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ANALYSIS ON ERGONOMIC ISSUES AMONG UNIVERSITY'S ACADEMIC STAFF

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Abstract:

Prevalence of Musculoskeletal Disorders (MSDs) was on the rise in Malaysia because of ergonomic issues. This research aims to analyse the factors that cause ergonomic issues among academic staffs in University Utara Malaysia (UUM), to observe the musculoskeletal pain among academic staffs at workplace in University Utara Malaysia (UUM). This research is conducted using the qualitative method where each respondent will be given a set of questionnaires to answer, and the researcher makes observation and semi structured interview. An assessment tool called the Rapid Entire Body Assessment (REBA) is used to assess the likelihood of developing musculoskeletal disorders (MSDs) while doing particular job-related duties. There are 12 respondents participated in this research which they work as a academic staff under the School of Technology Management & Logistic (STML) in University Utara Malaysia (UUM). The data that the researcher had collected and analyzed will be presented in the form of tables and graphs or both. The result shows that only 2 respondents have a medium risk level and corrective action is necessary, and the rest of the 10 respondents have low risk level and corrective action may be necessary. The findings of this research highlighted the ergonomic issues in the workplace of the academic staffs and raised the awareness about the importance of ergonomics.

Keywords:

Musculoskeletal Disorders (MSDs), Rapid Entire Body Assessment (REBA), Ergonomics, Academic Staff

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Introduction

In this modern era of the 21st century, technology plays an important role in our life. Technology makes our life easier and helps us to save time when doing things. Technology has changed the way of teaching in the educational field by a lot (Raja & Nagasubramani, 2018). Due to the use of information and communication technologies, educational technology plays a significant role in teaching. There are lots of benefits to educational technology with the aid of numerous programmes for distant learning, the Internet, teachers, and students themselves (Stošić Lazar, 2015). The utilisation of the latest technology, tools or equipment in teaching can improve student learning and involvement. When technology is used, the students find it a lot more engaging and exciting to learn. Then, knowledge transfer becomes incredibly simple, convenient, and effective (Raja & Nagasubramani, 2018).

Nowadays, technology and the method of teaching have evolved significantly in the educational field. It is almost impossible to find a lecturer who does not use digital devices such as a smartphone, desktop, or laptop in the process of lecturing. So, the lecturers will spend a lot of time using the computer to carry out the lecture class. Then, some ergonomic issues might arise and affect the academic staff's health as well as increasing the safety problem in the workplace. As a result, it will lead to dissatisfaction and reduced performance at work. However, by applying ergonomic principles, the efficiency of interaction between humans and computers, health, user's safety, and comfort level can be improved (Shikdar & Al-Kindi, 2007).

At the moment, the academic staff that work in educational institutions might face some ergonomic issues when working in the office for a long time on a daily basis. According to a research with 25 teachers as respondents, 72 percent of respondents indicated having limited awareness of ergonomics, and 68 percent said they do not implement these principles in their daily lives (Kraemer et al., 2020). The primary ergonomic hazards to which teachers were exposed were prolonged sitting and standing, sharp desk corners, the usage of laptop touchpads, and an insufficient monitor height. The most frequently affected areas were the low back (60 percent), neck (56 percent), and shoulders (48 percent) in the past year (Kraemer et al., 2020). The ergonomic issues can cause work-related musculoskeletal disorders (WMSDs). Work-related musculoskeletal disorders (WMSDs) will mainly affect the lower back, neck area, arms, and legs of a human body (Hossain et al., 2018). Also, it is a conventional occupational disease. The risk factors may include static posture, repetitive motion, forceful exertion, heavy lifting, and many more (Tee et al., 2017).

Musculoskeletal disorders have been around for many years, and they are an occupational health issue among workers such as teachers or lecturers. In Malaysia, there are a few studies focusing on musculoskeletal disorders among school teachers associated with risk factors. A study by Alias et al., 2020, consisted of 212 female respondents in a school and the data was collected using a questionnaire. The feet are affected the most with 36.8% for the past 7 days and 32.5% for the past 12 months (Alias et al., 2020). The commonly affected body parts were the lower limbs, which consist of feet and knees, followed by the upper back and lower back.

With that being said, the ergonomics in the workplace is very important for both students and academic staff because it will have an impact on them, whether it is positive or negative. Sometimes, the authorities might overlook the ergonomic aspect of the workplace such as the

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academic staff's office. Therefore, this research is to study about the ergonomic issues among the academic staff at University Utara Malaysia (UUM).

Literature Review

Ergonomics can be referred to as a study of the interactions between humans and the working environment, and it can help to increase the job satisfaction (Rozlina et al., 2012). Ergonomics awareness can be displayed by workers behaviour and based on their knowledge about ergonomics. Ergonomics awareness plays an important role in ergonomics application as it contributes considerably to human well-being and safety such as having a comfortable work environment as well as tools that are built ergonomically, man-machine interface design, and an appropriate work approach to human anatomy (Rozlina et al., 2012).

