and concerns of their workers. For this reason, workers often feel dissatisfied with certain parts of their bodies. The average number of absences per month is five, including sick leave and fatigue pensions. This will result in less than optimal service(Wibowo & Mawadati, 2021).

Fatigue/injury factors covered in this study are physical factors that cause work accidents at the Registrar's Office of the Faculty of Science and Engineering. Measurement of management work posture is carried out with the help of Rapid Office Strain Assessment (ROSA) and Rapid Entire Body Assessment (REBA)(de Barros, et al., 2022). This method was chosen because it is in accordance with the characteristics of the government which requires coordination in the management of the science and engineering departments. This study aims to reduce the level of risk achieved by conducting a Rapid Office Strain Assessment (ROSA) and a Rapid Systemic Assessment (REBA) for administrative staff in the department of science and technology. After processing work posture analysis data using the Rapid Office Strain Assessment (ROSA) method, it was found that five employees in the survey sample were at a dangerous level of risk and needed to be corrected. The Whole Body Assessment (REBA) method shows that five employees are at

the required and urgent level of risk. Improvements to reduce the level of risk aimed at reducing MSD-related complaints(Tajvar, et al., 2022). Swap or replace the existing chair with a more ergonomic chair with a fixed working time limit so that employees can go home from work smoothly and avoid injury to the science and technology faculty administrator.

Ergonomics is a science that examines human interaction with component systems to obtain optimal designs related to work postures and overall system performance. Ergonomics also includes optimization, efficiency, health, safety and human comfort at work, at home, and in recreation areas. Ergonomics requires the study of systems where humans, work facilities and the environment interact with each other with the main goal of adapting the work atmosphere to humans (Restuputri, 2017). In general, the goals of ergonomics include: increasing physical and mental well-being so as to prevent work-related injuries and illnesses, reduce physical and mental workloads, and seek job satisfaction. Improving social welfare through improving the quality of social contacts and coordinating proper work, useful for increasing social security both during the productive age and after being unproductive, creating a rational balance between technical, economic, and anthropological aspects of each work system carried out so as to create quality work and high quality of life. Understanding the principles of ergonomics will make it easier to evaluate each task or job even though science in ergonomics continues to progress and the technology used in the work continues to change. Ergonomics principles are guidelines in applying ergonomics in the workplace (Hutabarat, 2017).

*Musculoskeletal disorders* (MSDs) is a problem that causes discomfort in striated muscles, the meeting of two bones (joints) and other soft tissues (tendons and ligaments) from mild to severe complaints. Complaints arise due to repetition of loading in a stationary position for a long duration and working period(Lubis et al., 2021). If the muscles experience interference with daily activities such as doing work, it can be disrupted because muscle strength is an important part of the organs of the human body so that the body can move. The onset of pain in these muscles can result in lowering one's work productivity. In addition, excessive muscle contraction coupled with giving a load that is too heavy for a long enough duration will certainly raise the risk of MSDs complaints. (Tjahayuningtyas, 2019). MSDs are complaints or disturbances felt by a person ranging from mild complaints to feeling very sick in the musculoskeletal area which includes the joints, nerves, muscles and spine due to unnatural work. If the muscles experience interference with daily activities such as doing work, it can be disrupted because muscle strength is an important part of the organs of the human body so that the body can move. The onset of pain in this muscle can result in lowering one's work productivity (Tarwaka, 2015).

Work is a human activity to change certain conditions of the natural environment which is intended to maintain and maintain its survival. Ergonomics studies related to human work in this case are shown to evaluate and redesign work procedures that must be applied in order to provide increased effectiveness and efficiency as well as comfort or safety for humans as work.(Erliana & Zaphira, 2019). Work posture is the attitude of the body when working. Different work attitudes will produce different strengths. When working, the posture is designed to be natural so that it can reduce the incidence of musculoskeletal injuries. Good work posture is largely determined by the movement of the body's organs while working (Wijaya & Muhsin, 2018).

