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Impact and Prevalence of Musculoskeletal Injuries due to Accident at Work in Brazil, 2015-2020

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Results: In Brazil, during 2015 to 2020, there is evidence of a high number of accidents at work resulting in 65.9% of musculoskeletal injuries. The most affected age was between 30-39 years, the male gender corresponded to 63.3% of the cases, upper limb injuries were the most prevalent, and 36.1 billion were spent in aids.

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Impact and Prevalence of Musculoskeletal Injuries due to Accident at Work in Brazil, 2015-2020

Prevalência E Impacto Das Lesões Osteomusculares Por Acidente De Trabalho No Brasil, 2015 - 2020

Lesões Osteomusculares Por Acidente De Trabalho No Brasil

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Conclusion: Musculoskeletal injuries due to accidents at work have significant socioeconomic impacts, making essential the introduction of targeted social policies.

Keywords: musculoskeletal injuries; accidents at work; injuries due to accident at work; workers.

I. INTRODUCTION

The International Labor Organization (ILO) stipulates that approximately 317 million accidents at work occur annually in the world, with around 321,000 deaths as a result of these accidents. Additionally, an average of 2.02 million deaths are caused by work-related diseases.¹

Accident at work is configured as bodily injury or functional disorder that causes death, loss or reduction, permanent or temporary, of work capacity, in

the exercise of work when in service for the company or insured persons, described in the Brazilian law 8213/91, article 19.²

In Brazil, it manifests itself with a high rate of occurrences. On September 22, 1977, the Ministry of Labor created the law 6514, which guarantees safety and occupational medicine. The Brazilian labor legislation (Consolidação as Leis do Trabalho - CLT), modifies part-time work and extends the time limit, in addition to facilitating the extension of the food benefit program (Programa de Alimentação do Trabalhador - PAT).³

In 2002, a network of assistance and surveillance services in workers' health (Rede Nacional de Atenção Integral à Saúde do Trabalhador - RENAST) was created in Brazil, which disseminates actions aimed at health integrated into the services of the Brazilian public health system (Sistema Único de Saúde - SUS), through specialized reference centers in workers' health (Centros de Referência em Saúde do Trabalhador - CEREST). It is a national network with the goal of programming assistance, surveillance, prevention and health promotion actions. In the national scene, from 2009 to 2018, 752.777 cases of serious and fatal accidents at work were registered in the notification system (Sistema de Informação de Agravos de Notificação - Sinan), in which Brazil ranks 4th in the world with death outcome.⁴

Musculoskeletal injuries triggered by work have terms such as repetitive strain injuries (RSI) and work-related musculoskeletal disorders (WMSD), adopted by the Brazilian Ministry of Health and Ministry of Social Security (MPAS). In addition to direct, indirect or commuting to work trauma.⁵ The occurrence of work accidents has a direct relationship with the age group, as the economically active population is affected, since the injury may or may not be repairable, fostering temporary absolute or partial disabilities, or permanent for work. And when definitive, it can be partial, absolute for the usual work or absolute for any and all types of work.⁶

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Absolute Temporary Professional Incapacity (ITPA) refers to the impediment to perform the usual professional activity including hospitalization and absolute rest without prejudice to the specificities of the profession concerned, defined by days. Partial Temporary Occupational Disability (ITPP) corresponds to a reduction of at least 50% of the functional capacity for the usual performance, even with limitations. It is translated into number of days and disability rates, using clinical records, physical examination, history and the requirements of their usual profession, or after 18 consecutive months of ITPA. Permanent disability is conceptualized as loss of work capacity due to functional interruption of one or more systems, with different degrees determined by sequelae, in a three-dimensional manner.⁴

The habits seen during operational activities stand out, such as: repetitive movements, prolonged working hours and the absence of periodic breaks, productivity requirements, high muscle strength performance, poor posture adequacy, overloaded body segments and a higher degree of demand. Besides intense pace of work, stressful environment of charges, finding inadequate equipment and instruments of work, exposing the patient inappropriately to the risk of injury.^{7,8,9}

II. METHODS

The present scientific work is a retrospective clinical investigation, through a qualitative and quantitative epidemiological study, whose data were obtained through consultations in the databases of the Brazilian Ministry of Labor and Social Security, made available by the Federal Government, at the electronic address (<https://www.gov.br/trabalho-e-previdencia/pt-br/assuntos/previdencia-social>), accessed throughout the research period. As this is a public domain database, it was not necessary to submit the project to the Research Ethics Committee.

The research gathers health data and involves the category of musculoskeletal injuries caused by accidents at work, selecting the group "Anuário Estatístico de Acidentes de Trabalho - AEAT", as well as the option "Subseção C - Acidentes de trabalho segundo o CID" specifying "Brasil" and the year to be analyzed.

