Archives of Current Research International

Volume 24, Issue 4, Page 98-101, 2024; Article no.ACRI.114633
ISSN: 2454-7077

Kinematic Factors of Sitting Posture for Musculoskeletal Pain in University Staff

Dhenyffer Bruna Almeida Perez [a] and Bruno Sergio Portela [a*]

[a] University of Middle-West –UNICENTRO, Brazil.

Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/ACRI/2024/v24i4664

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/114633

Original Research Article

Received: 11/01/2024
Accepted: 15/03/2024
Published: 20/03/2024

ABSTRACT

Aims: The objective of the present study was to verify the relationship between musculoskeletal pain and kinematic factors of sitting posture in university staff at the University of Middle-West – UNICENTRO.
Methodology: The sample studied was 24 university agents from a total of 40 employees. Anthropometric data were collected by record and to assess the prevalence of pain, a standardized questionnaire was used. The employee positioning variables were: popliteal height, elbow-to-seat height, table height and thigh height. The arrangement of the workstation was also evaluated, checking the position of the computer and/or other equipment for daily use.
Results: It was found that 54.16% of the agents had some type of pain in the spine. The recommended chair seat for men would be a height of 44.3 cm and was found to be 50.2 cm, while for women the recommended height is 40.9 cm and was found to be 45.1 cm.
Conclusion: According to the results obtained, the height of the table was higher than recommended, which could perhaps justify the complaint of pain reported by university agents.

**Corresponding author: Email: bruno_sergio_por@yahoo.com.br;*

Keywords: Work posture; low back pain; civil servants.

1. INTRODUCTION

Most adults spend half of their waking hours at work [1]. The technological development of this environment has generated an increase in the time that workers remain in a sitting position while carrying out their activities in offices [2,3]. This fact may be negatively influencing innate physical capabilities such as the flexibility of the body's posterior chain. On the other hand, individuals who are physically active during work, frequently performing trunk flexion movements - maintenance and cleaning workers, for example - may have greater flexibility when compared to workers who remain seated during their occupational activity [4].

To improve working conditions, both in a corrective way – improvements in existing systems – and prospectively – improvements in work systems in the conception and project phase –, it is necessary to evaluate existing human work, using well-defined criteria, accepted and that obey a hierarchy of levels of valuation related to the worker [5].

However, despite the development of ergonomics regarding the manufacture of chairs and furniture used in workstations, these instruments were not very effective in preventing low back pain. Therefore, currently, the main focus for reducing the occurrence of this musculoskeletal symptom is the introduction of exercise and the adoption of postural re-education programs [6].

The objective of the present study was to verify the relationship between musculoskeletal pain and kinematic factors of sitting posture in university staff at the University of Middle-West – UNICENTRO.

2. MATERIALS AND METHODS

This research presents a cross-sectional correlational study design, in which the sample was evaluated at just one moment in time and the results were analyzed using statistical tests that relate the variables.

The sample studied was 24 university agents from the University of Middle-West – UNICENTRO, from a total of 40 employees who worked on the CEDETEG campus at that university. Campus workplaces that had employees working predominantly seated were randomly selected to represent the population.

The subjects signed the ICF, giving consent to carry out the research. Next, anthropometric data on body mass (kg) and height (cm) were collected by recall record to obtain the BMI (body mass index in (kg/m²). To assess the prevalence of pain, a standardized questionnaire was used [7].

The variables responsible for the positioning of the subjects in the sitting working posture were: popliteal height, elbow-to-seat height, table height and thigh height. The arrangement of the workstation was also evaluated, checking the position of the computer and/or other equipment for daily use. All measurements were made with a measuring tape with a 1mm scale.

