

Ergonomic Risk Factors and Musculoskeletal Disorders (MSDs) Discomfort among Retail Workers in Batu Pahat

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Abstract

Retail workers are routinely exposed to a range of occupational hazards, with ergonomic risk factors being a principal concern due to their potential to contribute to the development of musculoskeletal disorders (MSDs). Manual material handling including repetitive lifting, carrying, and moving of merchandise such as boxes and packages is a particularly prevalent risk within this sector. This study aims to systematically identify the key ergonomic risk factors encountered by retail workers in the execution of their daily tasks. Additionally, it seeks to evaluate the prevalence and severity of MSDs among these workers, with particular attention to the experiences of cashiers, and to elucidate the relationship between ergonomic exposures and reported musculoskeletal symptoms. A quantitative research approach was employed by distributing surveys to employees across several selected retail stores in Batu Pahat, Johor. The research population included a diverse range of job roles within the retail industry, ensuring a comprehensive representation of the workforce. Data collection focused on capturing ergonomic risk factors and self-reported musculoskeletal symptoms. Analysis of the collected data revealed that a significant proportion of retail workers experience musculoskeletal symptoms attributable to their work activities. Among cashiers, the prevalence of MSDs was predominantly at a moderate level, with the right shoulder, lower back, and right wrist reported as the most common sites of discomfort. Statistical analysis demonstrated a significant association between ergonomic risk factors and the incidence of MSDs. The findings underscore the importance of addressing ergonomic hazards in the retail sector, particularly those related to manual material handling and repetitive tasks. The observed relationship between ergonomic exposures and MSDs highlights the need for targeted prevention strategies. Future research and intervention programs should focus on mitigating these identified risk factors to promote occupational safety and health among retail workers.

1. Introduction

Retail employees execute associated jobs such as stocking and refilling shelves, cleaning and tidying the store, and designing product displays to attract clients. This implies that they will perform manual or physical tasks including lifting, lowering, pushing, tugging and carrying. According to Guideline for Manual Handling at Workplace (2018), this activity could contribute to musculoskeletal disorders (MSD) case in Malaysia. Musculoskeletal disorders (MSDs) are occupational diseases that frequently result in strains and sprains to the

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lower back, shoulder, and upper limbs. This will have an impact on various body systems such as tendons, joints, muscles, and nerves that have been damaged because of work-related activities. Even any simple work can cause this problem to occur. Basahel (2015) mentioned that the increased likelihood of getting MSD is related to repeated spine bent, putting on weights pushing or pulling. World Health Organization (2022) stated that musculoskeletal disorders could give impact to a person's movement and dexterity, early retirement from the workforce, lowered levels of wellbeing, and a reduced ability to engage in society. According to Palikhe *et al.* (2020) retail workers frequently engage in bending, reaching, and twisting motions, which can put stress on their joints and muscles. It can be uncomfortable and eventually contribute to the development of MSDs when these abnormal postures are maintained for a long time or routinely adopted. Prior to this study, a preliminary study had been implemented where a discomfort survey questionnaire had been distributed to all retail workers at participated retail stores around Batu Pahat, Johor. The initial finding indicated that some workers experienced MSDs discomfort due to their work activities especially those who works at the cashier counter. They reported MSDs discomfort in several parts of the body such as the neck, shoulders, upper back, upper arms, elbows, forearms, wrists, lower back, thighs, knees, calves, ankles and feet. According to Dinar *et al.* (2018), the study concluded that MSDs symptoms correlate with ergonomic risk factors. Fortified by this statement and supported by current MSDs complaints, therefore it is a need to address the ergonomic risk factors, MSDs discomfort and its relation among the retail's workers.

Retail workers work in stores that offer commodities such as books, clothing, cosmetics, electronics, furniture, and a variety of other items. Retail employees execute associated jobs such as stocking and refilling shelves, cleaning and tidying the store, and designing product displays to attract clients. This implies that they will perform manual lifting tasks as stated in the Guideline for Manual Handling at workplace (2018) including lifting, lowering, pushing, tugging, carrying, restraint or restraint manually using force. According to Guideline for Manual Handling at Workplace (2018), this activity could contribute to musculoskeletal disorders (MSD) case in Malaysia. Musculoskeletal disorders are occupational disease that frequently result in strains and sprains to the lower back, shoulder, and upper limbs. This will have an impact on various body systems such as tendons, joints, muscles, and nerves that have been damaged because of work-related activities. Even any simple work can cause this problem to occur. According Basahel (2015), the increased likelihood of getting MSD is related to repeated spine bent, putting on weights, pushing or pulling. World Health Organization (2022) stated that musculoskeletal disorders could give impact to a person's movement and dexterity, early retirement from the workforce, lowered levels of wellbeing, and a reduced ability to engage in society. According to Occupational Safety and Health Administration (2018), risk factors that contribute to the musculoskeletal disorders case are repetition movement, awkward posture, stationary position, forceful motion, vibration, direct pressure, noise, extreme temperature, and work stress. The study of ergonomics focuses on how to adjust a task to the worker to make it safer and more productive. The comfort and productivity of employees can be increased by implementing ergonomic solutions.

