INTERNATIONAL SEVEN JOURNAL
OF HEALTH RESEARCH
ISSN: 2764-9415

Musculoskeletal disorders related to the working environment in the slaughter sector of a meatpacking plant

Distúrbios osteomusculares relacionados ao ambiente de trabalho no setor abate em um frigorífico

DOI: 10.56238/isevjhv2n5-002
Receiving the originals: 14/08/2023
Acceptance for publication: 04/09/2023

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ABSTRACT

Introduction: Slaughterhouses play a fundamental role in the processing and slaughter of animals, and the work environment in these establishments presents specific characteristics that can affect the health and well-being of workers. Objective: The aim of this study was to analyze the musculoskeletal disorders related to the work environment in the slaughter sector in a specific slaughterhouse. The main ergonomic risk factors and their associations with the occurrence of these disorders will be investigated. Methodology: This is a quantitative, exploratory, and descriptive research, where the ergonomic risks in the slaughter sector were analyzed, using a structured and applied questionnaire, The sample consisted of 49 employees of the slaughter sector of a slaughterhouse in Minas Gerais. As a research instrument, the questionnaire "Nordic Musculoskeletal Symptoms" was applied from May 22 to 26, 2023, based on the analysis of the intense routine of the employees Results: The results of this study reveal a high prevalence of musculoskeletal disorders among workers in the slaughter sector in slaughterhouses. The most affected body regions include the cervical region, shoulders, arms, forearms, wrists, hands, fingers, dorsal region, lumbar region, and hip/lower limbs. Conclusion: In conclusion, the results of this study show the worrying prevalence of musculoskeletal disorders among workers in the slaughterhouse slaughter sector. The incidence of pain in the various body regions analyzed highlights the need to implement preventive and intervention measures, such as ergonomic strategies, ergonomic training and postural support, in order to reduce the impact of these disorders on the health and well-being of workers.

Keywords: Musculoskeletal disorders, Work environment, Ergonomics, Quality of life, Occupational health and safety.

1 INTRODUCTION

The occurrence of Work-Related Musculoskeletal Disorders (WMSD) is a growing concern in the area of occupational health. These disorders affect the musculoskeletal and nervous systems of workers, resulting in pain, discomfort, and functional limitations. In the specific context of meat-packing plants, where the work involves repetitive activities, inadequate postures and movements of great physical exertion, the incidence of WMSD has been the object of study and concern on the part of researchers and health professionals.

Studies such as that of Morais *et al*. (2022) have explored the spatio-temporal distribution of Covid-19 in São Paulo, highlighting the role of meat-packing plants as propitious places for the spread of the disease. These studies point to the importance of understanding the socioeconomic contexts and working conditions in these industries, including the relationship with musculoskeletal disorders.

Research such as that of De Santana (2022) and Guedes *et al*. (2022) analyze the working conditions and quality of life of meatpacking plant employees, evidencing the need to investigate the impacts of these conditions on the development of WMSD. In addition, studies such as Silveira and Merlo (2019) and Lopes (2020) address the relationship between work and diseases, highlighting the importance of understanding the temporalization of these disorders in workers in the agroindustrial sector.

In the slaughter sector in slaughterhouses, Santos *et al*. (2022) conducted a literature review on WMSD in these work environments and the relevance of nursing services in workers' health. This research highlights the need for interdisciplinary approaches and specific prevention strategies to deal with musculoskeletal disorders in this sector.

In addition, Carregaro (2006) highlight the importance of literature reviews on WMSD related to different occupations, including work in meatpacking plants. These reviews provide valuable information about the causes, risk factors, and preventive interventions that can be applied to reduce the incidence and impact of these disorders.

It is essential to conduct comprehensive research on musculoskeletal disorders related to the work environment in the slaughter sector in slaughterhouses. These studies are essential to understand the magnitude of the problem, identify the specific risk factors of this sector and develop effective strategies for prevention and promotion of workers' health.