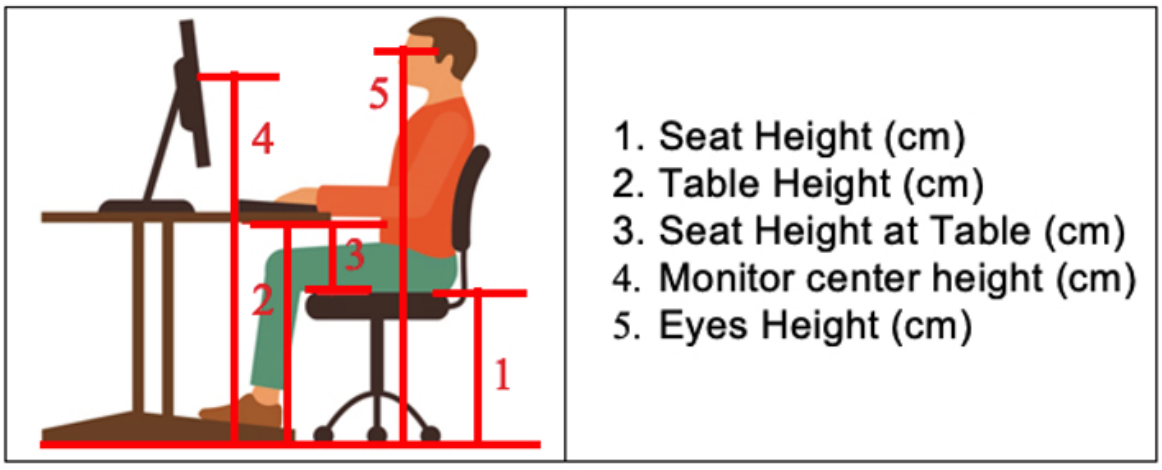

Fig. 1. The sitting working posture

Data analysis was performed using descriptive statistics with mean and standard deviation. For inferential analysis, Student's t-test was used for dependent and independent variables. All analyzes were performed using SPSS version 20 software, with a significance level of $p<0.05$.

3. RESULTS AND DISCUSSION

In this study it was found that 54.16% of the agents analyzed had some type of pain in the lumbar spine. Since agents with pain had a higher average time spent sitting at their workstation compared to those who did not experience pain, just as the number of years worked by agents who reported pain was greater than that of agents who did not experience pain. . The relationship between years of work in the same sector and the prevalence of low back pain is justified due to the demands placed on the body, daily, when carrying out work activities. Such requests probably cause cumulative injuries to the mechanics of the locomotor system and contribute to the emergence of painful complaints [8].

Table 1, presents the anthropometric data of the sample studied, showing the average of those who reported pain and those who did not report low back pain. Such measures are important in planning work environments and must be considered in order to provide comfort [9]. In addition to demonstrating data on the average amount of time worked as well as the time spent sitting in the role.

Table 2, presents comparative data between the heights of furniture used by agents and the heights recommended for the average height of agents. The seat of the chairs must be sized at a height of 44.3 cm for men and is 50.2 cm, while for women the recommended height is 40.9 cm and is 45.1 cm. As well as the height of the table is higher than recommended for agents, which may justify the high height of the chairs as the benches are fixed and cannot be changed.

The sitting behavior of office workers was quantified objectively by Ryan et. [10], where participants were seated at work for 5.3+1.0 h/d (mean+1 SD), equivalent to 66+12% of the working day, accrued in 27+7events/d individual sitting events. Dependent on their commendation applied, 5–20% of sitting events and 25–67% of time was accumulated in sitting events longer than current guidelines. No participants met the 20 or 30 min recommendations on every working day but seven (8%)participants met the 55 min recommendation. In conclusion, office workers spend a considerable period of their day sitting, accumulated in uninterrupted sitting events longer than current recommendations.