The platform Observatório de Segurança e Saúde no Trabalho - Smartlab, available at the electronic address (<https://smartlabbr.org/sst>), was used to survey public spending on sickness and accident benefits for occupational accidents during the study period. The groups "despesa - INSS", "prevalência dos afastamentos" and "frequência dos afastamentos" were selected.

The study sample was work accidents involving musculoskeletal injuries in Brazil during the years 2015

to 2020. Traumatic mechanisms that had no correlation with musculoskeletal injuries were not included in the sample. Microsoft Excel 2019 was used to analyze and prepare the data and graphs. The search period in the databases used was from February 1, 2022 and June 20, 2022, with 30 references used.

The inclusion criteria used in the search for articles in the databases searched were: occupational accidents associated with orthopedic injuries; works related to the costs involved in these occurrences; repercussions after occupational traumas; safety in the work environment; articles whose reading of titles and abstracts related to the theme proposed by the study; articles in Portuguese, English and Spanish.

Regarding the exclusion criteria, articles that were not related to the research topic were removed: non-orthopedic work traumas; articles whose language differed from those mentioned above; reading titles and abstracts of scientific papers that had no association with the main objectives of this study.

To build the theoretical foundation, articles available on the website of the Brazilian Ministry of Labor and Social Security were used, as well as articles selected from the SciELO, PubMed and LILACS databases. The terms "lesões osteomusculares", "acidente de trabalho", "lesões por acidente de trabalho", "trabalhador" e "absenteísmo" were chosen from the platform Descritores em Ciências da Saúde at the electronic address <<https://decs.bvsalud.org/>>.

III. RESULTS

Occupational accidents registered during the years 2015 to 2020 comprised 3.384.319 cases. Of this number, 2.232.945 (65.9%) were found to have musculoskeletal injuries due to accidents at work (Picture 1).¹⁰

The most affected age group was 30 - 39 years with 31.5% of the registered cases, followed by 20 - 29 years (28.6%), 40 - 49 years (22.1%) and lastly, 50 years or more with 15.3% of the records. In relation to sex, the total number of men affected in the study period is 2.244.887 (63.3%), being more commonly involved in this context, with a lower manifestation in women with 1.137.911 (33.6%) cases. 1.521 registrations did not have gender as a notified variable. It is evident the disparity of involvement between genders in relation to accidents at work, being in absolute values a number of 1.106.976 and in percentage amount corresponding to 29,7%.¹⁰

Upper limb injuries were the most prevalent with 53.2% of musculoskeletal trauma cases, lower limb injuries comprised 34.2%. In third place was the spine, with 8.5% of records. Lastly, synovitis and tenosynovitis accounted for 1.3% of injuries. Affections involving unspecified parts comprised 2.6% of cases.¹⁰

We can specifically highlight the main musculoskeletal injuries, being more recurrent in the upper limb the injuries and/or fractures of the wrist and hand, corresponding to 23.8% of the injuries analyzed. This was followed by lower limb injuries, particularly dislocations, sprains and strains of the joints and ligaments of the ankle and foot (6.9%) and fractures of the leg including the ankle (5%). Concerning spinal disorders, dorsalgia is the main symptom (5.5%), and the main associated injury is intervertebral disc dysfunction corresponding to 1% of reports.¹⁰

When it comes to the classification of occupational accidents, 61.6% of the cases were typical accidents, 18% were commuting accidents and 1.7% were considered work-related diseases. Of the cases analyzed, 414.919 (18.6%) did not have a register on the Brazilian social insurance institute (INSS) by the corresponding document (Comunicação de Acidentes do Trabalho - CAT) (Table 1).¹⁰

During the 6 years of analysis, expenditures on occupational accidents were accounted for, with 14.3 billion reais paid through sickness benefits and 21.8 billion reais for accident benefits (Picture 2).¹¹

Of the 1.250.086 accident social insurance benefits granted during the period, 73,5% were for victims of musculoskeletal injuries due to accidents at work, of which 13,4% were for patients suffering from wrist and hand fractures, which was the main cause for granting the aid (Table 2).¹¹

During the period from 2015 to 2020 there was an accumulation of 227.4 thousand days away from the work environment, with a financial contribution being granted to the victims through sickness benefits for accidents that occurred in the labor environment. Configuring high costs generated by this situation, mainly by the decrease in productivity due to worker absenteeism, and thus generating losses to the sector in which it is employed. Moreover, health expenditures are directed to develop actions aimed at resolving the problems in order to guarantee the cure, damage control, rehabilitation and reintegration of this worker in his work environment.¹¹

