

Ergonomic Risk of Workers in Compounding Pharmacy

Cristianne Confessor Castilho Lopes^{1*}, Vitor Ohana Marques Azzini², Daniela dos Santos³, Felipe Iago Medeiros Lobato³, Marlete Scremin¹, Pablo Adelino Estevam Barbosa⁴, Marilda Morais da Costa⁵, Arthur Cesário de Castro Neto⁶, Juelkson Vieira Sales³, Daiana Caide Lopes Brandenburg³, Fabio Herget Pitanga³

¹University of Joinville Region-Joinville-SC-Brazil

²State University of Rio de Janeiro-Rio de Janeiro-RJ-Brazil

³Alto Vale Rio do Peixe University-Caçador-SC-Brazil

⁴Nilton Lins University-Manaus-AM-Brazil

⁵Association Educational Lutheran - IELUSC College Joinville - SC - Brazil

⁶University of Uberaba - Uberlândia - MG - Brazil

*Corresponding author: Cristianne Confessor Castilho Lopes, University of Joinville Region-Joinville-SC-Brazil. Email: cristiannelopes3@gmail.com

Citation: Castilho Lopes CC, Marques Azzini VO, dos Santos D, Medeiros Lobato FI, Scremin M, et al. (2023) Ergonomic Risk of Workers in Compounding Pharmacy. Ann Clin Med Cas Rep Rev: 112.

Received: 27 July, 2023; **Accepted:** 01 August, 2023; **Published:** 07 August, 2023

Abstract

The term Ergonomics derives from the Greek words *ergon* (work) and *nomos* (norms). The objective of an ergonomic analysis is always to improve working conditions, without reducing production. The present study has as main objective to analyze the ergonomic risk in employees in the manipulation process in a pharmacy. This study is characterized as a cross-sectional, descriptive and qualitative research, where facts are observed, recorded, analysed, classified and interpreted. The evaluation was carried out through the application of previously validated checklists that occurred during the working day, so that the performed movements could be analysed. The tool used was the Hudson Couto Checklist, which presents questions related to posture, physical space and possible discomforts, they are: General Checklist for a simplified evaluation of the ergonomic condition of a workstation, where in the evaluation it presented 5 points, indicating reasonable ergonomic condition; Checklist for simplified assessment of the risk of occurrence of RSI/WMSD, in the evaluation it presented 10 points, indicating a very high risk for RSI/WMSD; Checklist for simplified assessment of the risk of low back pain, with 9 points in the assessment, which indicates low risk for low back pain and Checklist for simplified assessment of workstations with a terminal or with a computer. The study demonstrated that the body discomfort assessment scale, the points of greatest pain complaint were cervical, middle and lower back, right and left forearm, right and left thighs, right and left legs, presenting grade 3. to conclude that the painful body points relate to the practice of manipulation, despite having presented a reasonable ergonomic condition and low risk of low back pain, it still requires ergonomic measures to improve the execution of the activity, since the very high risk of RSI/WMSD occurrence was evident, thus ensuring the health of the worker.

Keywords: Ergonomics, RSI / DORT, Physiotherapy, Handling Pharmacy.

Introduction

The term Ergonomics derives from the Greek words *Ergon* (work) and *nomos* (norms) [1]. In the United States, *human factors* are also used as a synonym. The objective of an ergonomic analysis is always to improve working conditions, without reducing production [2].

When carrying out an ergonomic observation, in addition to analyzing the factors related to the physical work space, it is also necessary to know the details of each work activity from this perspective, to take the correct measures to adapt the man to work [3,4].

Currently, investing in the promotion of workers' health has become the main focus on the prevention of diseases that compromise the worker's physical and psychosocial condition [5,6].

Occupational musculoskeletal disorders are currently at the top of occupational pathological processes, when the focus is on changes in workers' health (BONFIGLIOLI; CARABALLO-ARIAS; SALMEN-NAVARRO, 2022; PRICE, 2021) [7,8]. Most occupational diseases can be prevented through simple adjustments to the workplace, adopting changes in positioning in a more functional and less aggressive way [9].

Both physical and mental activities are influenced by external stimuli, which can generate aggressive negative effects on musculoskeletal structures [10]. Many studies have shown that RSI (Repetitive Strain Injury) and WMSDs and Musculoskeletal Disorders are related to work [11,12,13].