Table 1. Data relating to working time and anthropometric data and dimensions of the sitting position

		Male			Female		
		Mean	**Standard Deviation**	***p**	**Mean**	**Standard Deviation**	***p**
Working time (years)	Without Pain	4.8	3.9	0.448	11.5	11.8	0.632
	With Pain	6.9	4.9		8.7	4.7	
Sitting Hours (hours)	Without Pain	6.2	3.3	0.514	6.7	1.0	0.134
	With Pain	7.1	1.6		9.0	3.3	
Age (years)	Without Pain	35.6	6.7	0.603	41.5	4.6	0.793
	With Pain	33.8	5.6		40.4	8.7	
IMC (kg/m2)	Without Pain	27.9	1.8	0.403	25.6	4.1	0.251
	With Pain	25.9	4.8		31.4	10.6	
Seat Height (cm)	Without Pain	48.6	4.5	0.286	47.7	4.9	0.079
	With Pain	51.3	3.9		42.0	4.5	
Table Height (cm)	Without Pain	75.0	1.8	0.597	75.4	1.7	0.282
	With Pain	74.5	1.4		74.4	1.1	
Seat Height at Table (cm)	Without Pain	26.6	4.7	0.251	29.4	3.9	0.308
	With Pain	23.3	4.9		32.4	5.3	
Monitor center height (cm)	Without Pain	20.4	4.8	0.139	27.5	11.8	0.524
	With Pain	27.3	8.8		23.6	6.1	
Eyes Height (cm)	Without Pain	119.1	5.3	0.425	118.3	0.5	0.048
	With Pain	120.5	3.4		112.2	0.3	

** Tested by the t test for independent variables, with a significance level of p<0.05*

Table 2. Comparative data between the recommended and used heights of furniture

	Male			Female		
	Mean	**Standard Deviation**	***p**	**Mean**	**Standard Deviation**	***p**
Seat Height (cm)	50,2	4,2	0,001	45,1	5,4	0,031
Recommended seat height (cm)	44,3	2,1		40,9	1,4	
Table Height (cm)	74,7	1,6	0,001	74,9	1,5	0,001
Recommended Table Height (cm)	68,3	3,2		63,2	2,2	
Eye Height (cm)	120,1	4,2	0,015	115,6	5,2	0,951
Recommended Eye Height (cm)	124,9	5,1		115,7	4,2	

4. CONCLUSION

Based on the data analyzed, we consider that the factors that may be interfering with the complaints of pain reported by the subjects may be related to the inadequacy of the chair used due to the height and/or inadequacy of the bench due to the fact that it is fixed, not allowing harmony between the furniture. (chair and bench).

The data obtained in this study reveal the need to adapt the furniture used by agents, as well as the need to guide agents regarding their positioning at the workstation and assist them with notions of ergonomics in order to alleviate their complaints. To prevent musculoskeletal pain chair and bench height should be adjustable not fixed, regular change of sitting position is also must.

CONSENT

As per international standards or university standards, Participants' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Dishman RK, Oldenburg B, O'Neal H, Shephard RJ. Worksite physical activity interventions. Am J Prev Med. 1998;15(4):344-361.
2. McLean L, Tingley M, Scott RN, Rickards J. Computer terminal work and the benefit of microbreaks. ApplErgon. 2001;32(3): 225-237.
3. Van Dieen JH, Looze MP, Hermans V. Effects of dynamic office chairs on trunk kinematics, trunk extensor EMG and spinal shrinkage. Ergonomics. 2001; 44(7): 739-750.
4. Milosavljevic S, Milburn PD, Knox BW. The influence of occupation on lumbar sagittal motion and posture. Ergonomics. 2005; 48(6):657-667.
5. Sell I. Quality of life and working conditions. Basic Occupational Medicine. 1995;5:158-175.
6. Pynt J, Higgs J, Mackey M. Seeking the optimal posture of the seated lumbar spine. Physiother Theory Pract. 2001; 17(1):5-21.
7. Corlett E.N, Manenica I. The effects and measurement of working postures. Applied Ergonomics. 1980;43:727-737.
8. Cecin AH, Molinar MHC, Lopes MAB. Low back pain and work: A study on the prevalence of low back pain and sciatic pain in different occupational groups. Rev. Bras. Reumatol. 1991;31(2):50-6.
9. Iida I. Ergonomics: Design and production. São Paulo: Blucher; 2002.
10. Ryan CG, Dall PM, Granat MH, Grant PM. Sitting patterns at work: Objective measurement of adherence to current recommendations. Ergonomics. 2011; 54(6):531-538.

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/114633