The word "ergonomics" can be referred to as "the science of work" and the word "ergonomics" comes from the Greek word which is ergon as well as nomos, where ergon means work and means law (International Ergonomics Association, 2017). By using theory, concepts, data, and methodology, ergonomics can be defined as a profession that utilises design to enhance human well-being and total system performance. It is also a scientific field that studies how humans interact with other elements of a system (International Ergonomics Association, 2017).

According to other sources, ergonomics can also be defined as the study of work in the working environment of humans (Edwards et al., 2022). Moreover, an ergonomist is someone who creates or redesigns the work to fit the worker rather than the other way around and the goal of an ergonomist is to eliminate or minimize the discomfort and risk of injury of the workers in their working environment (Edwards et al., 2022). The use of scientific theories, methods, and data from a variety of disciplines in the design of engineering systems in which humans play a significant role is known as ergonomics. Following that, among the fundamental disciplines are psychology, cognitive science, physiology, biomechanics, applied physical anthropometry, and industrial systems engineering (Kroemer, 2014).

A productive organisation starts with a safe work environment, regardless of how big the organisation or what type of organisation is. A proper procedure for staff safety, equipment and business property is a must to prevent the equipment damage and minimizing staff injuries. Thus, the organisation will have more profit and less expenses will be spent on issues related to ergonomic compensation. Ergonomics in workplace is about designing the workplace using science that can meet the worker's limitations and capabilities (ErgoPlus, 2022). Good ergonomics in the workplace can help to eliminate the risk factors that lead to musculoskeletal disorders, and it can improve the performance and productivity of the worker.

The basic ergonomic principles must be applied in the workplace whether it is in an industrial or office environment because they can help to avoid awkward or static posture. The workstation should be designed to fit for the task that the workers perform and depend on the size of the workers in order to create an ergonomic workstation (Fernandez, 1995).

Studies have shown that, when the worker is given the choice, they will choose to sit in an ideal position that they think they are comfortable with. However, not all of the workers know how their chairs operate and what is the ideal posture for them to aim for. As a result, they might sit in a posture that they think is the good posture according to their degree of knowledge (McKeown, 2019). The use of notebook personal computer has become more and more popular

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in the recent years because it is portable, but the disadvantage of the notebook personal computer is that the display height is not adjustable. The optimal posture is not just about what is correct for the back of the body. It also considers what is correct for the upper limbs, lower limbs, head, and neck.

Ergonomic risk factors are the aspects of ergonomics that can lead to the cause of musculoskeletal disorders injury in the workplace. The worker might be exposed to potential risks when doing their work. In this section, the researcher will talk about a few risk factors that contribute to the injury related to ergonomics in the workplace. The ergonomic risk factors include awkward posture, static posture and, environmental factors such as extreme temperature, noise as well as lighting.

Methodology

The research is conducted at University Utara Malaysia (UUM) located in Kedah. This research is conducted using the qualitative method where each respondent was given a set of questionnaires to answer and also the researcher makes observation and semi structured interview. In this research, the academic staffs that works at School of Technology Management & Logistic (STML) in UUM whether it is office staffs or lecturers, they are the target respondent in this research. There are total of 78 academic staffs in School of Technology Management & Logistic (STML) according to the official website of School of Technology Management & Logistic (STML) and the target sample size is 12 respondents. Therefore, the researcher has collected data from these respondents in order to analyse the collected data. An assessment tool called the Rapid Entire Body Assessment (REBA) is used to assess the likelihood of developing musculoskeletal disorders (MSDs) while doing particular job-related duties. It is a whole-body screening instrument that measures the biomechanical and postural loads on the body through a methodical process (Madani & Dababneh, 2016). The simplicity, speed, and little equipment is needed for this tool which only requires a pen and paper. This makes it straightforward to do several assessments for each activity or project. Any task may be evaluated using the REBA since it examines the entire body.

Table 1: REBA Action Levels

Action Level	REBA Score	Risk Level	Action (including further assessment)
0	1	Negligible	Non necessary
1	2-3	Low	May be necessary
2	4-7	Medium	Necessary
3	8-10	High	Necessary soon
4	11-15	Very High	Necessary now

