

ERGONOMICS IN “REMOTE WORK” ACTIVITIES: A WORKSTATION ADAPTATION CASE STUDY IN BRAZIL

Poliana Nascimento Arruda¹, Isabelle Rocha Araújo², Helen Pereira dos Santos Soares³, Joaquim Pereira⁴, João Lima⁵, Hélder Fernando Pedrosa e Sousa⁶, Maria Alzira Pimenta Dinis⁷ and Helder Simões⁸

¹UniAraguaia; arrudaifg@gmail.com

²UniAraguaia; isabellearao@uniaraguaia.edu.br

³UniAraguaia; helenpsbrasil@hotmail.com

⁴Coimbra High School of Health Technology - Polytechnic Institute of Coimbra; ORCID 0000-0003-0519-9197

⁵Coimbra High School of Health Technology - Polytechnic Institute of Coimbra; ORCID 0000-0003-0157-8368

⁶Department of Mathematics, University of Trás-os-Montes and Alto Douro; hfps@utad.pt ; ORCID 0000-0002-2952-8859

⁷UFP Energy, Environment and Health Research Unit, University Fernando Pessoa; madinis@ufp.edu.pt; ORCID 0000-0002-2198-6740

⁸Coimbra High School of Health Technology - Polytechnic Institute of Coimbra; Polytechnic Institute of Coimbra; ORCID 0000-0002-3412-8462

Abstract

The coronavirus disease 2019 (COVID-19) pandemic decreed by the outbreak of the new coronavirus culminated in the need to implement jobs in the homes of employees who had to adhere to the “remote work” style, due to social isolation actions in Brazil. Many of the employees started to work in the absence of adequate working conditions in their homes, impacting the three dimensions of ergonomics, i.e., physical, organizational and cognitive. The objective of this chapter is to report the adjustments made in a workplace after the change of modality from face-to-face (f2f) activities to “remote work” after the beginning of the pandemic in 2020, aiming to adopt actions aimed at ergonomics. The research was carried out with a professional in the area of Environmental and Sanitary Engineering who started remote work in March 2020. The work is of a qualitative nature, using photos to illustrate the changes occurring before and after the installation of the equipments and reports on strategies to improve working conditions in the “remote work”. The cost of physical adaptations was also computed. The most reported complaints collected by the professional were back pain, neck, forearm, wrist and eye pain, in addition to mental fatigue. The necessary equipment and furniture were acquired for the physical adaptation of the workspace. Issues of working hours, days off, means of communication were also addressed, but aspects of cognitive and organizational ergonomics must have the participation of the entire work group to achieve effective results. The accompaniment of a specialized technical professional would be important for the establishment of further assertive actions, seeking the productivity and quality of life of the employee.

Keywords: Remote work; COVID-19 pandemic; Ergonomics; working conditions.

Introduction

On January 30, 2020, the outbreak of the new coronavirus disease 2019 (COVID-19) was declared, and the highest level of global alert was established, Public Health Emergency of International Concern (ESPII) and on March 11, 2020, the pandemic was characterized (PAHO, 2021). As one of the measures to combat the disease, social distancing was adopted by the World Health Organization (WHO) and remote work was used by many companies to meet the requirements of compliance with the measures (PAHO, 2020). This scenario culminated in the need to implement jobs in the homes of employees who were forced to the “home office” style. According to a survey carried out in April 2020, 46% of Brazilian companies adopted the “home office” as a working modality, representing a large number of professionals (Brazil Agency, 2020). However, many of these employees continued their activities with the absence of adequate working conditions, impacting the three dimensions of ergonomics, i.e., physical, organizational and cognitive.

One of the three factors related to ergonomics is the physical one, covering issues related to human anatomy, physiology, anthropometry and biomechanics. This dimension assesses inappropriate postures, repetitive movements, inadequate furniture, physical effort, environmental variables regarding the work environment, e.g., noise, temperature, lighting, among other items (IEA, 2020). The cognitive factor takes into account mental processes, perception of the work environment, stress, performance, i.e., the interaction between the employee and the working system. The third factor is the organizational one, which involves the socio-technical system involved in the company, the internal and external environment, temporal organization of work, group and participatory work and quality management (moraes; Mont'alvão, 2010).