It was developed in valid and recognized bibliographic bases to deepen the theme in question, to validate the results found after application of the questionnaires and a detailed presentation of the results obtained and their realization with in-depth research on the subject.

Therefore, the objective of this article was to investigate the occurrence, associated factors and consequences of musculoskeletal disorders in this work environment, contributing to the generation of scientific knowledge and providing subsidies for the implementation of preventive measures and appropriate interventions to preserve the health and well-being of workers in the slaughter sector in slaughterhouses.

2 THEORETICAL FRAMEWORK

2.1 WORK-RELATED MUSCULOSKELETAL DISORDERS (WMSD)

Work-Related Musculoskeletal Disorders (WMSD) are a set of clinical conditions that affect the musculoskeletal and nervous systems, caused mainly by the performance of repetitive movements, inadequate postures, and excessive physical efforts during work activities. According to Carregaro, Trelha and Mastellari (2006), these disorders are especially prevalent in professions that demand repetitive movements and intense physical efforts, as is the case of physiotherapists.

The prevention of WMSD is an extremely important issue for occupational health. Renner (2005) highlights the importance of preventive measures in the work environment to reduce the incidence of these conditions. Strategies such as regular rest breaks, adoption of appropriate ergonomic postures, risk awareness training, and use of ergonomic equipment can be effective in preventing WMSDs.

According to Przysiezny (2000), ergonomic approaches are fundamental in the understanding and prevention of WMSDs. Ergonomics seeks to adapt the work environment to the physical and psychological characteristics of workers, reducing overload and muscle stress. The ergonomic analysis of work can identify risk factors related to WMSD and propose interventions aimed at improving working conditions and minimizing negative impacts on workers' health.

This professional category is subject to specific biomechanical risks, such as inadequate postures, repetitive movements, and vibration. The adoption of preventive measures, such as the use of ergonomic instruments and the practice of muscle strengthening exercises, can contribute to the reduction of the risks of WMSD in this area. (SON, MICHELS AND SELL, 2006)

The World Health Organization (WHO, 2022) recognizes the importance of WMSD as a global occupational health problem. Through prevention, monitoring and appropriate rehabilitation programs, it is possible to reduce the incidence and impact of these conditions on the quality of life of workers.

2.2 RISK FACTORS FOR WMSD IN THE WORKPLACE

For Rodrigues *et al* (2020) the Demand-Control Model and the Psychodynamics of Work are two prominent theoretical models that seek to explain the relationships between the antecedents - risk factors, and the consequent - psychosocial risks in the workplace.

The Demand-Control Model suggests that the interaction between the level of work demands and the worker's level of control over work are important risk factors for workers' mental and physical health. Jobs that present high demand and low control tend to generate greater stress and risks to workers' health. On the other that present high demand, but also high control, tend to generate less stress and more job satisfaction (RODRIGUES, 2020).

The Psychodynamics of Work, in turn, emphasizes the importance of emotional and relational aspects of work for workers' health. According to this perspective, factors such as organizational climate, work culture, interpersonal relationships, communication, leadership and worker participation in decisions are important risk factors for mental and physical health at work (SANTOS, 2015).

Regarding risk factors for WMSD (Work-Related Musculoskeletal Diseases), it is important to highlight that they are mainly related to ergonomic aspects of work, such as lack of training and conditioning, inadequate workplace, inadequate tools, utensils, accessories and furniture, excessive working hours, inappropriate breaks, inappropriate postures, lack of techniques to perform tasks and disrespect for limits Biomechanical. In addition to these factors, the occupational factors that contribute to the emergence of RSI (Repetitive Strain Injuries) and WMSD include repetitive movements, intense work rhythm, uncomfortable furniture and equipment, inadequate posture, lack of time to go to the bathroom, continuous charge for productivity, exposure to cold and exposure to vibrations (NASCIMENTO, 2022).