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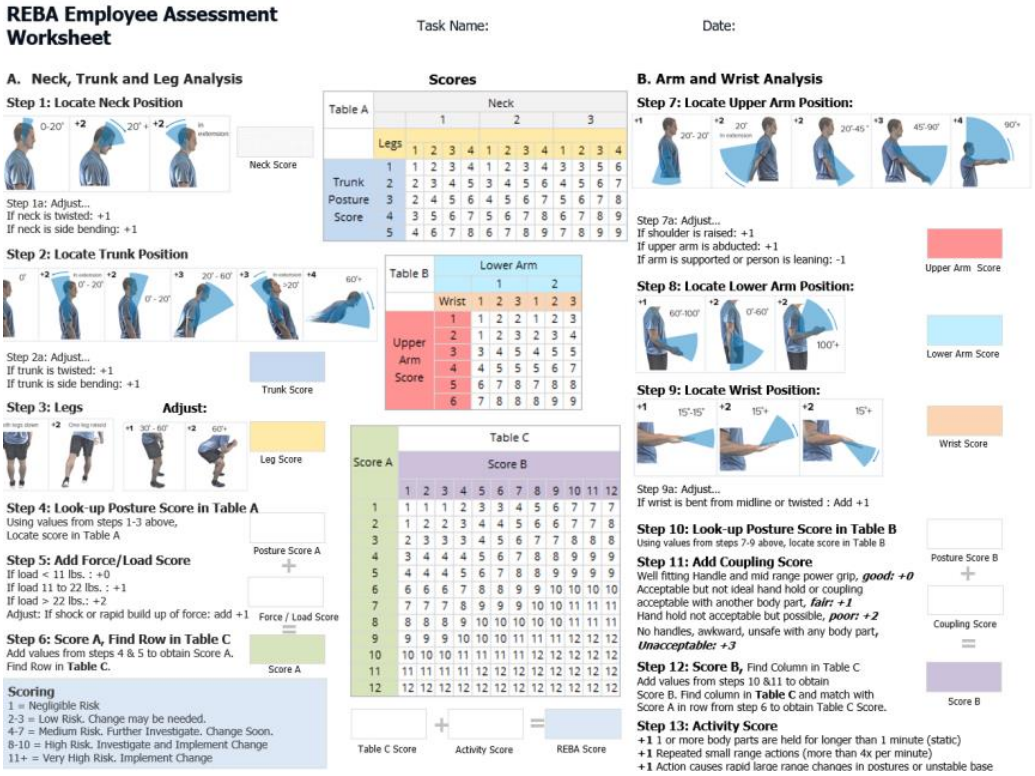

Figure 1: REBA Assessment Worksheet

Source: ErgoPlus, (2012)

Figure 1 is a REBA score sheet where score A represents the total posture scores for body parts such as trunk, neck, and legs. Score B represents the sum of posture scores for body parts such as upper and lower arms, wrists, and hand. Then, the A and B scores will be added together to become score C and activity score is added to get the final REBA score. Any static postures sustained for more than one minute, repetitions more than four times per minute, significant quick changes in posture, or an unstable basis are all described by the activity score. The REBA score indicates the REBA action level, which ranges from 0 to 4, indicating if action is necessary and how urgent it is.

Result And Discussion

The researcher visits each lecturer at the office hour to collect the data. In this research, 6 of the respondents are males and the 6 of the respondents are female respondents. All of the respondents are Malay race. The average age of the 12 respondents is about 45 years old. 6 of the respondents is from Technology Management department, 5 of the respondents is from Operation Management department and only 1 respondent is from Logistics & Transportations department.

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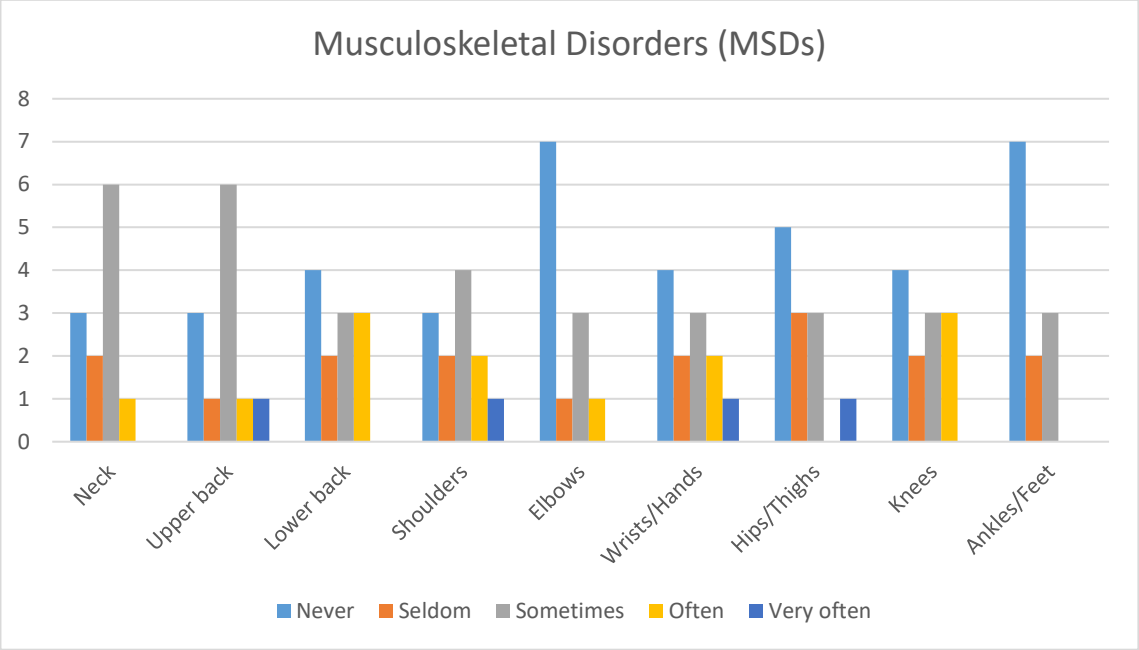

Figure 2: Musculoskeletal Disorders (MSDs)

Based on the graph above, the result shows that 7 of the respondent answer that they never have pain or discomfort in their elbows and ankles/feet which represents 58.33% of the total respondents respectively. Next, most of the respondents answer that they seldom have pain or discomfort in their hips/thighs which accounts 25% in total and represents 3 respondents. After that, majority of the respondents answer that they have pain or discomfort in their neck and upper back sometimes which was recorded at 50% or half of the total respondents respectively. However, the respondents answer that they often have pain or discomfort in their lower back as well as knees which was recorded at 25% for each body part. Finally, only 1 respondent that represents 8.33% of the total respondents answer that they often have pain or discomfort in their upper back, shoulders, wrists/hands, and hips/thighs.