Retail workers are at risk of getting musculoskeletal diseases as a result of actions such as stocking shelves (Abdol Rahman & Ahmad Zuhaidi, 2017). These activities pose ergonomic risks that can harm the workers. These tasks carry ergonomic risks that could be harmful to the workers. As a result, it is essential for employers to maintain an atmosphere that is safe, healthy, and free from accidents and illnesses. According to the study by Kielesiska (2021), employers must place a high priority on workplace safety. The study emphasises how frequently the work environment does not satisfy the needs of the employees, such as inadequate workspace and unsafe aisle space between shelves. In Malaysia, 201 incidents of occupational musculoskeletal diseases have been documented as of 2021, according to statistics, whereas in Britain, according to the Health and Safety Statistics (2021) report, 477,000 people have musculoskeletal illnesses related to their jobs, with the back being the body area most frequently afflicted. Lifting, carrying, and handling tasks contribute to 18% of non-fatal worker injuries. Findings from observation and the distribution of discomfort surveys to retail workers in selected retail stores show that some workers feel musculoskeletal symptoms caused by their work activities. Based on the study, it can be seen that those who experience this discomfort are the workers involved at the cashier counter. They stated that they experienced discomfort in several parts of their body such as the neck, shoulders, upper back, upper arms, elbows, forearms, wrists, lower back, thighs, knees, calves, ankles and feet. Therefore, it can be concluded that there is a case that happened in the supermarket.

To address the symptoms of musculoskeletal disorders (MSD) and reduce the number of cases, employers must act regarding ergonomic risk factors. According to Dinar *et al.* (2018) study found a link between MSD symptoms and ergonomic risk factors. The possibility of MSD complaints can rise when workers assume poor postures because of uncomfortable seats. Therefore, it is essential to identify and manage the ergonomic risk factors at work if you want to stop MSD from happening. The Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) is being used in this study in order to determine the relationship between ergonomic risk factors and MSD. The focus of this investigation is to understand the impact of work-related musculoskeletal problems on workers in the selected retail store. The study aims to determine the ergonomics risk factors among retail

workers, to determine the Musculoskeletal Disorders (MSD) symptoms among retail workers, and to identify the relationship between ergonomics risk factors and Musculoskeletal Disorders (MSD) symptoms among retail workers.

The study was conducted at the retail store located at Batu Pahat, Johor. Interviews with supermarket employees about their experiences with MSD allowed for the selection of respondents. Batu Pahat was selected as the study location because it lacks many large supermarkets that provide daily goods. As a result, there must be a high demand for goods from the local population, forcing workers to handle stock and a lot of goods that can increase the risk of ergonomic issues. One retail store was chosen to assess the risk and effect of each store. The study focused on selected respondents which are local retail workers who are involved in manual lifting in their daily work routine and who are at risk of experiencing musculoskeletal disorder (MSD) symptoms. This study is to motivate employees and promote a positive workplace atmosphere. This is due to MSD symptoms generated by uncomfortable posture methods of handling work in retail personnel. Back pain, neck pain, and joint injuries, for example, can have a substantial influence on an individual's physical and emotional wellbeing. This study can provide useful insight into the frequency, severity, and impact of these disorders on the retail workforce by investigating the ergonomic risk factors that contribute to MSD symptoms. It allows for the identification of specific factors that contribute to the development of MSD, making it easier to apply focused interventions to minimise symptoms and increase worker well-being. Worker pain brought on by musculoskeletal conditions will eventually lead to a decline in productivity and performance issues. The findings from this study could potentially help in developing preventative strategies to lessen the impact of MSD by elucidating the link between ergonomic risk factors and symptoms. The success and profitability of the retail store can be increased by enhancing employee wellbeing and decreasing the prevalence of MSD symptoms. An investigation on ergonomic risk factors and symptoms of MSD in retail workers may raise awareness among both employers and workers. Employers learn about the risks and potential hazards that their employees might encounter. This knowledge can lead to the introduction of preventative measures, such as ergonomic training, modifying workstations, and introducing equipment modifications that reduce ergonomic risk factors.

2. Literature Review

2.1 Ergonomic Risk Factors

Ergonomic risk factors are the workplace conditions that deteriorate the body over time and increase the chance of harm. Awkward posture, static and sustained work posture, forceful exertion, repetitive motions, vibration, and environmental factors are a few of the ergonomic risk factors. The risk factor, in accordance with the Occupational Safety and Health Administration (2018), is a factor in cases of musculoskeletal disorders that affect workers.