In Brazil, although Occupational Accidents (OA) with exposure to biological material are frequent, there is still no real diagnosis of the number of injured workers and the consequences caused by these injuries, which has hindered the planning and adoption of prophylactic measures [13].

Accidents involving biological material, frequent among health professionals, do not fit the legal definition. Despite this, its consequences, in the short and medium term, make its registration with the competent services of the hospital unit (Occupational Medicine, Hospital Infection Control Commission and others) essential [13].

The pharmaceutical and similar production sector has presented problems related to accidents and occupational diseases regarding the preparation of cytotoxic drugs [14]. Compounding pharmacies, despite being small units, present situations that are no less worrisome in terms of occupational risks than large-scale production, due to the small movements performed repeatedly for a considerable time, many of the times in the same position, whether standing or sitting [14].

The general objective of the present study was to ergonomically analyze laboratories and employees in the manipulation process in pharmacy. Having as specific objectives: to evaluate the ergonomic condition of the workspace; detect possible risk for low back pain; identify possible risks of occurrence for RSI/DORT.

Methods

This study is characterized as a cross-sectional, descriptive and qualitative research. The sample consisted of compounding pharmacy employees in the city of Caçador/SC.

This article aims to evaluate the workstations in the five work areas in compounding pharmacies, using the Hudson Couto Checklist tool, which presents questions related to posture, physical space and possible discomforts, they are: *General Checklist* for simplified assessment of the condition ergonomics of a workstation; *Checklist* for simplified risk assessment of the occurrence of RSI/DORT; *Checklist* for simplified low back pain risk assessment; Body discomfort assessment scale and *Checklist* for simplified assessment of workstations with a terminal or computer. All *checklists* were completed by the examiner, except for the body discomfort scale. Hudson Couto's Checklists are divided as follows [15]:

1. The *General Checklist* for a simplified assessment of the ergonomic condition of a workstation consisted of 10 closed questions where the interpretation criteria are carried out from the sum of points starting from 0 to 10, with 10 points: generally excellent ergonomic condition; 7 to 9 points: good ergonomic condition; 5 or 6 points: reasonable ergonomic condition; 3 or 4 points: poor ergonomic condition; 0 to 2 points: poor ergonomic condition.
2. The *Checklist* for simplified assessment of the risk of RSI/DORT occurrence, the evaluator followed a script with closed questions where manual work will be observed, with the 1st item: physical overload; 2°: strength with the hands; 3°: posture at work; 4th: work station; 5th: repeatability and 6th: work tool, totaling 25 questions, where the interpretation criteria are performed from the sum of points. With a score above 22: very low risk of RSI/DORT; between 19 and 22 points: low risk of RSI/DORT; between 15 and 18 points: moderate risk of RSI/DORT; between 11 and 14 points: high risk of RSI/DORT; below 11 points: very high risk of RSI/DORT.

3. The Checklist for the simplified assessment of the risk of low back pain consisted of 12 closed questions focused on the risk of low back pain, with the following interpretation criteria: 11 or 12 points: very low risk of low back pain; 8 to 10 points: low risk of low back pain; 6 to 7 points: moderate risk of low back pain; 4 to 5 points: high risk of low back pain; 0 to 3 points: very high risk of low back pain.
4. The Body Discomfort Assessment Scale was carried out through an interview with closed questions, where they pointed out the pain points and their intensity on the body diagram, which has 5 levels: 1- No discomfort/pain; 2- Some discomfort/pain; 3- Moderate discomfort/pain; 4- A lot of discomfort/pain; 5- Intolerable discomfort/pain.
5. The Checklist for simplified evaluation of workstations with a terminal or with a computer was applied especially at the reception of the pharmacy where computers are used, the analysis was observatory through closed questions with 9 topics: 1- Evaluation of the chair; 2- Work table; 3- Keyboard; 4- Support for documents; 5- Foot support; 6- Screen; 7- Environment lighting; 8- General and 9- Work system totaling 73 questions. The interpretation criterion will be through percentage, with 91 to 100% of the points - excellent ergonomic condition; 71 to 90% of the points - good ergonomic condition; 51 to 70% of the points - reasonable ergonomic condition; 31 to 50% of the points - poor ergonomic condition; Less than 31% of the points - poor ergonomic condition.