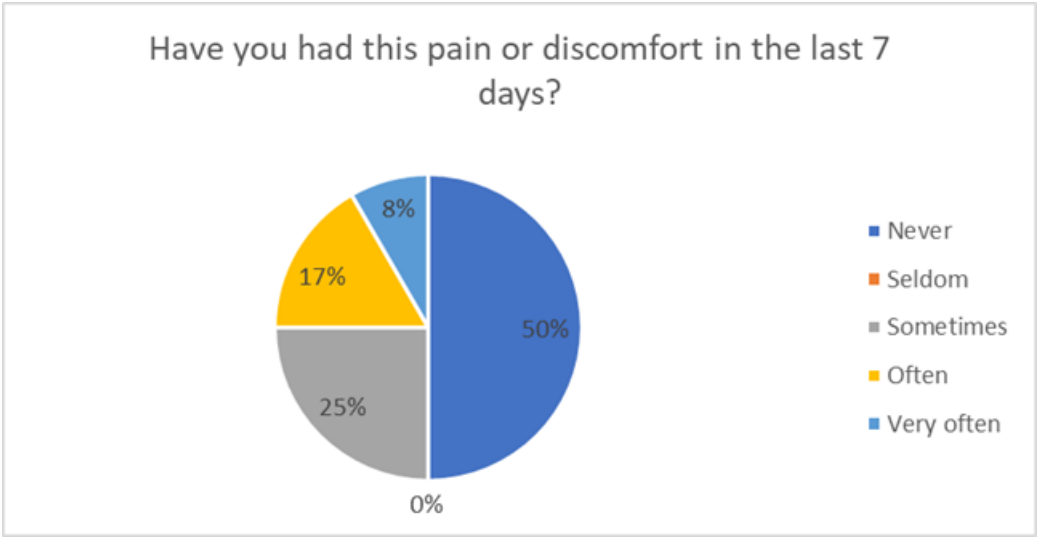

Figure 3: Pain or Discomfort in Last 7 Days

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According to the chart above, 50% of the respondent answered that they never had pain or discomfort in the last 7 days, 25% of the respondents answered that sometimes they had pain or discomfort in the last 7 days, 17% of the respondents answered that they had pain pr discomfort very often in the last 7 days, 8% of the respondents answered that they had pain or discomfort very often in the last 7 days, and none of the respondents answered they seldom had the pain or discomfort in the last 7 days.

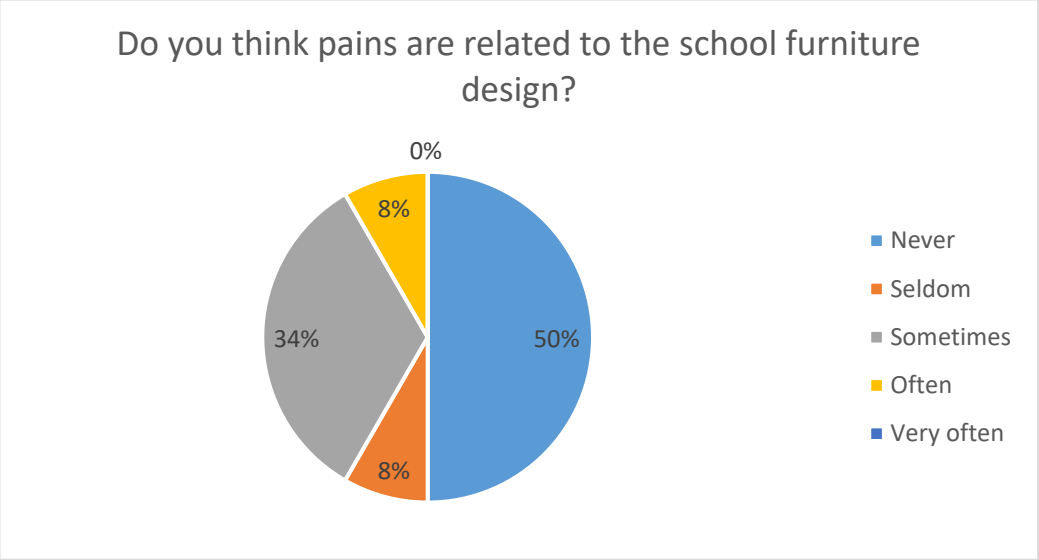

Figure 4: Pains Are Related to The School Furniture Design

Figure 4 shows that 50% of the respondents never think that the pains are related to the school furniture design, 34% of the respondents think that sometimes the pains are related to the school furniture design, both seldom and often category have the same percentage of respondents which represents 8%, and nobody thinks very often that the pains are related to the school furniture design.