Table 1 Previous research findings on ergonomic risk and MSD

Author	Findings
Mohd Nasrull and Muhammad Fareez (2017)	Most of the workers acquired prevalence of MSDs particularly involving lower back, upper back, neck, shoulder, and ankles/feet.
Çakıt (2019)	The study showed that in the upper and lower back, the feeling of discomfort felt subjectively by grocery workers was higher.
Saikia (2021)	It was found that the majority of the respondents experienced discomfort in their upper back (cervical), both ankles, feet, lower back (lumber) and knees during the last 12 months.
Algarni and Alkhaldi (2021)	The supermarket cashier job has several risk factors that may be related to ergonomic workstations, a person's characteristics, and some related to the nature of work, which involves repetitive movements

According to past researches as tabulated in Table 1, retail workers are at risk for musculoskeletal diseases that might cause movement while performing their daily jobs. This puts them at risk for developing these symptoms. According to Rahman and Zuhaidi (2017), most materials handlers suffered from a variety of musculoskeletal disorders. It was discovered that the exposure risk level for contact stress, back leg, wrists, and knees was fairly severe due to awkward posture, repetitive action, and heavy lifting.

2.1.1 Awkward Posture

Awkward posture is a significant ergonomics risk factors that can contribute to the development of musculoskeletal disorders (MSDs). Awkward postures happen when employees need to reach, twist, or bend in awkward positions in order to complete their job activities. Awkward postures can strain the muscles and joints, resulting in MSDs such as back problems, neck pain, and carpal tunnel syndrome. According to research (Rahman & Zuhaidi, 2017), there is a connection between ergonomic risk factors and MSDs because it was found that workers may experience MSDs if they neglect ergonomic hazards for safety. According to current research, static postures may raise the risk of lower back problems, which in some situations may even result in a person's inability to work permanently. High movement repetitions and prolonged sitting or standing at jobs or places of employment with a lack of physical exercise suggest an increased occurrence of MSDs, mainly in the back, neck, and shoulder areas. Additionally, encouraging workers to take breaks and teaching them proper lifting techniques might help lower the chance of developing MSDs. As a result, it is critical to apply ergonomic solutions in the workplace to prevent these injuries and diseases. Awkward posture is a significant ergonomic risk factor that can contribute to the development of MSDs.

2.1.2 Static and Sustained Work Posture

The development of musculoskeletal diseases (MSDs) in retail workers is potentially facilitated by static and prolonged work position, which is a significant ergonomic risk factor. While sustained postures occur when workers keep a position for a long time, such as standing or sitting in the same position for hours, static postures occur when workers maintain a fixed position for a long period of time (Nicollen de Langen & Kees Peereboom, 2020). Static positions may raise the risk of lower back problems, which in some situations can even result in lifelong inability to work. Unproductive behavior, such as prolonged static sitting, can result in several health risks, including MSDs. There is a large prevalence of passive lifestyles, and it is anticipated that as automation and computerization progress, more workers will be required to perform repetitive tasks. There has been many research looking into the relationship between retail workers' MSDs and their persistent, static work postures. According to these investigations, prolonged static postures are significantly associated with the growth of musculoskeletal issues. According to one study by Trask *et al.* (2017), prolonged static standing is positively correlated with the occurrence of lower limb and foot problems. The study looked at the effects of static and continuous work postures on retail workers. The study emphasized the significance of using anti-fatigue matting and scheduling regular breaks to reduce the negative effects of extended static postures.

2.1.3 Forceful Exertion

According to Workplace Safety and Health Council (WSHC) (2014), forceful exertion is a significant contributing factor in accidents involving manual material handling operations. Forceful exertion is the activity that involves lifting, pulling, gripping, or pushing heavy or awkward items, which can overload muscles and lead to MSDs. Exerting significant force to perform a motion necessitates the application of significant contraction forces by the muscles, which causes them to fatigue quickly. The higher the force that has to be applied during the activity, the faster muscles will fatigue or strain. Workers who make strong motions have a risk of developing MSDs (Government of Canada, 2023). A study Choobineh *et al.* (2019) evaluated the impact of vigorous exertion on low back pain among retail workers performing manual lifting and pushing/pulling duties. The study discovered a link between exertion and the occurrence of low back discomfort. It emphasized the importance of ergonomic interventions, such as good lifting technique training and the use of assistive equipment, in reducing the occurrence of work-related low back pain. Similarly, Chung *et al.* (2018) conducted research on the impact of vigorous effort on low back pain in retail workers. The study discovered a link between exertion and a risk of low back discomfort. It emphasized the significance of ergonomic treatments, such as restructuring work tasks and providing appropriate equipment, in reducing the risk of job-related low back discomfort.