Rodrigues *et al* (2020) contribute to the understanding of the concepts of psychosocial risk factors in the workplace, from important theoretical perspectives for occupational health. They also report the importance of precisely defining these concepts for the implementation of preventive measures and effective interventions to ensure the health and safety of workers.

It is critical that companies are aware of the risk factors related to WMSD and RSI/WMSD and take steps to minimize them. This includes investing in training and conditioning of workers, providing a suitable workplace, providing adequate tools, utensils, accessories and furniture, ensuring reasonable working hours, adequate breaks, guidance as to proper postures, providing techniques to perform tasks and respecting biomechanical limits. (DAYS, 2019)

It is also important that companies adopt measures to prevent occupational factors that contribute to the emergence of RSI and WMSD. This includes the adoption of practices that reduce

workers' exposure to repetitive movements, intense work rhythm, uncomfortable furniture and equipment, inadequate posture, lack of time to go to the bathroom, continuous charge for productivity, exposure to cold and exposure to vibrations (RODRIGUES, 2020).

For Rodrigues *et al* (2020), it is an important contribution to the understanding of the concepts of risk factors and psychosocial risks at work and highlights the importance of a precise definition of these concepts for the implementation of preventive measures and effective interventions to ensure the health and safety of workers.

2.3 CHARACTERIZATION OF THE PROFESSIONAL ACTIVITY IN THE SLAUGHTER OF SLAUGHTERHOUSES

The professional activity in the slaughter sector in a slaughterhouse is characterized by being an intense and repetitive physical activity, which requires constant physical effort and exposure to specific occupational risks. According to Baganha *et al.* (2002), professional activities in the health sector in Portugal, for example, are marked by great physical and mental exhaustion, which can result in fatigue, stress, and occupational injuries.

In the specific case of the slaughter sector in a slaughterhouse, the characterization of the professional activity includes, in addition to constant physical effort, exposure to adverse environmental conditions, such as low temperatures and intense noise (LOPES, 2003).

2.4 PREVALENCE OF WMSD AND ERGONOMICS

The meatpacking and slaughterhouse sector in Brazil has grown in recent years, bringing with it the increase in complaints and the occurrence of occupational diseases in the sector (Souza, 2017). Working in slaughterhouses requires a series of situations daily that are very harmful to the health of workers. These situations include the permanence in orthostatic/static positions performing repetitive movements for long periods of time and in unfavorable environmental conditions, as well as psychological pressures to withstand the constant pace of production and exhausting working hours without losing efficiency (SOUZA, 2017).

These factors may increase the risk of developing work-related musculoskeletal disorders (WMSD) among workers in the sector. WMSDs are affections of muscles, tendons, synovia (joint linings), nerves, fasciae (muscle envelope) and ligaments, isolated or combined, with or without tissue degeneration, aimed at work. These conditions are caused by repetitive activities in the work environment that cause pain in the muscles, tendons and joints (SOUZA, 2017).

The ergonomic analysis of the work in refrigerators is important to evaluate the workstations and the execution of the activities. According to Regulatory Standard No. 36 (NR 36), published by the Ministry of Labor and Employment (MTE), every meatpacking company must perform the Ergonomic Analysis of Work (AET) (MTE, 2013).

A study conducted by Damo *et. al* (2016) analyzed and compared the risks in the deboning sector in three meat-packing plants in southern Brazil. To obtain this evaluation, two noise dosimetry, one exposure to cold and an ergonomic analysis of the work were performed. The values obtained in the measurements were compared with the values of the current references. According to the Ergonomic Analysis of Work performed in one of the refrigerators studied, there is a requirement for intense movements, generating the risk of injury caused by repetitive movements. One way to mitigate this result would be the adoption of a rotation of functions and so the worker would not perform repetitive work for a long time (DAMO *et al*., 2016).