Results and Discussion

Data were tabulated and analysed using the Microsoft Excel® 2010 program, mean and standard deviation. The sample was composed of employees of compounding pharmacies and data regarding the characteristics of the participants were collected, as shown in table 1.

Table 1. Sample characteristics.

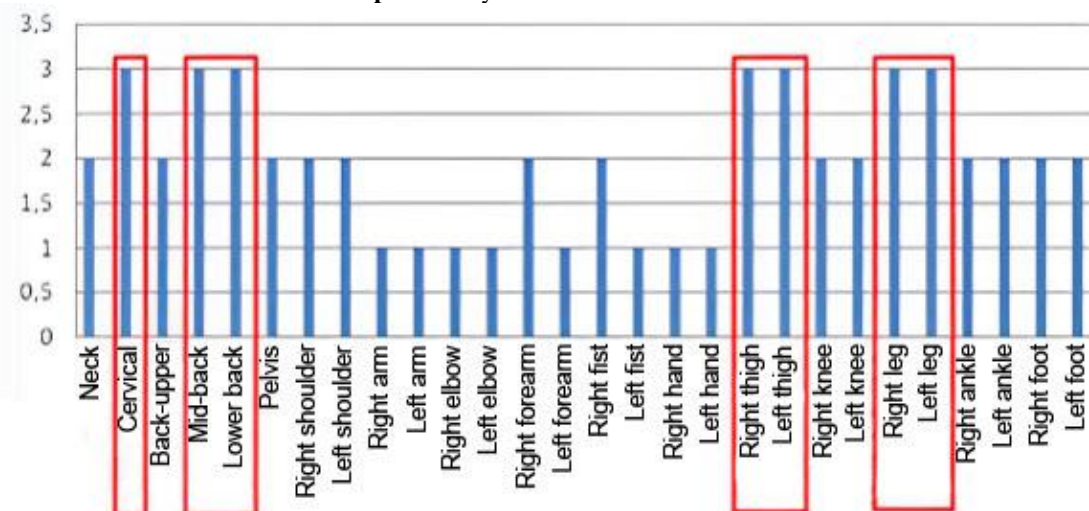
Characteristics	mean	SD
Age (years)	25.3	4.9
Weight (kg)	58.7	5.5
Height (meters)	1.6	0.1
BMI (kg/m ²)	23.6	4.3
Working time (months)	23	13.5
Dominant member (median)	right hand	right hand

Source: The authors

Regarding the Body Mass Index (BMI) of the participants, two had a normal BMI and one was overweight, as shown in Table 1. This overweight may be related, according to some studies, to low levels of physical activity combined with reduced strength,

resistance muscle and flexibility, with a propensity for pain and injury [16,17]. Excess weight can be considered a trigger for lumbar problems [18,19].

Graph 1. Body discomfort assessment scale



Classification of body discomfort adapted from Couto (2012): 1-No discomfort/pain; 2-Some discomfort/pain; 3-Moderate discomfort/pain; 4-Very uncomfortable/painful; 5-Intolerable discomfort/pain.