2.1.4 Repetitive Motions

As an ergonomic risk factor, repetitive motion refers to the regular repeating of specific movements or tasks in the workplace. It entails repeating the same or comparable motions, which can put additional strain on the musculoskeletal system and raise the risk of developing work-related musculoskeletal disorders (MSDs). Since the repeated actions required in their jobs, retail workers are at a significant risk for MSDs. Cashiers, stockers, sales associates, warehouse employees, and delivery drivers are among retail vocations that require repetitive actions and are at high risk for MSDs. Cashiers are subjected to repetitive activities such as scanning products and bagging groceries, which can result in shoulder and back injuries. Stockers are subjected to repetitive activities such as lifting and carrying large boxes, which can result in back injuries. Sales staff are subjected to repetitive motions, such as reaching for things on high shelves and bending to pick up items from the floor,

which can result in back injuries. Tendinitis, bursitis, and syndromes of nerve entrapment are another few of the disorders that can result from repetitive motion injuries (Greenberg & David Vearier, 2022). A systematic review of work-related musculoskeletal diseases (MSDs) in the retail industry is presented in the Oliveira *et al.* (2020) study. It looks at a number of ergonomic risk factors, such as repetitive motion, and how these affect the likelihood of MSDs in retail employees. The study emphasizes the significance of repetitive motion work in the retail industry and the risks for musculoskeletal pain and injuries that go along with it.

2.2 Musculoskeletal Disorders Among Retail Workers

Musculoskeletal Disorders (MSDs) are a major health concern for retail workers, affecting their wellbeing and capacity to perform their job duties successfully (Roquelaure, 2018). MSDs are conditions that affect the muscles, bones, tendons, ligaments, and other soft tissues in the body. These illnesses are frequently linked to repeated motions, uncomfortable postures, and manual material handling jobs that are widespread in the retail industry. MSDs have a significant impact on retail workers. These conditions can cause pain, discomfort, and poor job performance (Middlesworth, 2015). Workers may encounter constraints in their capacity to complete their tasks, resulting in greater absenteeism and lower work quality. MSDs are a serious issue among retail workers because of the repetitive actions required in their occupations. Employers should take steps to prevent MSDs by developing ergonomic solutions and providing staff with appropriate training. They can lower the risk of harm and improve the overall health and safety of their employees by doing so.

2.2.1 Low Back Pain

Low back pain (LBP) is a common Musculoskeletal Disorder (MSD) among retail workers, causing discomfort and affecting their ability to execute job duties. It refers to pain or discomfort in the lower back, usually extending from the waist to the upper buttocks. This disease can have significant effects on the wellbeing and productivity of retail workers. Another study on warehouse employees discovered that low back pain is a common MSD that causes functional impairment and absence from work (Gomes *et al.*, 2023). Due to the nature of their profession, material handlers in grocery retail businesses are also at risk for serious low back pain and other musculoskeletal problems (Rahman & Zuhaidi, 2017). Several factors lead to retail employees developing low back discomfort. The frequent and inappropriate lifting of big objects, such as boxes or cargo, is a major contributor. Lifting improperly, such as bending the knees and maintaining the back straight, can strain the muscles and ligaments in the lower back, causing pain and discomfort. According to Webber (2018), his study's findings revealed that retail workers are more likely to have back pain.

2.2.2 Shoulder Pain

Shoulder pain is defined as pain or discomfort in the shoulder region, which includes the muscles, tendons, and joints of the shoulder complex. Shoulder pain can have a substantial influence on the well-being and productivity of retail workers. A study by (Russo *et al.*, 2020) on Italian workers found that the 12-month period prevalence of MSDs was 46.1% for shoulders, neck, and/or upper limbs. Several factors lead to retail employees developing shoulder pain. Repetitive motion is a major factor. Scanning products, stacking shelves, and organising merchandise all necessitate regular reaching and repeated arm and shoulder actions. These repetitive motions can cause muscular imbalances, strain, and inflammation in the shoulder area over time. Manual material handling jobs like lifting and transporting large goods can potentially cause shoulder pain. Improper lifting techniques, high loads, and uncomfortable postures can all put too much strain on the shoulder joints and muscles, causing discomfort and agony. Shoulder pain can have a substantial impact on retail workers. It can affect work performance, limit range of motion, and create discomfort and distress.

