57 - APPLICATION OF ERGONOMICS IN COMPUTERIZED WORKS: A CASE STUDY

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INTRODUCTION

The term Ergonomics was first used in the 50s when British researchers decided to form a society for the study of individuals in their work environment, known as "Ergonomic Research Society". The etymology of the term "ergonomics" comes from the Greek root "ergon" (work) and "nomos" (rules) to denote a general way as work science. Thus, ergonomics is the scientific study that investigates the relationship between individuals and the context of production of goods and services. It analyzes contradictions present in this inter-relationship and, as a result, individual and collective strategies of operative mediation are constructed by individuals to respond to multiple demands of work situations and thus ensure healthy working conditions (IIDA, 2005; REIS, et al, 2012). It is a multidisciplinary science based on the theories and principles of Anthropometry, Physiology, Biomechanics, Industrial Design, Psychology and Engineering, which main aim is to adapt working conditions to the psychophysiological characteristics of man, important variables in Human-Computer Interactions (IIDA , 2005; GRANDJEAN, 1998; GUERIN et al, 2001).

It is noteworthy that the desired levels of productivity and reliability at work are only achieved considering the human element as the focus of our attention. This point is where there is information on possible improvements, and also on dysfunctions, risk and involvement of the entire production system, as well as the health and safety of workers (REIS and MORO, 2012). Repetitive Strain Injury (RSI) and Work-Related Musculoskeletal Disorders (WMSD) may have a strong relationship not only with physical factors, but with psychosocial factors, highlighting the repetition of movements, poor posture, use of physical force and the search for productivity without limits for humans, highlighting RSI / WMSD of the upper limbs (Fernandes et al., 2010).

The main aim of ergonomics is to provide workers a healthy, comfortable and human work environment (IIDA, 2005; GRANDJEAN, 1998; REIS, 2003; REIS, 2012). However, due to the lack of ergonomics in organizations, the work environment often becomes prone to the emergence of occupational diseases. In this sense, figure 01 shows the stages of an ergonomic analysis of work to detect and resolve problems arising from inadequate workplaces.

It is important to warn organizations that every worker has an individual work capacity, i.e., workers must carry out their activities according to their physical and mental capacity. This author reports that the demands of work must respect the individual capacity of each worker (SALIM, 2003). Accordingly, it was observed that the lack of autonomy, physical inactivity, lifestyle, obesity and physical load contribute to worsen the health status of workers (VAN DEN GERG, et al., 2009). A significant increase in the number of workers in industries affected by repetitive strain injuries and work-related musculoskeletal disorders - RSI / WMSD has been observed, which is target of concerns of both public and private organizations (PROTTO; ZIMBALATTI, 2010). In Brazil, the Regulatory Standard (NR 17) establishes some parameters that can help to adapt working conditions to the psychophysiological characteristics of workers in order to provide comfort, safety and efficient performance (BRASIL, 2002).

RULA (Rapid Upper Limb Assessment)

The RULA method allows rapid and simple assessment of physical risks arising from work situations, consisting of six body areas, and developed for use in ergonomic investigations of workplaces where work-related upper limb disorders have been reported. This method requires no special equipment and offers a quick analysis of the postures of neck, trunk and upper limbs along with muscle function and external load received by workers (MCATAMNEY; CORLETT, 1993). The RULA method was created to investigate the exposure of workers to risk factors associated with work-related diseases of the upper limbs.

It was developed with the aim of providing a rapid assessment method of a working population exposed to the risk of musculoskeletal lesions and of assessing situations that might lead individuals to risks of dysfunctions related to extreme postures, excessive force and muscle activities (repetitive strain), with emphasis on the upper limbs. This tool uses scoring criteria to rate the risk level, ranging from 1 to 7, where higher scores indicate high risk level (MCATAMNEY; CORLETT, 1993).

CORLET (Body Discomfort Diagram)

This ergonomic tool divides the human body into several segments to facilitate the location of areas in which workers feel pain. With this diagram, the ergonomist (work analyst) interviews workers at the end of a working period, asking them to indicate the regions where they feel pain. They are also asked to subjectively evaluate the level of discomfort that they felt in each segment shown in the diagram. The discomfort index is classified into eight levels, ranging from zero to "extremely comfortable" to level seven "extremely uncomfortable", linearly marked from left to right (BORG, 2000). Through this diagram, the researcher can identify machinery, equipment and workplaces that promote greater postural discomfort. The same author reports that this method can be applied with or without the aid of specific software, and may be advantageous in some research situations, being a simple methodology that does not need to interrupt work for data collection. Thus, in this study, after verification of workplaces, incorrect postures linked to the use of furniture inadequate to the anthropometric characteristics of workers of the administrative sector were observed. In this context, an Ergonomic Work Analysis was performed to verify the current situation of the ergonomic risks and propose improvements.