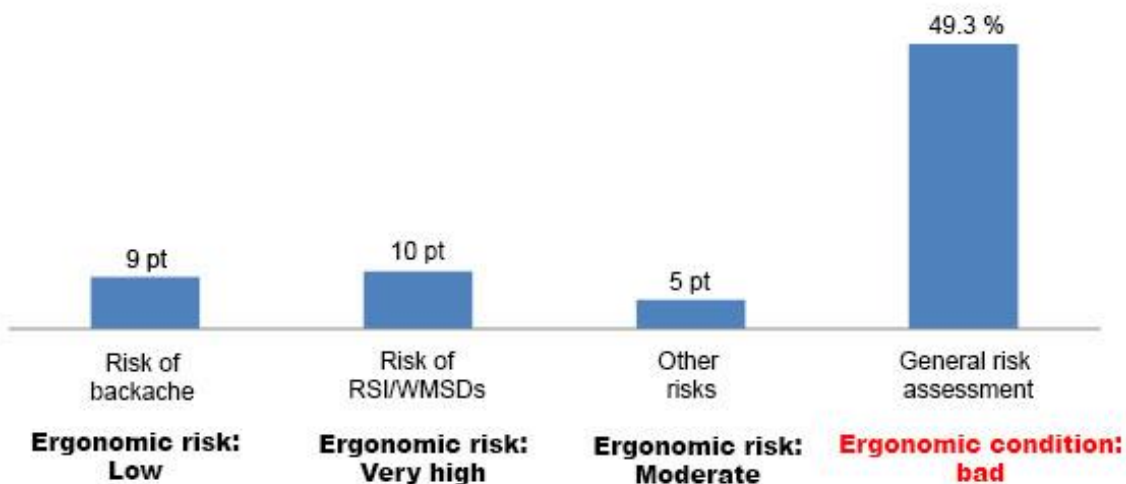
Source: The authors

The overall results for the body discomfort assessment scale indicated a predominance of discomfort/pain in the neck, mid-back and lower back, right and left thigh, right and left leg, neck, upper back, pelvis, right shoulder and left, right forearm, right wrist, right and left knee, right and left ankle, right and left foot.

In the study carried out by Diniz; de Moraes (2011) [21], in a class of dental surgeons, in the evaluation through the body discomfort scale, demonstrated that discomfort/pain in the neck was a very frequent complaint. He also pointed out a problem with back pain (upper and middle), and especially in the lower back.

The small movement of the neck is harmful for the upper part of the spine. If the neck is bent too much during any work, there will be more muscle work, and thus, the joints and ligaments in that region will be overloaded. The more the neck is flexed, the greater the number of complaints of discomfort, as such a position requires work on this joint [22].

Graph 2. Checklists



Source: The authors

Graph 2 shows the results of the checklists applied in the survey. It can be seen that in the simplified assessment of the risk of low back pain, the ergonomic condition was classified as low risk for low back pain. SILVA et al. (2011) [23], used the standard Nordic questionnaire and Checklist for simplified assessment of the risk of low back pain, to assess the risk of low back pain in chemical weeding workers, the questionnaires are useful in identifying low back injuries. In Couto's checklist, it was verified that the activity exposes workers to ergonomic risks with moderate risk for low back pain.

In the simplified assessment of the risk of RSI/WMSD occurrence, the ergonomic condition was of very high risk. Studies have shown that physical and psychosocial factors in the work environment are involved in neck and upper limb pain and that the prevention of these factors can reduce RSI/WMSD rates. Physical factors include high repetitiveness and poor working postures; the psychosocial ones are due to the intense demand, short deadlines and poor work organization [24-27].

Regarding the simplified assessment of the ergonomic condition of a workstation, the ergonomic condition presented a reasonable risk. In a study carried out by Jardim (2022) [28],

with call center professionals working with computers, it demonstrated the need for future adjustments in the working posture, advising that the operator change his sitting position and stand up during the breaks, which are prescribed between 10 and 15 minutes every two hours of work in a static way and that adjusts to the height of the seat and the position of the backrest to adapt to the physical characteristics of the worker. The incorrect use of equipment, inappropriate work postures and the poor distribution of tasks indicated the existence of some ergonomic risk to the worker, with the possible occurrence of WMSDs.

Silva et al. (2013) [29], from the elaboration of a barema or checklist containing the most relevant aspects observed regarding each of the types of risks such as physical, chemical, biological and ergonomic, proved to be feasible in its total or partial incorporation in the process of periodic internal audit carried out by magistral pharmacies for strict compliance and effectiveness of the preventive measures adopted.

In the simplified assessment of workstations with a terminal or a computer, the ergonomic condition was poor. Lourenço (2012) [30], carried out a study with pharmacy attendants in Foz do Iguaçu, where he found that the condition of the table and chair were poor, the author used the checklist for the evaluation of a computer workplace described in Couto's methodology.

According to NR-17, the reception of the pharmacy left something to be desired in terms of comfort and appropriate working conditions, such as: support for the feet, seats for rest, accessible to all employees, in addition to adequate support for documents that can be adjusted providing good posture, visualization and operation, avoiding frequent movement of the neck and visual fatigue, in the case of activity related to typing.

Final Considerations

It can be concluded that the painful body points are related to the practice of manipulation, despite having presented a reasonable ergonomic condition and low risk of low back pain, it still requires ergonomic measures to improve the execution of the activity, since the very high risk of occurrence of injuries was evident. READ/DORT. It should be noted that employees had a high rate of lower back pain, but the risk of low back pain was low.