2.3 Ergonomic Risk and Musculoskeletal Disorders

Multiple studies have consistently established a correlation between ergonomic risk factors and the prevalence of musculoskeletal disorders (MSDs) among cashiers. The nature of cashier work exposes individuals to various risks, including awkward and static postures, repetitive movements, and strenuous exertions, all contributing to a range of musculoskeletal health issues. Specific risk factors identified include repetitive reaching, awkward arm stretching, and bending over the counter, leading to upper limb illnesses. Cashiers in small-scale enterprises face a higher prevalence of work-related musculoskeletal diseases, with additional risk factors such as excessive physical effort, non-neutral postures, and vibration. Poor workstation design and inadequate ergonomic support have been highlighted as significant contributors to musculoskeletal problems among cashiers. Studies focusing on female cashiers and those utilizing electronic scanners reveal associations between musculoskeletal disorders and ergonomic risks. Notably, scanning postures, especially with electronic scanners, have been linked to upper extremity musculoskeletal diseases, emphasizing the role of factors like repetition, force, and poor posture in the development of MSDs in the upper extremities.

2.4 Research Framework

Several researches have looked into the risk factors for MSDs and have found a variety of risk variables. Based on knowledge, the mechanisms that might result in MSD should be determined. To eliminate or reduce the risk factors for MSD related to the workplace, an intervention might be devised. The workplace, the work organisation, or employee behaviour may be the focus of the intervention. There is evidence that the burden of MSDs attributable to occupational exposure to physical ergonomic risk factors, such as force exertion, demanding posture, or repetitive movement, is significant, according to recent studies (Van de Wijdeven *et al.*, 2023). Fig. 1 shows the research framework adopted for this study.

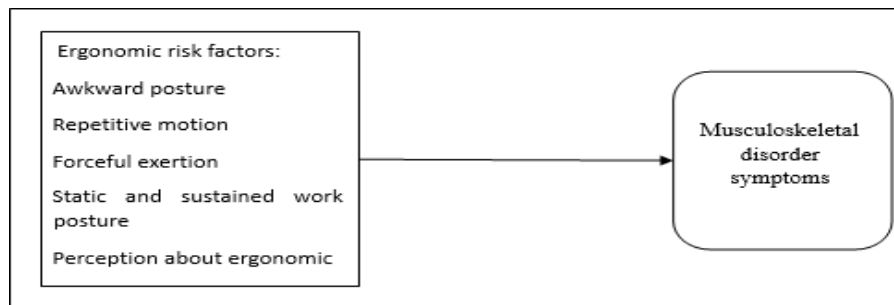


Fig 1 Research Framework

3. Research Methodology

In this research, the quantitative approach involves giving workers questionnaires to determine the symptoms of musculoskeletal disorders (MSDs) they may be experiencing. This study design is consistent with the current research aims, as the goal of the study was to analyse ergonomic risk factors and musculoskeletal disorders symptoms. The research population for this study consisted of employees from a selected retail store, representing a cashier job within the retail industry. The study aimed to examine the relationship between ergonomic risk factors and MSD symptoms in this specific population, providing valuable insights for improving workplace ergonomics and promoting the health and well-being of retail workers. In the study, respondents were chosen for the study using a non-probability convenience sampling technique. A non-probability sampling technique called convenience sampling involves choosing subjects who are easily reachable and accessible to the researcher. This sampling method is often used when it is challenging to reach the whole population of interest or when there are time and resource constraints. Using the convenience sampling method, researchers can quickly collect information from a small number of agreed and easily reachable participants. Depending on their availability and willingness to participate, retail staff members inside the chosen stores may have been approached and invited to engage in the research.

The study's focus area is Batu Pahat, Johor, and its intended audience is made up of people who work in retail stores as a cashier. The targeted respondents will also be the concentrated workforce in Batu Pahat, Johor. A sample of Batu Pahat, Johor, employees, were used in this investigation. A total of 32 people take part in this ongoing inquiry. The questionnaires used for data collection in this study were created according to OSH regulations. The Initial Ergonomic Risk Assessment (IERA) and Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) are the questionnaires that were used. Retail workers who are exposed to ergonomic risks are identified using an initial ergonomic risk assessment (IERA). The components asked in the questionnaire are demography, awkward posture, static and sustained work posture, forceful exertion, repetitive motion, vibration, and environmental factors. Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) is a 54-item survey that asks about the occurrence of musculoskeletal aches, pains, or discomfort in 20 different body areas throughout the previous week and includes a body chart.