IV. DISCUSSION

Accidents at work are classified as typical, commuting and work-related diseases, caused by recklessness, malpractice and/or negligence. The malpractice consists in the execution of an action, without really mastering it, which may cause civil and criminal liability among those involved, in case of any type of accident. Recklessness is to act without caution, with the due knowledge, however, leading to casualty and negligence results from voluntary omission.¹² Causal agents are divided into large groups: chemical, physical, biological, ergonomic and commuting/traffic risks.¹³

Typical accidents are those arising from the professional activity performed by the injured worker and commuting accidents occur between the insured person's home and place of work. Work-related illnesses include work-related pathologies, those triggered by the specific performance of a particular work activity. Regardless of the nature of the accident, it is of great importance that all accidents are registered with the INSS through the CAT so that the worker has access to all his rights determined by law.¹⁴

Physical occupational risks mainly include falls, either from their own height or from altitude. They are associated with inadequate posture, prolonged working hours, stress, inadequate lighting, anxiety and other psychiatric disorders, fatigue and defective individual and collective protection equipment or the non-use of these safety devices. A Standard Regulatory number 35 was created by the Brazilian Federal Government, specifically by the Ministry of Labor and Employment, in order to stipulate mechanisms for managing the safety and health of workers for all work activities developed at height with risk of falling.¹⁵

Chemical incidents are linked to the production/consumption of substances and occur as an emission, fire or explosion involving one or more dangerous chemicals, not only in the industrial production process, but in transportation and storage. The potential for severity and extent of their effects include teratogenesis, carcinogenesis, mutagenesis and damage to specific target organs.^{16,17}

Explosions are the events with the highest frequency of large numbers of immediate deaths, caused by burns, trauma and/or suffocation by the gasses released after the explosions.¹⁸ In fires, besides the radiation of heat and additional explosions, there are also the risks of combustion itself triggering the emission of multiple gasses and toxic smokes that generate dispersion and can reach large extensions and a greater number of people, constituting the predominant form of environmental and occupational exposures.¹⁹ The prevention of these accidents is done through the control of work equipment associated with the functions performed, monitoring and maintenance. Also the use of all personal protective equipment (PPE) and adequate professional training of the worker.

Trauma to the hand and/or wrist is the leading cause of musculoskeletal injuries in Brazil, as a result of negligence in the use of protective materials, such as gloves and safety sleeves. This equipment not only protects against cutting and piercing (mechanical) agents, but also abrasive, excoriating and thermal agents. The good state of use, the appropriate size for each professional and the guidelines on the correct use of the equipment are of paramount importance for its effectiveness.²⁰

Biological risk occurs due to environmental factors and working conditions, in addition to

characteristics such as time of service, training and professional category. Thus, these include contact with blood and secretions, microorganisms such as viruses, fungi, protozoans and bacteria, handling of sharps, among other associated items.²¹ They involve workers who carry out work activities related to health sciences, which present continuous exposure to the contagion of diseases. Other labor classes also exposed are: garbage collection, general services, sterilization, rescue and/or security operations, among others.²²

Ergonomics is a science that studies and applies standards for better work performance with machines, equipment and working conditions. The goal is to provide an environment compatible with the required needs, reducing risks, whether physical, emotional, mental and/or structural. Thus, it is necessary to recognize the profile of the employees and the type of activity in question, including posture, organizational management, cognitive assessment process and accessibility.²³

Synovitis and tenosynovitis accounted for 56.952 cases of occupational diseases. They were mainly associated with females, sewage workers, radio and TV activity, manufacturing of computer equipment and electronic products, and financial service activities.²⁴ Edema and hyperemia associated with pain caused by inflammation can result in limitation of the affected joint movement, which leads to compromised execution of certain activities, such as exercising work activity.

Thus, the performance of the ergonomic analysis of work (AET) is essential to understand the real needs of professionals and the company, allowing to identify, minimize or even extinguish the existing ergonomic risks. It is necessary to correct and evaluate posture in work activities, handling of materials, execution of movements, projection of positions of the field of action, communication, group work, network organization, time of performance, quality management; required mental load, decision-making processes, stress, and possible musculoskeletal disorders, to obtain the best human performance.²³ Investing in ergonomics provides more safety, health and quality of life for the worker, as well as better results and productivity for the company.