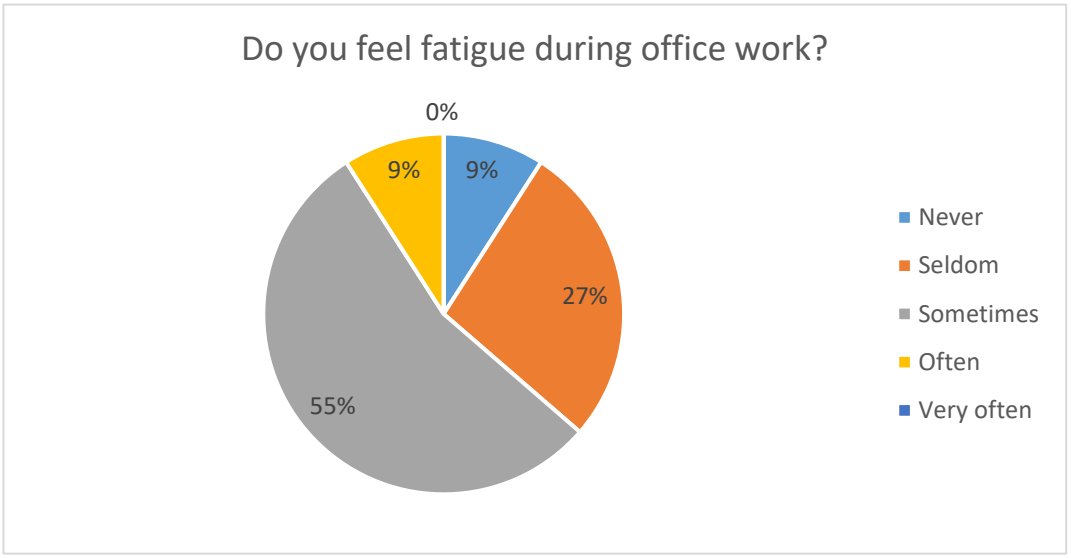

Figure 5: Fatigue During Office Work

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Based on the pie chart above, 55% of the respondents answered that sometimes they feel fatigue during office work, 27% of the respondents answered that they seldomly feel fatigue during office work. 9% of the respondents often feel fatigue during office work. On the other hand, 9% of the respondents never feel fatigue during office work. Finally, none of the respondents feel fatigue very often during office work.

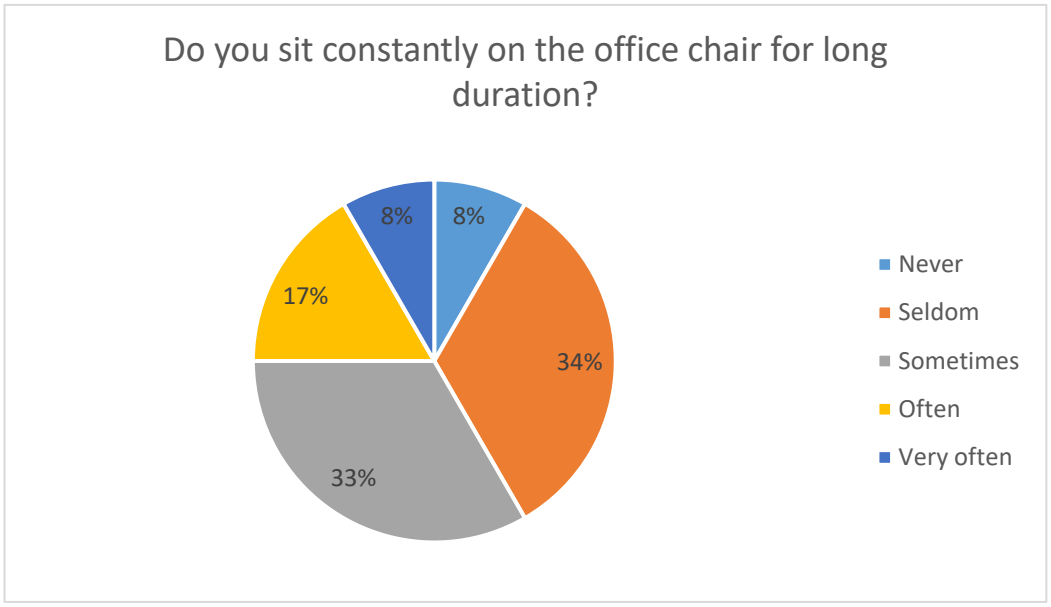

Figure 6: Sit Constantly on The Office Chair for Long Duration

According to the chart above, the number of respondents that answered seldom and sometimes for this question is the same which represents 33% and 34%. 17% of the respondents often sit constantly on the office chair for long duration and 8% of the respondents do that very often. The respondents that never sit constantly on the office chair for long duration is only represents 8%.