During 2020, scientific work was intensified in order to verify the effects of remote work on people's lives, especially due to the COVID-19 pandemic (Bortolan; Domenech; Ferreira. 2021). In a survey with 14 women, who were working remotely, aiming to assess conflicts experienced in the work-family relationship, it was found that many of them were overloaded with work. In addition to carrying out the company's activities, it was also necessary to take care of their children and household chores, resulting in additional stress. Interestingly, some of the interviewees reported feeling closer to the family, but overwhelmed in terms of activities (lemos, Barbosa e Monzato, 2021).

The objective of this study was to report the adjustments made in a workplace located in a residence after the change of modality from face-to-face (f2f) activities to "home office" after the beginning of the COVID-19 pandemic in 2020, in addition to assessing the strategies and costs involved.

Material and Methods

The research was carried out from August to November 2021 with a professional in the area of Environmental and Sanitary Engineering who started remote work in March 2020. The goal of the observation is to create a baseline observation of the remote work activities. The activities performed were the preparation of documents, assessment of reports, in addition to meetings for alignments of future activities. All activities required the use of a notebook and Internet. There were no working hours delimitation per part of the contractor, only product demands to be handed out in dates previously defined. The communication between the co-workers and the supervisor was done through messaging application (WhatsApp) and meetings by Google Meet. For information collection, an interview with the professional was carried out, in order to identify relevant data that would encompass the three assessed ergonomic factors, i.e., physical, cognitive and organizational.

The ergonomics analysis begins by observing operational activities, mapping the flow of work, Based on this analysis we begins the process mapping iteration by creating a workplace snapshot to be used during the discussions as well as the theoretical background needed to argument the discussion.

The study was qualitative in nature, using of photos to document the alterations occurred before and after the installation of equipment and reports on strategies to improve working conditions in "home office". The cost of physical adaptations was supported by the worker.

Results and discussion

At the beginning of activities in a “home office” environment , the professional 's workplace assessed at residence was located in a room, used as office. The available work materials were an office table, plastic chairs (adapted in height) and a notebook.

The workday started at 9 am and during the day, according to the demands of tasks domestic activities, tasks were stopped for several times. The term in most of the time happened at 11 pm. The messaging application was used for troubleshooting and communication between the co-workers , and used without time criterion.

The improvement points sought by the professional were the following: definition of the working day, time delimitation for answer in the messaging app and furniture adaptation, ensuring health and comfort during work. Figure 1 shows the workplace at the beginning of the activities, without the necessary furniture adjustments.



Figure 1 – Global vision of the workplace with the pre-existing furniture at residence, before adjustments.

The main complaints reported by the professionals are lumbar, neck, forearm, wrist and eye pain, in addition to mental fatigue. The pain at spine is among the most reported by people who joined to the “home office” regimen during the COVID-19 pandemic, being caused by the lack of furniture and space suitable for working hours. One of the postural changes triggered by position sitting is hyperlordosis, corresponding to abnormal, i.e., increased, curvature of the cervical spine by the inadequate sitting position (Hantmann et al ., 2021). In a study conducted by Castañon et al. (2016) engineers and architects were assessed during “home office” activities, common for this category type. A predominance of discomfort/pain at trunk region was verified, comprising the neck, back and pelvis, due to long working hours at sitting position. Accordingly, and aiming to reduce complaints related to the spine, furniture adjustments were performed. A chair and a stand for notebook with height adjustment, keyboard, mouse and mouse pad were acquired. Figure 2 presents the equipment and the arrangement at the workplace and Figure 3 shows the detail of the notebook support.



Figure 2 – Global vision of the workplace after furniture adjustment.