It is suggested the use of other ergonomic assessment tools to be used together, offering greater reliability in data collection in order to assist the ergonomist in his intervention protocol. More research needs to be carried out in order to establish parameters for different functions and different conditions.

References

1. STRADIOTO, JP; MICHALOSKI, AO Ergonomic analysis of biomechanical overloading: external coating activity using mortar. *Acta Scientiarum. Technology*, v. 43, p. e51335, 26 Feb. 2021.
2. EJSMONT, K.; GLADYSZ, B.; CORTI, D.; CASTAÑO, F.; MOHAMMED, WM; MARTINEZ LASTRA, JL Towards 'Lean Industry 4.0' –Current trends and future perspectives. *Cogent Business & Management*, v. 7, no. 1, p. 1781995, 2020.
3. HOE, VC; URQUHART, DM; KELSALL, HL; ZAMRI, EN; SIM, MR Ergonomic interventions for preventing work-related musculoskeletal disorders of the upper limb and neck among office workers. *Cochrane Database of Systematic Reviews*, v. 2018, no. 10, 23 Oct. 2018.
4. NICKEL, P.; BÄRENZ, P.; RADANDT, S.; WICHTL, M.; KAUFMANN, U.; MONICA, L.; BISCHOFF, H.-J.; NELLUTLA, M. Human-system interaction design requirements to improve machinery and systems safety *Advances in Safety Management and Human Factors: Proceedings of the AHFE 2019 International Conference on Safety Management and Human Factors*, July 24-28, 2019, Washington DC, USA 10. *Annals ...Springer*, 2020
5. LOVEJOY, M.; KELLY, EL; KUBZANSKY, LD; BERKMAN, LF Work redesign for the 21st century: promising strategies for enhancing worker well-being. *American Journal of Public Health*, v. 111, no. 10, p. 1787–1795, 2021.
6. SCHULTE, PA; DELCLOS, G.; FELKNOR, SA; CHOSEWOOD, LC Toward an expanded focus for occupational safety and health: a commentary. *International journal of environmental research and public health*, v. 16, no. 24, p. 4946, 2019.
7. BONFIGLIOLI, R.; CARABALLO-ARIAS, Y.; SALMEN-NAVARRO, A. Epidemiology of work-related musculoskeletal disorders. *Current Opinion in Epidemiology and Public Health*, v. 1, no. 1, 2022.
8. PRICE, JW Osteopathic model of the development and prevention of occupational musculoskeletal disorders. *Journal of Osteopathic Medicine*, v. 121, no. 3, p. 287–305, 26 Feb. 2021.
9. SCHLUSSEL, AT; MAYKEL, JA Ergonomics and musculoskeletal health of the surgeon. *Clinics in colon and rectal surgery*, v. 32, no. 06, p. 424–434, 2019.
10. SARANCHA, I; MAKSYMCHUK, B.; GORDICHHUK, G.; BERBETS, T.; BERBETS, V.; CHEPURNA, L.; GOLUB, V.; CHERNISHENKO, L.; BEHAS, L.; ROIENKO, S. Neuroscientific principles in labor adaptation of people with musculoskeletal disorders. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience*, v. 12, no. 4, p. 206–223, 2021.
11. KHAN, MI; BILAL, UU; SHAHZAD, A.; DARAIN, H. Frequency of work related musculoskeletal disorders among bankers in Hayat Abad Peshawar through cross sectional study. *Journal of Khyber College of Dentistry*, v. 9, no. 02, p. 49–53, 2019.
12. PAULA, EA DE; AMARAL, RMMF DO. Interdisciplinary approach in quality of life groups for patients with Repetitive strain injuries/Work-related musculoskeletal disorders-RSI/WMSD. *Brazilian Journal of Occupational Health*, v. 44, 2019.
13. VAZ, FF; EVANGELISTA, RA; BUENO, A. DE A.; SILVA, LA DA; NASCIMENTO, ACM DO; MAGALHÃES, B. DE S.; SILVA, MCDA. Prevalence and incidence of repetitive strain injury and work-related musculoskeletal disorders in physical therapists: systematic review protocol. 2022.
14. GOMES, SCS; CALDAS, A. DE JM Incidence of occupational accidents with exposure to biological material in health professionals in Brazil, 2010–2016. *Brazilian Journal of Occupational Medicine*, v. 17, no. 2, p. 188–200, 2019.
15. JANIK-KARPINSKA, E.; BRANCALEONI, R.; NIEMCEWICZ, M.; WOJTAS, W.; FOCO, M.; PODOGROCKI, M.; BIJAK, M. Healthcare Waste—A Serious Problem for Global Health Healthcare. *Anais ...MDPI*, 2023