## 2. Literature Review

### *Rapid Office Strain Assessment* (ROSA)

Rapid Office Strain Assessment (ROSA) is one of the methods in office ergonomics, where the assessment is designed to measure the risks associated with computer use and to determine the level of change action based on reports of discomfort at work. In this method, the assessment is carried out by analyzing the posture of which the assessment is carried out by filling out a checklist such as using the checklist in REBA(Pajoohnia, et al., 2022).

The risk factors for using computers differ in several ways, namely chairs, monitors, telephones, mice and keyboards. These risk factors are given an increasing value from 1 to 3. At the final ROSA value, a value ranging from 1 to 10 will be obtained. If the final value obtained is greater than 5, it is considered high risk and must be administered at a workplace that is concerned. In this method, the length of time a worker is in that position is considered(Agustin, et al., 2021).

As for based on the following observations:

1. If the duration is less than 30 minutes continuously or less than 1 hour every day, then the value is -
2. If the duration is between 30 minutes to 1 hour continuously or between 1 hour to 4 hours every day, then the value is 0.
3. If the duration is more than 1 hour continuously or more than 4 hours every day, then the value is +1.

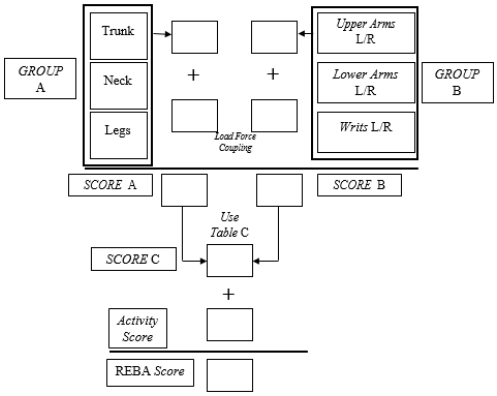
The ROSA method scores indicate increasing values associated with the level of risk found for each risk factor. The risk factors are given from 1 to 3 and the sum of the values of the influencing risk factors gives the maximum value (Erliana & Zaphira, 2019).

***Rapid Entire Body Assessment* (REBA)**

This method can be used to quickly assess a worker's posture. In addition, the method is also influenced by coupling factors, external loads supported by the body and worker activities (Prabaswari et al., 2020; Budiyanto & Setiyoso, 2021).

The inputs for the REBA method are:

1. Retrieval of worker posture data using camera photos.




2. Determination of angles on the torso, neck, legs, upper arms, forearms and wrists.

Fig. 1. REBA Final Score

The REBA output that needs to be produced is based on the final result of the total value of the REBA assessment as shown in the table below.

Table 1 – Action Level method REBA

| Action Level | Score REBA | Risk Level | Corrective Action |
|---|---|---|---|
| 0 | 1 | Can Be Ignored | No Need |
| 1 | 2 – 3 | Low | May Need |
| 2 | 4 – 7 | Currently | Need |
| 3 | 8 – 10 | High | Need Urgently |
| 4 | 11 + | Very High | Need Now |

## 3. Research Methods

### 3.1 Research Location and Time

This research was conducted in the administrative section of the faculty of science and technology at Campus 2 of Muhammadiyah University of Sidoarjo. The research was carried out for 3 months.

### 3.2 Data Retrieval

In collecting this data, ergonomics focuses on the administration of the faculty of science and technology. This study was conducted to determine ROSA and REBA can reduce risk. The data takers of this research will be explained how to carry out the research process quantitatively. The research steps carried out by the research can be described as follows:

1. Interview

The interview was led by asking questions after being planned in advance, by asking direct questions to the administrative staff of the faculty of science and technology, from the interview obtaining the data needed for research, namely Rapid Office Strain Assessment. (ROSA) and Rapid Entire Body Assessment (REBA) .