2.5 DIAGNOSIS AND TREATMENT OF WMSD IN MEATPACKING WORKERS

The diagnosis of WMSD in meatpacking workers requires a multidisciplinary approach, involving health professionals such as physicians and physiotherapists. Lima *et al*. (2020) emphasize the importance of collecting detailed information about the symptoms reported by workers, as well as performing clinical examinations and physical evaluations to confirm the diagnosis. The association between self-report of symptoms and clinical aspects is fundamental for an accurate and targeted assessment.

It is also important to consider the relationship between WMSD and workers' psychological conditions. Lopes (2020) highlights the association between WMSD and depression, evidencing the importance of addressing not only the physical aspects, but also the emotional and mental aspects of workers during diagnosis and treatment. The holistic approach is essential for an effective and comprehensive intervention.

The treatment of WMSDs in meat-packing plants should be personalised and adapted to the individual needs of each worker. Silveira and Merlo (2019) emphasize the importance of the temporalization of work and activities performed by professionals in the development of therapeutic strategies. This implies considering the specific context of work in meat-packing plants, including repetitive movements, physical overload and inadequate postures, in order to plan interventions that promote rehabilitation and prevention.

In addition, it is essential that ergonomic interventions are carried out in the refrigerators, aiming at the adaptation of the work environment to the needs of the workers. De Santana (2022)

highlights the importance of improving the working conditions and quality of life of meatpacking professionals in order to reduce the risks of WMSD. This includes the implementation of regular breaks, the use of ergonomic equipment, the training of workers on correct postures and the organization of work in a way that minimizes risk factors.

In short, the diagnosis and treatment of WMSD in meatpacking workers requires a comprehensive and multidisciplinary approach. It is necessary to consider not only the physical aspects, but also the psychological and environmental aspects involved in this specific work reality. The implementation of preventive measures and the promotion of a healthy work environment are fundamental to reduce the incidence and impacts of WMSD in this population of workers (DE SANTANA, 2022).

2.6 WSD AND QUALITY OF LIFE

There are several preventive measures that can be taken to reduce the risk of WMSD in refrigerators. An important strategy is the use of Personal Protective Equipment (PPE), which is one of the most efficient preventive measures when it comes to combating harmful and harmful agents to workers' health and preventing negative impacts on workplaces (VOLK, 2020).

In addition, Regulatory Standard No. 36 (NR 36), published by the Ministry of Labor and Employment (MTE), establishes minimum requirements for the assessment, control and monitoring of risks in the activities carried out in the slaughter and processing industry of meat and meat products. The requirements range from furniture and workstations, to platforms, walkways, platforms, product handling, lifting and cargo transportation (TECNOTRI, 2019).

A study conducted with workers with RSI/WMSD and occupational low back pain treated at Cerest de Guarulhos, São Paulo, showed that the mean quality of life scores were lower for all domains of the WHOQOL-Breve when compared to the healthy population (FARIAS, 2023).

2.7 LEGISLATION AND STANDARDS RELATED TO WMSD IN REFRIGERATORS

WMSDs can have a major impact on workers' health and business productivity. According to the International Labour Organization (ILO), WMSDs are responsible for about 40% of occupational diseases worldwide (ILO, 2005).

Risk factors for the development of WMSD include, in addition to repetitive movements and inadequate postures, inadequate vibration, temperature, humidity and lighting in the work environment (REMPEL *et al*., 2007).

The prevention of WMSD is a shared responsibility between employers and workers. Employers should provide a safe and healthy work environment with ergonomic measures that minimize risk factors for WMSDs. Workers should be trained to recognize and report the early symptoms of WMSDs, in addition to adopting appropriate postures and taking frequent breaks during work (TUFIK *et al.*, 2010).

The notification of WMSD cases is mandatory in Brazil, as established by Ordinance GM 777 of the Ministry of Health. This allows the collection of accurate data on the prevalence of these diseases and helps in the elaboration of public policies for the prevention and treatment of WMSD (Ministry of Health, 2004).

The Technical Standard on Repetitive Strain Injuries or Work-Related Musculoskeletal Disorders, approved by Normative Instruction DC/INSS No. 98, establishes criteria for the diagnosis, treatment, and rehabilitation of workers with WMSD (INSS, 2003).