According to Çakıt (2019) the Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) was used to assess discomfort. It has been utilized in working groups for the evaluation of musculoskeletal pain, including those of healthcare providers and machine operators. This questionnaire distributed to workers involved in manual lifting and at risk of musculoskeletal disorders themselves. This is because, by distributing the Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) form, it can identify in more detail where and how often they experience discomfort in their body parts. The CMDQ scoring rules were followed in calculating the musculoskeletal discomfort score in order to determine the rate of discomfort and quantify the discomfort level. Following is an evaluation of musculoskeletal discomfort. First, the operators calculated the degree of discomfort as follows: "Never, once or twice per week, three or four times per week, once every day, or several times every day." The result will then be multiplied by the severity rate ("slightly uncomfortable, moderately uncomfortable, very uncomfortable") and interference rating ("Not at all, slightly interfered substantially

interfered") to arrive at the weighted musculoskeletal discomfort level. Thus, the most severe cases were explained. Each questionnaire was checked for completeness and uniformity. The correct data and completed were then labelled, validated, classified, and then exported into the Statistical Package for the Social Sciences (SPSS) programme for further analysis. According to Syed Muhammad Sajjad Kabi (2016), data is used to assess the achievement of research objectives, and certain approaches are used to acquire it. Descriptive analysis, reliability analysis, pilot test, normality and correlation analysis are included in this study.

Descriptive analysis is a statistical approach for summarising and describing the key characteristic of dataset. By using measures of central tendency (such as mean, median and range) and variability (such as standard deviation and range), it seeks to give a clear and understandable explanation of the data. Descriptive analysis assists researchers to learn about the characteristics, patterns and distribution of data that has been collected (Blanque & Cortés-martín, 2022). This is analysed for pilot test to identify whether the questionnaire that have been developed are fit for the study or not. The first 10 responses that were collected through questionnaire were selected to do pilot test (refer to Table 2).

Table 2 Reliability analysis for pilot test

Variables	Cronbach's Alpha	Strength of association
Ergonomic risk factors	0.873	Good & acceptable
Musculoskeletal disorder symptoms	0.983	Excellent & effective

Reliability evaluation is used to determine the measuring instrument's stability so that it is reliable and remains stable when re-measuring (Saiful Azwar, 2018). According to Masri Singarimbun, reliability is a measure that indicates the level to which the testing instruments are reliable. Testing for reliability is essential for ensuring the correctness and validity of study findings (Kyriazos *et al.*, 2018). Data that has been collected will define the strength based on table in. Normality test is a statistical procedure to determine the data is set closely aligns with a normal distribution and to estimate the possibility of a random variable with the data set being normally distributed. This test is commonly performed to verify the data used in research follows a normal distribution which is a requirement for many statistical procedures such as correlation, regression, t-tests, and ANOVA. There are a few methods to determine the normality of data. However, there is two most common normality tests that are used which are the Kolmogorov-Smirnov test, and the Shapiro-Wilk test. According to González-Estrada *et al.*, 2022 if the sample size is larger than 50, the Kolmogorov-Smirnov test will be employed, but the Shapiro-Wilk test will be used if the sample size is equal to or less than 50. According to Pearce (2023), correlation analysis is a statistical technique for investigating the relationship between two or more variables. It aids in determining the degree of correlation as well as the direction of that association (positive or negative). Correlation analysis investigates how changes in one variable correspond to changes in another. The outcome is reported as a correlation coefficient ranging from -1 to 1. A positive correlation shows a rise in one variable that corresponds to an increase in the other, whereas a negative correlation indicates a decline in one variable that corresponds to a decrease in the other.

4. Results and Discussion

4.1 Demographic Analysis

From the 32 respondents, female respondents are higher with percentage of 78.1% represent of 25 people. Meanwhile, male respondents recorded 21.9% represent of 7 people. In the survey, participants aged 21-30 years constituted the majority, with 68.8% of the respondents, representing 22 individuals. Those aged 20 years and below accounted for 15.6%, comprising 5 people. The age group of 31-40 years constituted 12.5%, with 4 participants, while individuals aged 41-50 years made up 3.1%, represented by 1 person. In terms of educational background, the majority of participants, accounting for 56.3% (18 people), held an SPM qualification. STPM/Diploma holders comprised 21.9%, with 7 individuals, while those with a bachelor's degree constituted 15.6%, involving 5 people. Additionally, a small percentage, 3.1%, represented by 'others' and PT3 qualifications, was observed among the respondents. The questionnaire discovered a predominance of Malay participation, accounting for 96.9% of the responses with a total of 31 people. Indians made up a lower percentage, accounting for 3.1%, with only one participant. There were no Chinese respondents in the surveyed population. Most respondents, comprising 71.9% (23 people), reported a monthly income of less than RM 2000. In contrast, 28.1% of participants, totalling 9 individuals, indicated a monthly income falling within the range of RM 2001 to RM 3000. All respondents, totalling 32 individuals, exclusively identified themselves as cashiers, constituting 100% of the surveyed population in the work category analysis. The analysis of years of work experience in this field revealed that most respondents, accounting for 56.3% (18 people), reported a tenure ranging from 2 to 5 years. Approximately 28.1% of participants, totalling 9 individuals, had less than 1 year of

experience, while 15.6%, represented by 5 people, had a work history spanning 5 to 10 years in this field. The survey of daily working hours found that 96.9% (31 persons) of respondents reported working 8 hours each day. A small proportion, 3.1%, represented by a single person, reported working 10 hours per day. When considering the weekly working hours, 12.5% of respondents, equivalent to 4 individuals, reported working less than 40 hours. The majority, comprising 81.3% (26 people), reported working between 40 to less than 48 hours per week. Additionally, 6.3%, represented by 2 people, reported working 48 to 60 hours weekly.