2. Observation

Observations made in the field at the Faculty of Science and Technology are directed to find out the current issues. So that in order to get information directly and see the condition. To get data about this ongoing issue that is happening. The information needed for this exploration is an administrative employee.

### 3.3 Research Flow

The flow of research carried out in this research is collecting administrative data from the faculty of science and technology, data processing starts from processing using the Rapid Office Strain Assessment (ROSA) and Rapid Entire Body Assessment (REBA) methods to reduce Musculoskeletal Disorder (MSDs) injuries. figure 2.

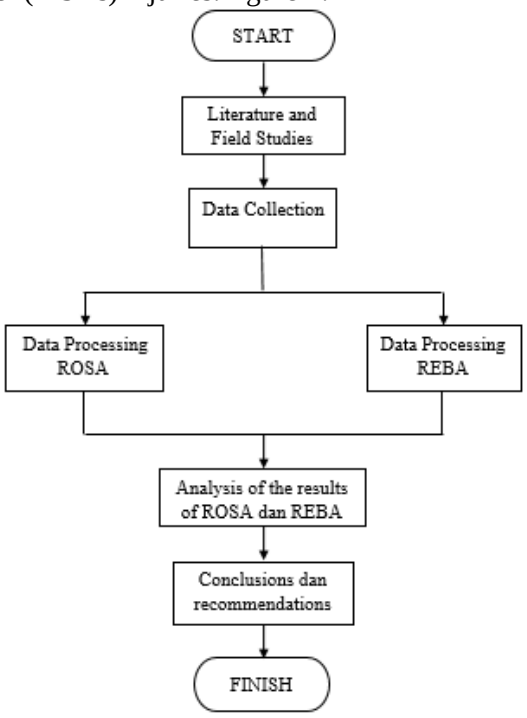



Fig 2. Research Flow

## 4. Results and Discussions

The research data is carried out directly at the administration of the science and technology faculty. Research data by filling in from the ROSA and REBA assessments. The number of employees observed were 5 people, the administrative staff of the Faculty of Science and Technology, namely student data making letters, was strongly influenced by what the workers did.

### 4.1 ROSA (Rapid Office Strain Assessment) Analysis

Data were collected and evaluation of working posture using by ROSA based on the observed object. Data processing averaging determination of the score in part A the ready, in part B the monitor and telephone, in part C the mouse and keyboard. In the determination of the final score there can be distributed phases before obtaining a final score, there are these phases, including the determination of the score in part A, the determination of the score in part B, the determination of the score part of the score for decision Be part C. The data processing based on ROSA can be seen in Table 2.

Table 2 - ROSA Form Results

| No | Name | Section A | Section B | Section C | Monitor dan Peripheral |
|---|---|---|---|---|---|
| 1 | Employee 1 | 7 | 3 | 4 | 4 |
| 2 | Employee 2 | 6 | 2 | 4 | 3 |
| 3 | Employee 3 | 6 | 3 | 3 | 3 |
| 4 | Employee 4 | 5 | 3 | 3 | 3 |
| 5 | Employee 5 | 5 | 3 | 3 | 3 |

### 4.2 REBA (Rapid Entire Body Assessment) Analysis

The data was created using previously collected data and the values conform to the criteria contained in the REBA evaluation form. In the REBA method, data processing begins with determining Group A and Group B scores. After obtaining the scores for Group A and Group B, we continue by determining the weight of the object lifted, the binding value, and the activity score(Varghese, et al., 2022; Abidin, & Sugiyanto, 2021). The Group A Score, Group B Score, Weight of Object Lifted, Mating Value, and Activity Score must be calculated to obtain the final REBA score. Table 3 shows REBA-based data processing.