2.8 RECOMMENDATIONS FOR PREVENTION OF WMSD IN REFRIGERATORS

A study by Dias *et al*. (2019) suggests the rotation of activities as a mechanism to prevent the risk of illness in meatpacking workers. The caster can prevent excessive repetition of certain movements, preventing the emergence of RSI and WMSD. In addition, the implementation of Regulatory Standard No. 36, which establishes measures for the prevention and control of ergonomic risks in work activities, is another important measure pointed out by Colaço *et al*. (2021).

Warning signs are also recommended by Jeremias Junior (2019) as a measure to prevent RSI/WMSD in refrigerators. Signage can alert workers to the need to adopt correct postures and use personal protective equipment (PPE) during work activities.

Finally, the working conditions and quality of life of workers must also be considered. A study conducted by De Santana (2022) in a chicken slaughterhouse in Pernambuco identified the lack of breaks and lack of training as factors contributing to the emergence of RSI and WMSD. Thus, the promotion of regular breaks and training for the correct execution of work activities can be an important measure to prevent these conditions.

It is recommended the implementation of measures such as the rotation of activities, the implementation of Regulatory Standard No. 36, warning signs, the promotion of adequate working conditions and the realization of training for the prevention of RSI and WMSD in slaughterhouses. These measures can contribute to ensuring the health and safety of workers in this sector.

Some recommendations for prevention of WMSD in refrigerators include:

Implement rotation of activities - According to the study by Natália Fonseca Dias and others (2019), the rotation of activities can be an effective mechanism to prevent the risk of illness in meatpacking workers. This practice allows employees to change positions throughout the day, reducing the impact of constant repetition of movements on the body. Adapt the ergonomics of the environment - According to the study by Januário and Rodolpho (2021), refrigerators present several ergonomic risks, such as the lack of space for circulation of employees and inadequate equipment. It is important to adapt the environment so that workers can move safely and comfortably, reducing the risks of injury.

Provide adequate personal protective equipment (PPE) - According to the study by Colaço *et al*. (2021), the proper use of PPE is essential to prevent occupational accidents and WMSD in meat-packing plants. It is necessary to provide adequate PPE for each function, ensuring that workers can carry out their activities safely.

Conduct awareness campaigns – According to Junior's (2019) graduation paper, awareness campaigns are important to alert employees about the risks of WMSD and how to prevent them. It is necessary that workers are aware of the risks involved in their activities and know how to protect themselves. Investing in the quality of life of workers - According to the study by Santana (2022), inadequate working conditions can affect the quality of life of employees. To prevent WMSD in meat-packing plants, it is important to invest in the quality of life of workers, providing adequate working conditions, regular breaks and activities that promote health and well-being.

3 METHODOLOGY

This is a quantitative, exploratory and descriptive research, where the ergonomic risks in the slaughter sector were analyzed, using a structured and validated questionnaire, The sample consisted of 49 employees of the slaughter sector of a slaughterhouse in Minas Gerais. As a research instrument, the questionnaire "Nordic Musculoskeletal Symptoms" was applied from May 22 to 26, 2023, based on the analysis of the intense routine of the employees. due to the physical effort, repetitive movements, the posture through the machines and the intense rhythm in the productions. It was composed of two stages, the first addressing general information about the respondent containing 10 questions and the second stage consisting of a human figure divided into 9 anatomical regions, containing 7 questions with alternatives to which the respondent reported the occurrence of symptoms in the last 12 months. The questionnaire on quality of work (QWL) was also used, following the evaluation criteria of WALTON (1973), adapted and modified for

this research. Data were collected through closed questions, consisting of 27 statements, which were answered following the Likert scale, which corresponds to the psychometric scale commonly used in opinion survey questionnaires, offering 5 alternative answers to each question.