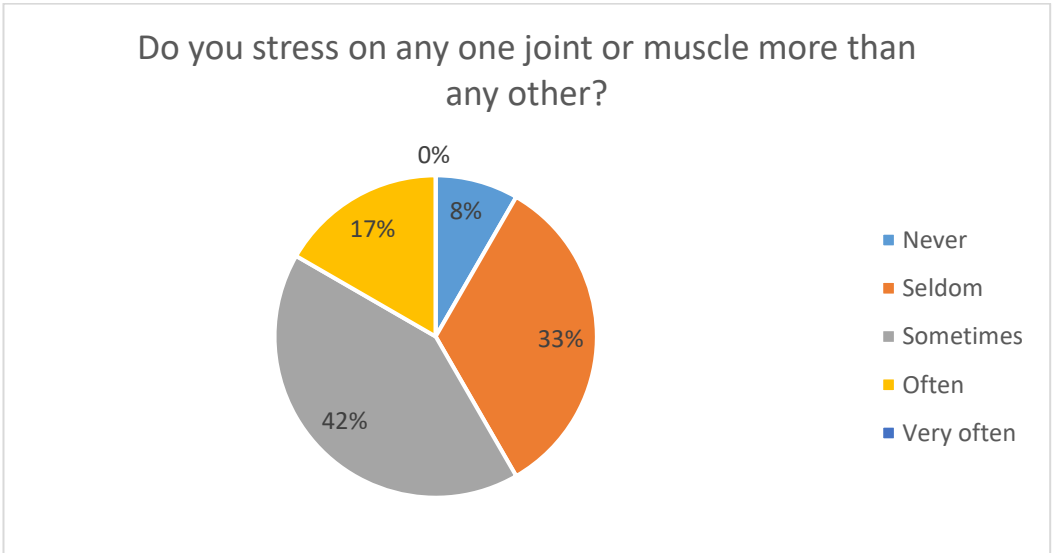

Figure 7: Stress on Any One Joint or Muscle More Than Any Other

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The pie chart above depicts that 42% of the respondents sometimes stress on any one joint or muscle more than any other while 33% of the total respondents seldomly do that. 17% of the respondents often stress on any one joint or muscle more than any other and 8% of the total respondents never do that. 0% of the respondent stress on any one joint or muscle more than any other very often.