Table 3 - REBA form results

| No | Name | Score A | Score B | Score C | Activity Score |
|---|---|---|---|---|---|
| 1 | Employee 1 | 6 | 6 | 8 | 1 |
| 2 | Employee 2 | 4 | 4 | 4 | 1 |
| 3 | Employee 3 | 4 | 5 | 5 | 1 |
| 4 | Employee 4 | 3 | 4 | 3 | 1 |
| 5 | Employee 5 | 5 | 4 | 5 | 1 |

### 4.3 Discussion of ROSA and REBA

Risk level classification based on the office's ROSA rating. After processing the data to obtain the final result, the next step is to rank the calculated risk. If the final score obtained is greater than 5, it is considered a risk and further research on the worker and workplace should be done. If the value is greater than 5, the risk is dangerous. Following the processing of administrative staff data, the office has value of 5 and can be classified as high risk. After processing the ROSA-based data, they are displayed in Table 4.

Table 4 - ROSA method results

| No | Part | Score | Risk |
|---|---|---|---|
| 1 | Employee 1 | 7 | Dangerous |
| 2 | Employee 2 | 6 | Dangerous |
| 3 | Employee 3 | 6 | Dangerous |
| 4 | Employee 4 | 5 | Dangerous |
| 5 | Employee 5 | 5 | Dangerous |

The risk level categorization is based on the REBA rating of employee measurement 5 after data processing and the final results are obtained. The next step is to classify the calculated risks. The risk classification of REBA calculation results for each group is obtained based on the results of data processing. The employee size has a REBA value of 5, so the risk levels are high, medium, urgent, and "corrective action". Table 5 shows the data after REBA-based processing.

Table 5 - REBA method results

| No | Part | Score | Risk Level | Status |
|---|---|---|---|---|
| 1 | Employee1 | 9 | High | Need Urgently |
| 2 | Employee 2 | 5 | Currently | Need |
| 3 | Employee 3 | 6 | Currently | Need |
| 4 | Employee 4 | 4 | Currently | Need |
| 5 | Employee 5 | 6 | Currently | Need |

## 5. Conclusion

The ROSA and REBA methods aim to analyze and enhance the working attitudes of the administrative staff of the Faculty of Science and Technology. Furthermore, the ROSA and REBA methods were able to analyze the level of risk experienced by the personnel employed in the science and engineering departments and, based on the ROSA method, the level of risk was found to be dangerous for the administrative staff. The REBA method was dangerous for an administrative staff of four, but needed immediate improvement. and 1 administrative staff are urgently needed. The ROSA and REBA methods can minimize the inconvenience of scientific and engineering staff employed by providing appropriate working posture assessments so that they can work more safely.

**References**

Abidin, Z., & Sugiyanto, S. (2021). Ergonomic Analysis Using Rapid Upper Limb Assessment (RULA) And Rapid Entire Body Assessment (REBA) Methods On Workers Posture In The Packaging Radiator Sector PT. XYZ Tbk. *HUMANIS (Humanities, Management and Science Proceedings), 2*(1).

Agustin, M., Tannady, H., Ferdian, O., & Alamsjah, S. I. G. (2021). Posture Analysis Using Nordic Body Map and Rapid Office Strain Assessment Methods to Improve Work Posture. *JIEMS (Journal of Industrial Engineering and Management Systems), 14*(1).

Budiyanto, T., & Setiyoso, F. A. (2021). Designing an Ergonomic-Based Work Facility of Dough Stirrer for Kerupuk Cipir Using Rapid Entire Body Assesment (REBA) Analysis to Reduce Muskuloskeletal Complaints and Increase Productivity. *Logic: Jurnal Rancang Bangun dan Teknologi, 21*(2), 87-92.

de Barros, F. C., Moriguchi, C. S., Chaves, T. C., Andrews, D. M., Sonne, M., & de Oliveira Sato, T. (2022). Usefulness of the Rapid Office Strain Assessment (ROSA) tool in detecting differences before and after an ergonomics intervention. *BMC Musculoskeletal Disorders, 23*(1), 1-12.