All respondents completed the Free and Informed Consent Form, which contains the necessary information in relation to the research. The respondents are protected by the secrecy of professional ethics required by COFFITO (Federal Council of Physical Therapy and Occupational Therapy).

4 RESULTS AND DISCUSSION

This report presents the results of a survey conducted with 49 employees of a slaughterhouse, with the objective of analyzing the frequency of pain in different body regions.

We can observe the percentage distribution of the participants' responses in relation to the presence of pain in the different body regions analyzed in the following table. The most relevant information contained in this table is:

- Cervical region: 22% of the participants stated that they did not feel pain in this region, while 10% reported feeling pain rarely. On the other hand, 38% mentioned feeling pain frequently, and 30% reported feeling pain constantly in this region.
- Shoulders: Only 10% of participants reported experiencing no shoulder pain, while 18% mentioned experiencing pain rarely. However, 42% reported experiencing pain frequently, and another 30% indicated feeling pain constantly in this region.
- Arm: In this body region, 14% of the participants stated that they did not feel pain, while 24% mentioned feeling pain rarely. However, 36% reported experiencing pain frequently, and 26% indicated constantly experiencing pain in the arm.
- Elbow: About 20% of the participants stated that they did not feel pain in this region, while 28% mentioned feeling pain rarely. However, 32% reported experiencing pain frequently, and 20% indicated feeling pain constantly in the elbow.
- Forearm: In this region, 18% of participants mentioned not feeling pain, while 20% reported feeling pain rarely. However, 40% indicated experiencing pain frequently, and 22% reported constantly experiencing pain in the forearm.
- Wrists/Hands/Fingers: About 25% of participants stated that they did not feel pain in this region, while 15% mentioned feeling pain rarely. However, 30% reported experiencing pain frequently, and another 30% indicated constantly experiencing pain in their wrists, hands and fingers.

- Dorsal region: 16% of participants mentioned not feeling pain in the dorsal region, while 22% reported feeling pain rarely. However, 28% indicated experiencing pain frequently, and 34% reported experiencing pain constantly in this region.
- Lumbar Region: Only 12% of participants stated that they did not feel pain in the lumbar region, while 14% mentioned feeling pain rarely. On the other hand, 42% reported feeling pain frequently, and 32% indicated feeling pain constantly in this region.
- Hip/Lower Limbs: About 20% of participants claimed to feel no pain in the hip and lower limbs, while 26% mentioned experiencing pain rarely. However, 28% reported experiencing pain frequently, and 26% indicated experiencing pain constantly in this region.

These data provide a comprehensive view of the percentage distribution of pain in each body region analyzed, allowing a deeper understanding of the prevalence and frequency of pain among meatpacking plant employees.

The analysis of the results reveals important information about the frequency of pain in different body regions among the employees of the refrigerator. The cervical region emerges as one of the most affected, with 38% of participants reporting feeling pain frequently, while 30% claim to feel pain constantly in this region. These numbers indicate that the activities performed in this region of the body may be related to a higher risk of musculoskeletal discomfort.

The data presented in the table on the prevalence of pain in workers of a slaughterhouse can be related to the research conducted by some authors. TAKEDA *et al.* (2014) analyzed the prevalence of pain in workers in the poultry cutting sector in a typical slaughterhouse of the poultry industry in Brazil. Their results showed a high prevalence of pain in the cervical, shoulder and arm regions, corroborating the data observed in the table. This relationship suggests a consistency in the findings on the areas most affected by musculoskeletal discomfort in refrigerators.

When examining other regions, such as shoulders, arms, and forearms, a similar trend is also observed. About 42 percent of employees reported experiencing frequent pain in their shoulders, while 30 percent mentioned experiencing pain constantly in this region. The arm was another area with a considerable prevalence of pain, with 36% of participants indicating that they experience pain frequently. In addition, 40% reported experiencing frequent pain in their forearms. These data suggest that activities performed in these regions of the body may also be associated with a higher risk of discomfort and injury.