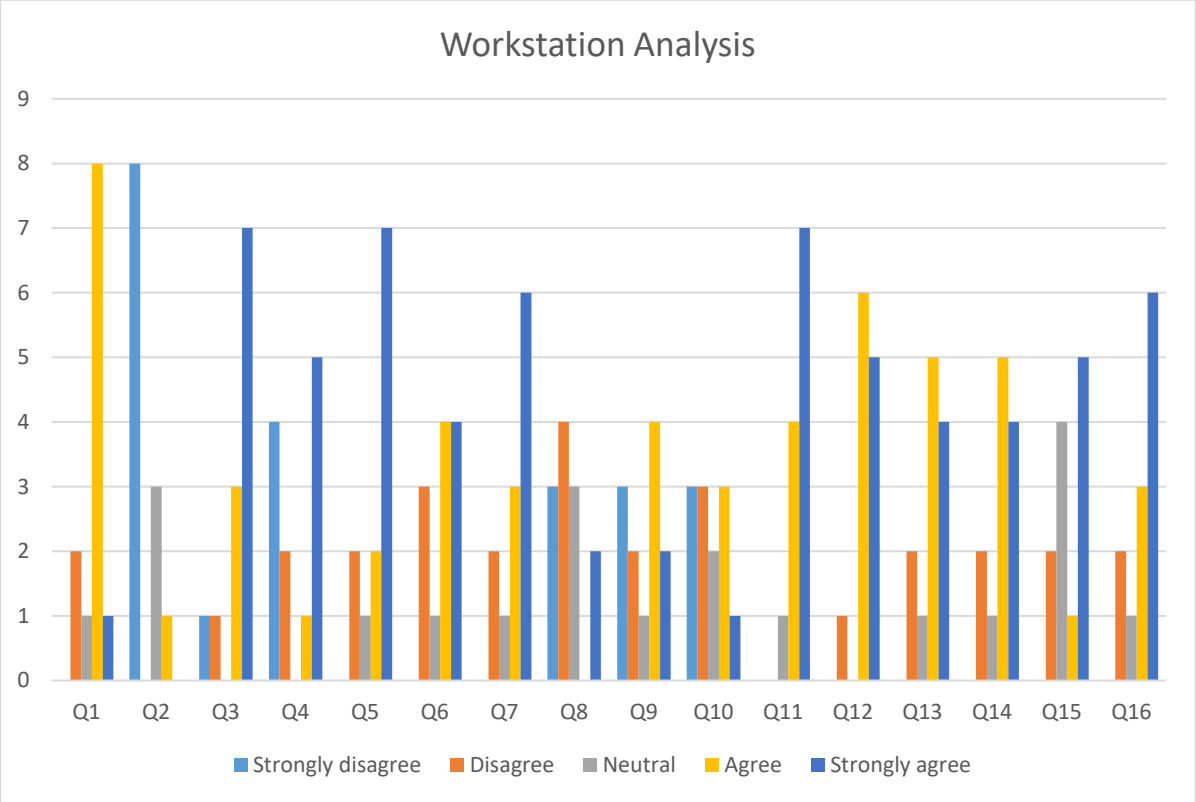

Figure 8: Workstation Analysis

The chart above shows the percentage response for the workstation analysis questions. Q3, Q5, and Q11 had the most respondents that answer strongly agree which represents 58.33% of the total respondents. The respondents strongly agree that the height of the office chair and desk is adjustable (Q3) but some of the respondent responded that the desk is not adjustable. Besides that, the respondents also strongly agree that the hands and arms are free from pressure from sharp edges on office chair & desk (Q5), and also the office chair has armrest (Q11). Moreover, most of the respondents agree that they feel comfortable using the existing furniture setup (Q1) which represents 66.67% of the total respondents. The question that got the most response in neutral is Q15 which is "the office chair is stable in all reasonable postures" and it represents 33.33% of the total respondents. On the other hand, majority of the respondents strongly disagree that the present furniture setup caused injury to them (Q2) which accounts 66.67% of total respondents and 33.33% of the respondents disagree that the office chair has a stiff backrest (Q8).

Table 2: REBA Score for Different Respondents

Respondents	REBA Score	Risk Level	Action
Respondent 1	3	Low	May be necessary
Respondent 2	4	Medium	Necessary
Respondent 3	2	Low	May be necessary

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Respondent 4	2	Low	May be necessary
Respondent 5	2	Low	May be necessary
Respondent 6	2	Low	May be necessary
Respondent 7	2	Low	May be necessary
Respondent 8	4	Medium	Necessary
Respondent 9	2	Low	May be necessary
Respondent 10	2	Low	May be necessary
Respondent 11	2	Low	May be necessary
Respondent 12	3	Low	May be necessary

The table above shows the REBA score for the 12 respondents as well as the risk level and action. 2 of the respondents have the highest REBA score among all the respondents which is 4 and the risk level for these 2 respondents is at medium level. So, the corrective action is necessary including further assessment to solve the ergonomic issues as well as correct the posture to prevent Musculoskeletal Disorders (MSDs). On the other hand, the rest of the 10 respondents have a lower score where 2 of the respondents have a REBA score of 3 and the other 8 respondents have a REBA score of 2. This indicates that they have low risk level and corrective action may be necessary including further assessment to prevent them from the ergonomic issues and Musculoskeletal Disorders (MSDs).

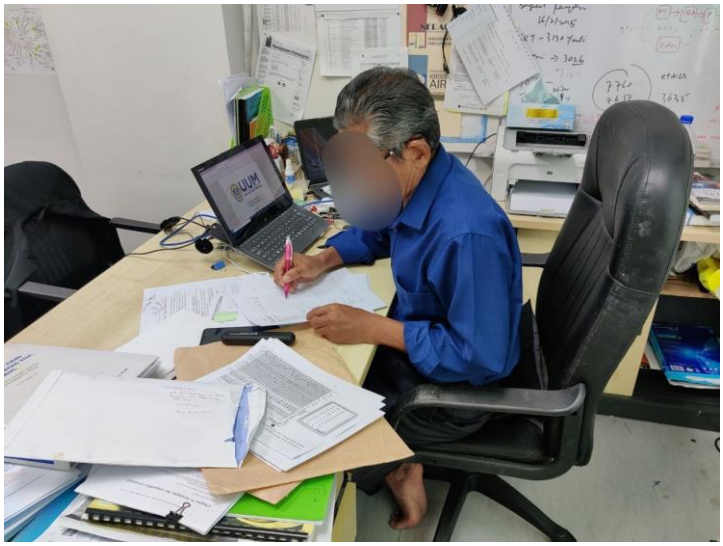

Figure 9: Respondent 2 Working in A Twisted Neck Posture

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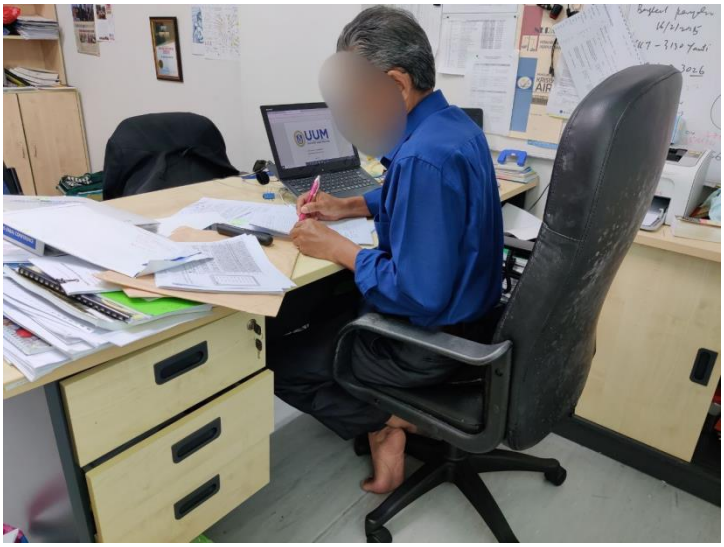

Figure 10: Respondent 2 Working in A Twisted Trunk Posture

Both figures above show a respondent is working in his office sitting on a chair and using the desk. He is respondent 2 and he has a REBA score of 4 with medium risk level. The respondent is working in a twisted neck posture as shown in figure 9 and a twisted trunk posture as shown in figure 10. Working in such posture will cause fatigue of the neck and trunk because it is not in the correct posture. The position of the upper arm, lower arm, and the wrists is correct. Based on the posture, REBA score is calculated using the REBA assessment table and the result is that correction action is necessary to prevent the Musculoskeletal Disorders (MSDs).