4.2 Descriptive Analysis

Descriptive analysis is a technique that uses selected variables to explain and characterise the distribution of data. The collected data will be computed in terms of standard deviation and mean. The mean and standard deviation of each item will be utilised to display the genuine outcome of the study for better understanding. The data analysis indicates a medium central level of tendency, with mean values ranging from 0.30063 to 3.5813. Repetitive motion emerges as the highest mean among the ergonomic risk factors, with a mean of 3.5813 and a standard deviation (σ) of 0.66110, signifying the impact of repetitive motion on cashiers' daily work. According to OSHA (2004), repetitive motion is a significant contributor to workplace issues in supermarkets. Awkward posture follows with the second-highest mean of 3.5500 and $\sigma = 0.60107$, while forceful exertion records a mean of 3.4188 and $\sigma = 0.88916$. Perception is the lowest among the ergonomic factors with a mean of 3.2813 and $\sigma = 0.45962$. The standard deviation score suggests a distribution that is not close to the mean. Analyzing specific body parts shows that most parts fall within the medium level (mean between 2.41 to 3.03, with the right shoulder having the highest mean (3.03), followed by the lower back (2.91) and right wrist (2.84). The mean for the right hand, where most parts have low mean values, except for area F, is recorded with a medium mean of 2.38. Similarly, the mean for the left hand, with all parts having low mean values ranging from 1.66 to 2.13. Overall, the analysis identifies the workers' musculoskeletal issues as primarily centered in the right shoulder, lower back, and right wrist.

The primary focus of the first objective in this study was to identify ergonomic risk factors for cashiers, with the highest risk being attributed to repetitive motion. Cashier tasks involve routine and repetitive actions, such as scanning products and handling cash transactions, which can lead to strain on muscle groups and joints, potentially resulting in musculoskeletal diseases over time. Prolonged repetition without adequate rest or ergonomic support may contribute to chronic conditions like tendinitis or carpal tunnel syndrome. This finding aligns with Ahmad Zuhaidi (2018) earlier research, which also identified repeated motion as a significant ergonomic issue for cashiers. The study assessed upper limb diseases and risk factors among cashiers, revealing that frequent and repetitive arm movements can contribute to musculoskeletal diseases. The study underscores the importance of addressing repetitive motion through ergonomic considerations, including workstation design, breaks, and proper training to mitigate the risk of overuse injuries among cashiers.

The analysis of musculoskeletal disorder (MSD) symptoms among retail workers, particularly cashiers, revealed a consistent pattern of pain across various body areas. Notably, the right shoulder, lower back, and right wrist emerged as predominant sources of discomfort among participants, indicating a critical concern that warrants targeted interventions. This aligns with Abdol Rahman and Ahmad Zuhaidi (2017) research, which highlighted medium exposure levels in the shoulder, wrist, upper back, neck, and upper arm. Another study by Batiz *et al.* (2019) emphasized musculoskeletal discomfort in the shoulders, lower back, and upper back for supermarket cashiers, prompting the investigation of working conditions and risk factors. While mild pain was noted in the upper back, left hand, right hand, and other areas, the intense discomfort observed in the neck, forearm, and lower leg underscores the diverse musculoskeletal issues cashiers face. The findings emphasize the need for customized ergonomic solutions, potentially focusing on shoulder-specific actions, to alleviate discomfort in this crucial work environment. Recognizing varying discomfort levels in different body regions contributes to a comprehensive understanding of pain points, enabling the development of targeted treatments to enhance overall well-being.

4.3 Normality test

The significant level of independent variable which is ergonomic risk factor showed value 0.751. The total of respondent is not more than 50, so Shapiro-Wilk were used to analyse the data (refer to Table 3). The significant value of ergonomic risk factor showed value 0.751, that mean the data were normally distributed because $p > 0.05$. For the musculoskeletal disorder symptoms showed the significant value is 0.243, and it's also normally distributed. Due to the variable showed result in normal distribution, thus the Pearson selected for the correlation analysis.

Table 3 Normality test

	Kolomogorov-Smirnov ^a	Shapiro-Wilk
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	Static	df	Sig	Static	df	Sig
Ergonomic risk factors	0.093	32	0.200	0.978	32	0.751
Musculoskeletal disorder symptoms	0.121	32	0.200	0.958	32	0.243

4.4 Correlation analysis

Table 4 shows the value of the relationship between these 2 variables is 0.603, which indicate that there is a strong relationship between the ergonomic risk factors and musculoskeletal disorder symptoms. Therefore H1 for this study is supported.