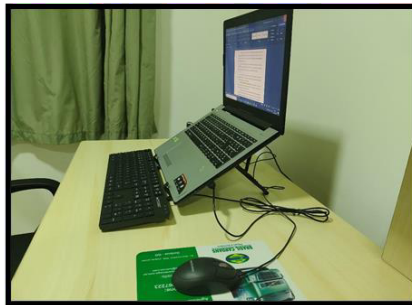


Figure 3 – Detail of the notebook support to adjust the screen height.

Ergonomics includes three factors, i.e., physical, cognitive and organizational. Therefore, complaints related with “home office” encompass other dimensions that go beyond those related to physical issues. Through a literature review seeking to assess the relations of teleworking with the ergonomics, Antunes and Fischer (2021) verified that in 92% of the analysed articles, there are complaints related to cognitive and organizational aspects and only 8% were limited to physical ergonomics. As a way to heal questions related at work time, the professional sought delimit the working day from 8 am to 6 pm, from Monday to Friday and from 8 am to 12 pm on Saturday.

The communication carried out through WhatsApp, for sending demands and taxation was also seen and answered only within the established schedule work. After actions to improve working conditions there were some established demands of meetings and work on Saturday and Sunday. The professional would perform the activity if urgent. However, that situations ended up being extinct. Adaptations in the workplace had a cost that was the responsibility of the assessed professional.

During the COVID-19 pandemic, Brazilian institutions published manuals and/or booklets with guidelines for the “home office”, covering the three mentioned ergonomic factors. In this way, the workers can be based in

these instructions in order to adapt to tasks jobs. SESI Ceará produced a booklet addressing provisional measure n. 927/2020 concerning labour measurements during the pandemic state, in addition to instructions on the appropriate place for installing the workplace and actions in respect to the ergonomics (Figure 4a) (SESI, 2020).

Another content that has information for the general public is a manual published by Ergosys, an ergonomics consulting company, which provides information on the three aspects of ergonomics, exercise suggestions, proper posture, among other actions (Figure 4b) (Miguez, 2021). In 2021, the surveillance team of the Division of Employee Health Care (Diass) of the Brazilian Ministry of Health published the Ergonomic Guidelines Guide for Remote Work, to guide workers in the transition from f2f work to telework due to the pandemic situation caused by the new coronavirus (Brazil, 2021).

According to the assessed professional, actions on ergonomics during the “home office” was not a topic addressed by the coordinators of the project in which she participated. Therefore, the concern with adaptation issues came from the professional, especially after attending the classes of the specialization in occupational safety, specifically the discipline of Ergonomics.

The assessed professional stated that after the adjustments made, gradually the complaints of pain in the lumbar region and neck were no longer reported. The issues related to organizational and cognitive ergonomics were those that presented greater difficulties to be solved, due to not depending only on the professional, i.e., a group of people also needed to adhere to some actions.

Conclusions

Applying concepts related to the three aspects of ergonomics, i.e., physical, cognitive and organizational, is essential so that activities during the “home office” are performed efficiently for the employer and ensuring the maintenance of the employee's health and quality of life.

The study methodology was qualitative in nature, the changes that occurred were documented by photographic records, before and after the installation of the equipment. Subsequently, the best strategies to improve working conditions in the “home office” were identified.

During the adaptations of the workplace, difficulties were found to put into practice actions related to cognitive and organizational ergonomics, due to the need for the work group to also be seeking the establishment of ergonomics actions. It is noteworthy that the preparation of the job, guidelines regarding working hours and working hours, means of communication between employees and the cost inherent to adaptations are discussed between the employee and employer, thus being a joint action. In addition, the monitoring of a specialized technical professional would be important for the establishment of assertive actions. The assessed professional could also perform several actions, such as breaks during the workday, periodic exercises, improve lighting and correct posture issues. It is evident that a specialized professional could significantly contribute to the improvement of the job.

With the help of a few punctual directions the understanding and training process can result in significant benefits for the workstation understanding with minimal financial investment.