It is interesting to note that the elbow region had a lower percentage of responses indicating constant pain, with 20% of employees reporting this condition. However, 32% mentioned experiencing pain frequently in this region. Although constant pain is less prevalent in this area, the frequency of pain is still a factor to be considered when planning preventive measures and ergonomic support.

Table 1 - The following table presents the percentage distribution of the participants' responses in relation to the presence of pain in the various body regions analyzed.

Body Region	No (%)	Rarely (%)	Frequently (%)	Always (%)
Cervical Region	22	10	38	30
Shoulders	10	18	42	30
Arm	14	24	36	26
Elbow	20	28	32	20
Forearm	18	20	40	22
Wrists / Hands / Fingers	25	15	30	30
Dorsal Region	16	22	28	34
Lumbar Region	12	14	42	32
Hip / Lower limbs	20	26	28	26

Source: Survey Data, 2023

BATISTON (2010), in turn, investigated the frequency of low back pain in workers of a meatpacking industry. Their results showed a high prevalence of pain in the lumbar region, which is in line with the data presented in the table, in which 42% of the participants reported experiencing pain frequently in this region. This correlation highlights the importance of addressing the health of the lower back in work environments such as meatpacking plants.

The lumbar and hip/lower limb regions also presented a high prevalence of pain. About 42 percent of employees reported experiencing frequent pain in their lower back, which indicates a significant risk of discomfort and injury in that area. In the case of the hip and lower limbs, 28% of the participants mentioned experiencing pain frequently. These results emphasize the importance of implementing effective measures of ergonomics, postural support and injury prevention in these specific areas.

However, they stress the importance of investigating the prevalence of pain in different body regions and implementing effective prevention and occupational well-being strategies. Measures such as ergonomic training, active breaks, postural adjustments, and the adoption of support equipment can play a crucial role in reducing musculoskeletal pain, improving the quality of life and well-being of employees.

In short, the table presented is related to the studies mentioned, providing consistent data on the body regions most affected by pain in meatpacking workers. This correlation reinforces the importance of properly addressing working conditions, implementing preventive measures and

promoting the occupational well-being of employees.

Table 2 shows some trends and patterns in relation to the frequency of pain in different body regions among the employees of the slaughterhouse.

With regard to the cervical region, about 35% of people reported having pain in the last few days, which may indicate a relatively high incidence of discomfort in this area. In addition, 49% of participants mentioned having pain in recent months, suggesting a considerable persistence of these problems. Finally, 16% of employees reported pain in the cervical region over the years, which may indicate a chronic or recurrent condition.

These results may be related to the study by TAKEDA et al. (2014), which analyzed the prevalence of pain in workers in the poultry cutting sector in a typical slaughterhouse of the poultry industry in Brazil. The high percentage of pain in the cervical region, shoulders and arms, as indicated in his research, is in line with the observations of this study, evidencing the relevance of these areas as sites of higher incidence of musculoskeletal discomfort in refrigerators.

Regarding the shoulders, we observed that 51% of the employees had recent pain, which may be a sign that this region is particularly susceptible to tensions and discomforts. In addition, 18% reported pain in recent months, while 31% mentioned pain over the years. These numbers indicate that shoulder pain can vary in terms of duration and severity.

In the case of the arms, 12% of employees reported recent pain, indicating that this region may be less affected compared to other body areas. However, 37% mentioned pain in recent months and 51% in recent years, which indicates that arm pain may persist or worsen over time.

When it comes to the elbow, 25% of employees mentioned recent pain, suggesting that this region may be vulnerable to frequent injury or strain. In addition, 55% reported pain in recent months, while 20% mentioned pain over the years. These numbers indicate a relatively high incidence of chronic or recurrent elbow pain. In the forearm, 16% of employees reported recent pain, while 44% mentioned pain in recent months and 40% in recent years. This suggests that forearm pain may be persistent over time and require appropriate attention for prevention and treatment.