Erliana, C., & Zaphira, M. Z. M. (2019). Analisis Postur Kerja Untuk Mengurangi Tingkat Risiko Kerja Menggunakan Metode Rapid Office Strain Assessment (ROSA). *Talenta Conference Series: Energy and Engineering (EE), 2*.

Hutabarat, Y. (2017). *Dasar Dasar Pengetahuan Ergonomi*. Media Nusa Creative.

Katano, K., Nakajima, K., Saito, M., Kawano, Y., Takeda, T., & Fukuda, K. (2021). Effects of line of vision on posture, muscle activity and sitting balance during tooth preparation. *International dental journal, 71*(5), 399-406.

Loske, D., Klumpp, M., Keil, M., & Neukirchen, T. (2021). Logistics Work, ergonomics and social sustainability: Empirical musculoskeletal system strain assessment in retail intralogistics. *Logistics, 5*(4), 89.

Lubis, Z. I., Yulianti, A., Nisa, F. K., & Ajeng, S. (2021). Hubungan Resiko Posisi Kerja Duduk Terhadap Keluhan Musculoskeletal Disorders ( MSD ) Pada Pegawai Pemerintah Kabupaten Malang. *Jurnal Ergonomi Indonesia*, *07*, 57–65.

Pajoohnia, M., Roveshti, M. M., Valipour, F., & Raei, M. (2022). Ergonomic Assessment of Risk Factors for Musculoskeletal Disorders of the Administrative Staff in Military Center Using ROSA. *Paramedical Sciences and Military Health, 16*(4), 1-9.

Prabaswari, A. D., Suryoputro, M. R., & Utomo, B. W. (2020). Analisis Postur Kerja pada Perusahaan yang Bergerak Bidang Pemeriksaan, Pengawasan, Pengujian, dan Pengkajian. *Jurnal PASTI*, *14*, 181.

Restuputri, D. P. (2017). Metode REBA Untuk Pencegahan Musculoskeletal Disorder Tenaga Kerja. *Jurnal Teknik Industri*, *18*, 19.

Tajvar, A., Daneshmandi, H., Dortaj, E., Seif, M., Parsaei, H., Shakerian, M., & Choobineh, A. (2022). Common errors in selecting and implementing pen–paper observational methods by Iranian practitioners for assessing work-related musculoskeletal disorders risk: a systematic review. *International journal of occupational safety and ergonomics, 28*(3), 1552-1558.

Tarwaka. (2015). *Dasar-dasar Pengetahuan Ergonomi dan Aplikasi di Tempat Kerja* (Edisi Kedu). Harapan Press.

Tjahayuningtyas, A. (2019). Faktor Yang Mempengaruhi Keluhan Musculoskeletal Disorders (MSDs) Pada Pekerja Informal. *The Indonesian Journal of Occupational Safety and Health, 8*.

Vahdat, S. (2021). The role of IT-based technologies on the management of human resources in the COVID-19 era. *Kybernetes*.

Varghese, A., Panicker, V. V., Abraham, J., Gimmi, J., Tom, J., & Desini, K. (2022). Ergonomic Risk Assessment of Rubber Tappers Using Rapid Entire Body Assessment (REBA). In *Recent Advances in Manufacturing Modelling and Optimization* (pp. 709-717). Springer, Singapore.

Wibowo, A. H., & Mawadati, A. (2021, March). The Analysis of Employees' Work Posture by using Rapid Entire Body Assessment (REBA) and Rapid Upper Limb Assessment

(RULA). In *IOP Conference Series: Earth and Environmental Science* (Vol. 704, No. 1, p. 012022). IOP Publishing.

Wijaya, I. S. A., & Muhsin, A. (2018). Analisa Postur Kerja Dengan Metode Rapid Upper Limb Assessment (Rula) Pada Oparator Mesin Extruder Di Stasiun Kerja Extruding Pada Pt Xyz. *Opsi*, *11*, 49.