The “home office” will be a trend in companies and as a way to bring quality of life to employees. In addition to productivity, the establishment of an ergonomics sector in the company to monitor the “home office” would be a suggestion of action on the topic addressed in this study.

In the final phase of this investigation, we intend to outline some limitations found throughout this study, as well as make some recommendations and suggestions for the structuring and development of future investigations.

One of the initial limitations of this investigation was the size of our sample, making this a case study with a working reality under analysis.

As recommendations for future research on this same topic, we emphasize the importance of expanding the sample of participants that allow a broader collection of data.

References

- Brazil Agency (2020). Covid-19: See how each state determines social distancing]. Available in: <https://agenciabrasil.ebc.com.br/saude/noticia/2020-04/covid-19-veja-como-cada-estado-determina-o-distanciamento-social>. Access in: 20 nov. 2021.
- Antunes, E. D.; Fischer, F. M. Home Office, Telework or Remote Work? The importance of ergonomics when work has moved home]. In: Elói Martins Senhoras (Org.). Engenharia de produção: além dos produtos e sistemas produtivos 2. Ponta Grossa - PR: Atena, 2021. p. 149- 154.
- Bortolan, G. M. Z.; Domenech, S. C.; Ferreira, M. G. G. Home office user experience: a literature review]. Human Factors in Design, Florianópolis, v. 10, n. 19, 2021. DOI: 10.5965/2316796310192021137.
- Brazil. Ministério da Saúde. Ergonomic guidelines for remote work. Ministério da Saúde, Secretaria-Executiva, Subsecretaria de Assuntos Administrativos. – Brasília : Ministério da Saúde, 2021.28 p.
- Castañon, J. A. B.; Cruz, T. C. B.; Carvalho, J. L.; Ragone, G. N. The home office and ergonomics in the working and health conditions of architects and engineers, Blucher Engineering Proceedings, v.3 n.3. São Paulo: Blucher, 2016. p. 643-654.
- Hantmann, S.B. et al. Survey of anatomoclinical, biomechanical and ergonomic aspects of the sitting position on the spine - a reflection of home office work during the pandemic. Brazilian Journal of Development, São José dos Pinhais, v. 7, n. 10, p. 97392-97402, 2021. Available in: <https://www.brazilianjournals.com/ojs/index.php/BRJD/article/view/37812>. Access in: 22 nov. 2021.
- EA. What Is Ergonomics?. (2020). Available in: <https://iea.cc/what-is-ergonomics/>. Access in: 20 nov. 2021.
- Lemos, A. H. C. Barbosa, A. O.; Monzato, P. P. Women working from home during the COVID-19 pandemic and the configurations of the work-family conflict. Revista de Administração de Empresas, São Paulo, v. 60, p. 388-399, 2021. Available in: <https://www.scielo.br/j/rae/a/9WS6pYzLdhWY6qWwDXTKTsN/?lang=pt>. Access in: 20 nov. 2021.
- Miguez, S. Ergosys. Ergonomics Manual: Home Office. Available in: <http://www.ergosys.com.br/manual-de-ergonomia-para-home-office-ou-teletrabalho/>. Access in: 27 dez. 2021.
- Moraes, A; Mont’alvão, C. Ergonomics: concepts and applications. Rio de Janeiro: 2AB, 2010.

OPAS. Considerations for social distancing measures in the context of the response to the COVID-19 Pandemic].

Available in: <https://www.paho.org/pt/node/73957>. Access in: 20 nov. 2021.

OPAS. History of the COVID-19 pandemic. 2021. Available in: <https://www.paho.org/pt/covid19/historico-da-pandemia-covid-19>. Access in: 20 nov. 2021.

SESI. Office ergonomics guidelines for work: Home Office. 2020. Available in:

https://arquivos.sfipec.org.br/sfipec/files/files/SESI_Cartilha_Trabalho_Home_Office.pdf. Access in: 27 dez. 2021.