Table 4 Correlation analysis

		Musculoskeletal disorder
Ergonomic risk factor	Pearson correlation	.603**
	Sig (2-tailed)	<0.001
	N	32

The third objective of this study aims to investigate the correlation between ergonomic risk factors and symptoms of musculoskeletal disorders (MSDs) among retail workers. Employing Pearson correlation analysis, the study reveals a positive relationship between the variables, with the strength of both independent and dependent variables recorded as positive based on the data. The correlation result indicates a strong relationship between ergonomic risk factors and musculoskeletal disorder symptoms, with a correlation value of 0.603. This finding aligns with previous research, particularly a study by Algarni *et al.* (2020), which also demonstrated a significant relationship between ergonomic risk factors and MSDs. Similarly, another study by Fan *et al.* (2022) supports these findings by establishing a significant relationship between ergonomic risk and musculoskeletal disorders.

5. Conclusion

The research on ergonomic risk factors and symptoms of musculoskeletal diseases (MSD) among retail employees in several stores provided valuable insights into the occupational health and safety challenges that this particular group faced. The study offered a comprehensive understanding of the occurrence and consequences of MSD symptoms and ergonomic risk factors within the retail workplace. Repetitive motion, manual material handling, awkward postures, poor workspace design, and forceful exertion were identified and documented as prevalent ergonomic risk factors in the work environment of retail workers. These factors significantly compromised the health of retail employees and contributed to the onset of MSD symptoms. Furthermore, the study highlighted the prevalence of common MSD symptoms, including right shoulder pain, low back pain and right wrist pain, among retail employees. These symptoms were found to have considerable adverse effects on both the health and productivity of the workforce, manifesting in decreased job satisfaction, increased absenteeism, and reduced work output. Overall, this study advanced the understanding of ergonomic risk factors and MSD symptoms among retail employees, underscoring the critical importance of addressing these issues to protect the health, safety, and productivity of this occupational group. The findings and recommendations of the study served as a foundation for future interventions, policies, and practices aimed at improving the working conditions and well-being of retail workers, ultimately contributing to the creation of safer and healthier workplaces within the sectors. A comprehensive approach to future studies in occupational health for retail workers, particularly cashiers, holds significant promise for enriching understanding and improving intervention strategies. Long-term studies tracking the impact of ergonomic risk factors and repetitive motion over an extended period offer valuable insights into the development of musculoskeletal conditions and potential preventive measures (Algarni *et al.*, 2020). Intervention studies, as highlighted by Abdol Rahman and Ahmad Zuhaidi (2017), are essential for testing the effectiveness of targeted ergonomic interventions, including redesigned workstations, training programs, and scheduled breaks, to identify practical solutions for mitigating musculoskeletal issues. Divicenzo (2021) recommends investigating psychosocial factors' impact, such as job satisfaction and stress levels, to gain a comprehensive understanding of the intricate interactions between psychological and physical components in the workplace. Additionally, conducting comparison research among various retail sectors can reveal industry-specific obstacles, facilitating customized treatments. The integration of technology, such as ergonomic equipment and wearable devices, provides an intriguing option for real-time feedback and assistance to help cashiers minimize the negative effects of repetitive motion. Furthermore, adopting an inclusive strategy that considers the viewpoints of cashiers with impairments is imperative to comprehend a range of needs and adjust ergonomic considerations appropriately.

This study significantly contributes to occupational health, particularly in the realm of retail labor and cashier roles. It identifies repetitive motion as the primary ergonomic risk factor for cashiers, offering a focused area for interventions. Exploring musculoskeletal disorder symptoms reveals specific pain regions neck,

shoulder, forearm, and lower leg with shoulder pain as a prevalent issue. The findings emphasize the need for tailored ergonomic treatments, including workstation design, breaks, and training. This knowledge enables organizations and policymakers to implement targeted interventions, enhancing the overall well-being of retail employees. The study's generalizability to similar work situations with repetitive duties expands its relevance, providing valuable insights beyond the specific context investigated. Overall, the research advances our understanding of ergonomic factors in occupational health and offers practical implications for effective planning and policy development.

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Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

The authors confirm contribution to the paper as follows: **Study conception and design:** Rumaizah Ruslan, Nuriyana Suherman; **data collection:** Nuriyana Suherman; **analysis and interpretation of results:** Nuriyana Suherman, Norhadilah Abdul Hamid, Rumaizah Ruslan; **draft manuscript preparation:** Nuriyana Suherman, Norhadilah Abdul Hamid. All authors reviewed the results and approved the final version of the manuscript.

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