Back pain (Brazilian ICD M54) is the most common symptom of accidents at work and is related to spinal disorders. It is the second leading cause of permanent absence from work, as well as being responsible for decreased performance, fatigue and even temporary absences for full recovery. Such problems are linked to body overload in high-impact occupations, repetitive execution and/or weight loading on the axial skeleton and improper sitting posture. Some professions are more related to this type of injury, such as machine operators, repair, maintenance, production and industrial services.¹⁰

Body overload secondary to inadequate sitting posture is due to the fact that the seat is usually higher than it should be, which causes pain as a result of hip compression and improper support for the ischial tuberosities (because of the adjustment). Knee and thigh complaints result from prolonged contraction of the lower limb muscles combined with difficulty in venous return. The blood flow can be strangled when it rests on the edge of the seat, causing blood capillaries to bulge into the epidermis, as well as numbness in the lower limbs and even the appearance of varicose veins. Investment in ergonomic seating is therefore essential to preserve workers' health.²⁵

Lastly, commuting accidents are those that occur between home and work, accounting for 403.387 cases.¹⁰ Most of these injuries are caused by motorcycles, with a higher number of leg fractures (Brazilian ICD S82) and consequent losses capable of generating disability, death, absence from work and prolonged hospitalization, configuring a socioeconomic impact. In addition to causing other types of trauma, such as abrasions, bruises, contusions, neurological and/or spinal cord injuries, brain injuries and lacerations.²⁶

It reflects, so, the need to apply traffic and safety education, encouraging the use of protection equipment (helmets and seat belts), awareness about the consumption of alcohol and other drugs associated with driving, based on the Brazilian Ordinance No. 1,820, of August 13, 2009, which provides for the rights and duties of health users under current legislation. And everyone has the right of access to goods and services ordered and organized to ensure the promotion, prevention, protection, treatment and recovery of health. Companies and/or insurers are required to comply with specific occupational health and safety standards, made through specific reports in accordance with national labor law. These are designed to ensure periodic medical examinations to monitor work capacity and health, notification of accidents to the INSS, prevent, identify and treat risks. It also provides adequate assistance and treatment to the individual who has suffered an injury.

Examples of the above reports are: risk management program (programa de gerenciamento de risco - PGR), technical report on working conditions (laudo técnico das condições de trabalho - LTCAT) and occupational health medical program (programa médico de saúde ocupacional - PCMSO). The PGR goal is to identify situations that are harmful to people, institutions and the environment at an early stage. The main objective is to establish a set of measures to prevent, identify and reduce the occurrence of unwanted events, which may lead to negative effects of physical or psychological aspect, in order to establish immediate measures, thus minimizing the damage.²⁷

The technical report of working conditions (LTCAT) has as objective to identify, analyze and record the harmful agents present in the work environment, in addition to concluding if these can produce unhealthiness or special retirement rights for employees. The environmental assessment where the work activities are performed by the company's employees are analyzed for aspects of unhealthiness and dangerousness.²⁷ The main objectives of the occupational health medical program (PCMSO) are the prevention, monitoring and early identification of work-related health problems, and promoting the preservation of workers' health in order to provide maximum comfort, safety and productivity efficiently in the workplace.²⁸

Accidents at work have repercussions on workers, generating costs for the State and the employer. In more serious situations, the INSS is responsible for paying benefits such as accident sickness benefit, accident benefit, professional and personal habilitation and rehabilitation, disability retirement and death pension. In these cases, the employer is responsible for resolving the legal, economic, social and social security situations; it also has to bear the costs in cases of less serious accidents, since it is responsible for paying the salary of workers on sick leave up to the fifteenth day since the work accident occurred. These expenses negatively impact several sectors, generating high costs for the health and labor field, being associated with the disabilities generated by the injuries that produce temporary and / or permanent disabilities depending on the degree of involvement, being added to this, the loss of productivity due to the days of absenteeism in the work environment.²⁹

The demand for medical care after occupational accidents is important and should be done as soon as possible, so that treatment is instituted in an appropriate time and manner, however, access to care is compromised, due to lack of demand, difficulties in scheduling appointments in public health services and / or inaccessibility to financing for private care or medical insurance. In addition to these factors, the quality of life of these patients is compromised, since after work accidents the psychological damage and functional limitations have repercussions on the well-being and balanced social life, compromising the reintegration of these individuals in the social and labor environment.³⁰

V. CONCLUSION

Given the facts above, the great socioeconomic relevance of the impacts of work accidents with orthopedic consequences is evident. Expenses for prevention, treatment, diagnosis, sequelae and rehabilitation services are high. This reinforces the need for the application of public policies directed to the inspection and reduction of risks, criminal action for companies that do not comply with the rules and

adequate regulation and demand by workers of their rights. The applicability and enforcement of occupational safety laws is the duty of the State, since maintaining the health of the individual is a constitutional right.

Risk exposure increases the chance of developing a series of health problems, such as infectious diseases, loss of temporary or permanent functional capacity, disability, job insecurity, anxiety, Post-Traumatic Stress Disorder (PTSD), suicide and/or death. Thus, these disorders compromise active participation in the labor market and their social interaction, bringing with them a deficit in the economy and distancing from society.

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