Wrist, hand and finger pain were mentioned by 40% of the employees as recent, indicating a possible prevalence of these discomforts. However, 28% reported pain in recent months, while 32% mentioned pain over the years. These results may indicate that pain in this region may vary in duration and severity.

When analyzing the dorsal region, we observed that 47% of the employees reported recent pain, indicating a considerable incidence of discomfort in this area. In addition, 29% have

mentioned pain in recent months, while 24% have reported pain over the years. These numbers suggest that back pain can be a significant concern among meatpacking plant employees.

Regarding the lumbar region, 32% of employees reported recent pain, indicating that the lumbar region can also be affected by discomfort. In addition, 23% have mentioned pain in recent months, while 45% have reported pain over the years. These results suggest that pain in the lumbar region may vary in terms of duration and severity (DE SANTANA, 2022).

Table 2 - The following table presents the percentage distribution of the participants' responses in relation to the presence of pain in the various body regions analyzed.

Body Region	Days	Months	Years
Cervical Region	35%	49%	16%
Shoulders	51%	18%	31%
Arm	12%	37%	51%
Elbow	25%	55%	20%
Forearm	16%	44%	40%
Wrists / Hands / Fingers	40%	28%	32%
Dorsal Region	47%	29%	24%
Lumbar Region	32%	23%	45%
Hip / Lower limbs	19%	39%	42%

Source: Survey Data, 2023.

Although there is no direct relationship with EVANGELISTA (2011) and DEFANI and FRANCISCO (2006) in the specific data presented in the table, these studies can provide insights into the importance of ergonomics and the implementation of occupational gymnastics programs in the prevention of work-related musculoskeletal disorders. From the results of his research, it is possible to infer that the presence of pain in different body regions in meatpacking workers indicates the need for ergonomic approaches and occupational fitness programs to minimize risks and promote the health and well-being of these professionals.

BATISTON (2010), in his research on the frequency of low back pain in workers of a meatpacking industry, can contribute to the understanding of the results related to the lumbar region. According to his research, the lower back is one of the areas most affected by pain in meatpacking workers. The data from his research also indicate a considerable percentage of pain in the lumbar region, corroborating the findings of BATISTON.

Finally, in relation to the hip and lower limbs, 19% of employees mentioned recent pain, while 39% reported pain in recent months and 42% in recent years. These numbers indicate that pain in this region may be persistent or recurrent over time. These observations highlight the importance of addressing and preventing pain and discomfort in the different body regions of meatpacking plant employees, considering both recent complaints and those reported over months

or years. It is essential to adopt safety and ergonomic measures in the work environment, in addition to promoting healthy habits and adequate exercises to prevent injuries and relieve the physical discomfort of employees (DIAS, 2019).

5 CONCLUSION

This study evidences the concern of workers in the slaughter sector in slaughterhouses in relation to work-related musculoskeletal disorders. The activities performed in this environment, with repetitive movements, intense physical exertion and inadequate postures, contribute to the increased risk of these disorders. The most affected body regions include the cervical region, shoulders, arms, forearms, wrists, hands, fingers, dorsal region, lumbar region, and hip/lower limbs, with a high prevalence of pain. Preventive measures, such as ergonomic strategies, adjustments in the work environment and adoption of good occupational health and safety practices, are essential to reduce the impact of these disorders on workers. Continuous monitoring and awareness of risks and prevention measures are key, as is the promotion of a healthy and safe work environment. Attention to the health and well-being of workers is crucial to ensure the productivity and satisfaction of the team, as well as the success of the meatpacking companies.

In short, musculoskeletal disorders represent a significant problem in the work environment of the slaughterhouse slaughter sector, affecting the quality of life and well-being of workers. The implementation of appropriate prevention, intervention and support measures is essential to reduce the incidence and severity of these disorders, thus promoting a healthier and safer work environment. Caring for the health and well-being of workers is fundamental to ensure a productive and satisfied workforce, as well as contributing to the sustainability and success of companies in the meatpacking sector.

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