Figure 11: Respondent 8 Working in A Side Bending Neck Posture

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Figure 12: Respondent 8 Working in A Raised Shoulder Posture

The two figures above show a respondent is working in her office sitting on a chair and using the desk. She is respondent 8 and she has a REBA score of 4 with medium risk level. The respondent is working in a side bending neck posture as shown in figure 11 and a raised shoulder posture as shown in figure 12. Working in such posture will cause fatigue of the neck and shoulder because it is not in the correct posture. The position of the trunk, lower arm, and the wrists is correct. Based on the posture, REBA score is calculated using the REBA assessment table and the result is that correction action is necessary to prevent the Musculoskeletal Disorders (MSDs).

Figure 13: Respondent 4 Working in A Good Posture

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Figure 14: Respondent 5 Working in A Good Posture

Figure 13 and 14 above shows two respondents are working in their office sitting on a chair and using the desk. Both respondents have a REBA score of 2 with low risk level. Both respondents are working in a low ergonomic risk posture unlike respondent 2 and respondent 8. The arms of the two respondents are in correct position which is parallel to the table. The shoulders and wrists are also in not raised too much. The trunk of the respondents is also not twisted. The only thing that is not correct is the position of the head is slightly tilted down. This may cause neck pain if the respondents continue to work in this position for a long period of time. Based on the posture, REBA score is calculated using the REBA assessment table and the result is that correction action may be necessary to prevent the Musculoskeletal Disorders (MSDs).

The factors that caused ergonomic issues among the academic staffs includes the lack of awareness and knowledge about ergonomic among the lecturers. The most common mistake is that the position of computer or laptop display is not at the eye level of the head. Almost all of the lecturers put their laptop on the table without a laptop stand. So, they have to tilt their head down to look at the computer screen. For a long period of time, they feel discomfort or pain at the neck area because the weight of the head is giving pressure against the spine of human body.

The second factor is that the height of the desk at the workstation is not adjustable. Due to the non-adjustable desk, some of the staffs cannot find a good working position that is ergonomic and comfortable. Moreover, the academic staffs spend their time to work in the office for about 6 hours per day. They constantly sit on the office chair for an extended period of time without much movement which translates to a static posture. The lower legs will be dragged onto the chair and create pressure against the office chair, and it will cause the restriction of blood flow to the lower legs because the blood vessel is being pressed against the chair If the height of the desk is adjustable, the academic staffs can work while standing because the desk is adjustable to a certain height to allow the staffs to work while standing and prevent the restriction of blood flow. Therefore, the non-adjustable office desk have caused ergonomic issues.

Suggestions to improve or solve the ergonomic problems can be implement by the university. The first step to solve the ergonomic problems or Musculoskeletal Disorder (MSDs) is to

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increase the ergonomic awareness of the lecturers. For instance, the university can organise a campaign related to the importance of ergonomics in the workplace to show the benefits of ergonomics and what is the negative impact having bad ergonomic awareness. So, the academic staffs or lecturers start to pay attention to their working posture and make correction to their wrong posture to prevent ergonomic problems and Musculoskeletal Disorder (MSDs).

Next, the university can also upgrade the office furniture by buying new office chair that has ergonomic design to help the academic staffs to maintain good posture. Upgrading the non-adjustable office desk to an adjustable office desk also helps to prevent ergonomic issues and Musculoskeletal Disorder (MSDs) because the academic staffs can adjust the desk to the desired height that fits their body height. Moreover, the academic staffs will not have to sit for a long period of time to work because they can adjust the height of the desk to be suitable to work while standing. This can prevent the academic staffs for sitting too long in a static posture. Hence, the academic staffs will have improved ergonomic in workplace.

Conclusion

The result of the study shows that there is a significant relationship between nature of work and musculoskeletal disorders among the academic staffs in UUM. There is also a significant relationship between workstation analysis and musculoskeletal disorders among the academic staffs in UUM. The result of the REBA assessment shows that only 2 respondents have medium risk level and corrective action is necessary. The rest of the 10 respondents have low risk level and corrective action may be necessary.

The university should pay more attention on improving the ergonomic in workplace for the academic staffs to have a better working experience and improve the productivity as well as the quality of work produced by them. The university can also work with the government to discuss about the ergonomic issues and find ways or solve the problem. Therefore, the ergonomics status in the university can be improve.

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