16. PACHECO, SG; DE SOUZA, MCA; COSTA, APT; DE ALENCAR, DB; PARENTE, RS APPLICATION OF COUTO'S CHECKLIST ERGONOMIC TOOL IN THE EVALUATION OF ERGONOMIC CONDITIONS IN WORKSTATIONS AND COMPUTERIZED ENVIRONMENTS. *South American Development Society Journal* , v. 6, no. 17, p. 91, 22 Aug. 2020.
17. JUSTUS, F. Workplace gymnastics: A proposal to reduce sedentary lifestyle among telemarketing employees of the energy company from Paraná – COPEL Curitiba, , 2021.
18. PERNAMBUCO, CS; PACHECO, TR; DE OLIVEIRA BRUM, RD; DUBLASIEVICZ, RM; DE SOUZA VALE, RG CORRELATION BETWEEN FUNCTIONAL AUTONOMY AND COGNITIVE DOMAIN OF PHYSICALLY ACTIVE ELDERLY PEOPLE. *Physical Exercise and Health Protection: A New Look at the Body and Movement* , 2021.
19. BORISOVSKAYA, A.; CHMELIK, E.; KARNIK, A. Exercise and chronic pain. *Physical Exercise for Human Health* , p. 233–253, 2020.
20. URITS, I.; BURSHTAIN, A.; SHARMA, M.; TESTA, L.; GOLD, PA; ORHURHU, V.; VISWANATH, O.; JONES, MR; SIDRANSKY, MA; SPEKTOR, B. Low back pain, a comprehensive review: pathophysiology, diagnosis, and treatment. *Current pain and headache reports* , v. 23, p. 1–10, 2019.
21. DINIZ, RL; DE MORAES, A. Application of ergonomic intervention: the case of work in general elective surgeries. *Ergonomic Action Magazine* , v. 1, no. 2, 2011.
22. JUNG, B.; BLACK, AC; BHUTTA, BS Anatomy, Head and Neck, Neck Movements . [sl: sn].
23. SILVA, FC; ROSA, LP; ROCHA, MP; LEITE, MF Adequacy of biosafety protocols in compounding pharmacy in the interior of Bahia based on RDC 67/2007. *Electronic Pharmacy Magazine* , v. 10, no. 2, p. 23, 2013.
24. LUCENA, LM DE. “A shard of glass, it seems that there is no way to glue it”: psychosocial risks, accidents and illness of the Brazilian worker. 2023.
25. NASCIMENTO, JMR Risk factors for work-related musculoskeletal disorders among a population in the northeastern countryside analysis of the structural equation model. 2022.
26. NESVADBA, BL Perception of occupational area professionals about the relationship between pathologies in the organizational environment and occupational psychosocial stressors in the telemarketing sector. *Psychology-Shark* , 2019.
27. TOLEDO, T. DE S. Quality of life and intensity of symptoms in workers with ler/dort: effects of collective interventions. 2021.
28. JARDIM, MKN Ergonomic analysis of work: a case study of a telemarketer with emphasis on the conditions of the workstation and the sitting posture of the operators . [sl] UFVJM, 2022.
29. SILVA, E.; MINETTE, L.; AMAURY; SOUZA, A.; LEIÃO, F.; MARZANO, F.; REGIANE; LEITE, V.; LUIZ, A.; SANCHES, P. Assessment of Low Back Pain Risk in Workers Involved in Chemical Weeding Activity. In: [sl: sn].
30. SILVA, FC; ROSA, LP; ROCHA, MP; LEITE, MF Adequacy of biosafety protocols in compounding pharmacy in the interior of Bahia based on RDC 67/2007. *Electronic Pharmacy Magazine* , v. 10, no. 2, p. 23, 2013.
31. LOURENCO, TN DE. Ergonomic evaluation based on the working conditions of cashiers at a pharmacy in Foz do Iguaçu. 2012.