METHOD

This case study was established by two administrative sector female workers aged 25-27 years with company time of more than three years in a company in western state of Paraná, Brazil. To analyze the problem in question, the free and consent form was signed and subsequently, a survey of primary data regarding workers' routine was conducted, where photos and filming using a Sony camera DSC HX5 10.5 mega pixel were used. Later, the percentage of body discomfort in the administrative sector and production was assessed by applying the CORLET Discomfort Diagram and the RULA (Rapid Upper Limb Assessment) tool

to analyze the workplace. Statistical data were performed using the Bioestatic 5.0 software.

RESULTS AND DISCUSSION

To analyze the problem in question, the percentage of body discomfort in the administrative sector and production was assessed by applying the CORLET Discomfort Diagram, which shows areas of discomfort of the human body, being considered only discomfort / pain according to the Borg scale ≥ 6 (BORG, 2000). Figure 01 shows the secretary workplace and evaluation by the RULA / CORLET method, showing the workplace and pain sites.

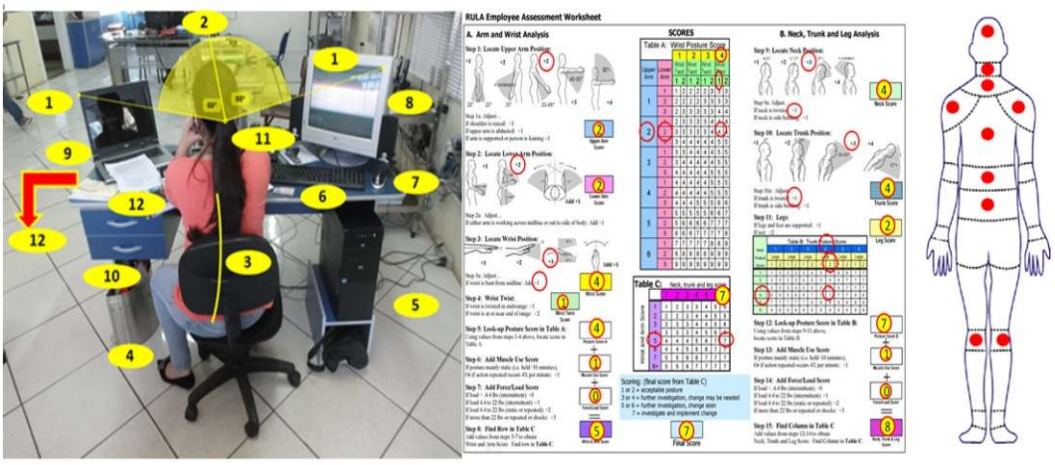

Figure 01 - Workplace (1) - RULA Worksheet - CORLET Diagram Source: Authors

A considerable percentage of discomforts were observed, highlighting regions of shoulders, spine, knees and feet, which show values higher than 67%, and in the spine and shoulders, 100% of workers evaluated reported discomforts, detecting 12 ergonomic risks.

The workplace is small, with poorly organized objects. Thus, it should be planned according to the reach of workers, providing the most used objects close to their body and those less used during the workday no so close, thus avoiding unnecessary wear of the humeral joint and spine. It was also found that it is necessary to increase the workplace, and an increase in the desk length is suggested, which can be "L" shaped. There is the presence of glare, which can be corrected by changing the position of the desk or curtains on windows, since the presence of glare on the computer screen affects the ocular system (BRASIL, 2002).

In relation to the chair, it has no armrests and the back support is damaged. Another important factor of this workplace is the lack of footrest, lack of wrist support while using the mouse and lack of support for documents, these accessories must be provided, since their absence provides inclination of trunk and head, impairing the worker's health and productivity (BRASIL, 2002), because to manipulate the mouse, the arm is abducted, flexed, extended forearm and the wrist performs radial and ulnar deviation, flexion and extension, which may cause discomfort, favoring the emergence of compression syndromes of the Carpal Tunnel and Ghion Channel (DINIZ , et al, 2010;. REIS, 2012).

Figure 2 shows the workplace of worker 02, which has the function of administrator, being analyzed by RULA worksheet and CORLET diagram. At typing work, there is excessive use of muscles of the upper limbs, requiring stretching and labor gymnastics at the beginning, middle and end of the workday (REIS, 2004).

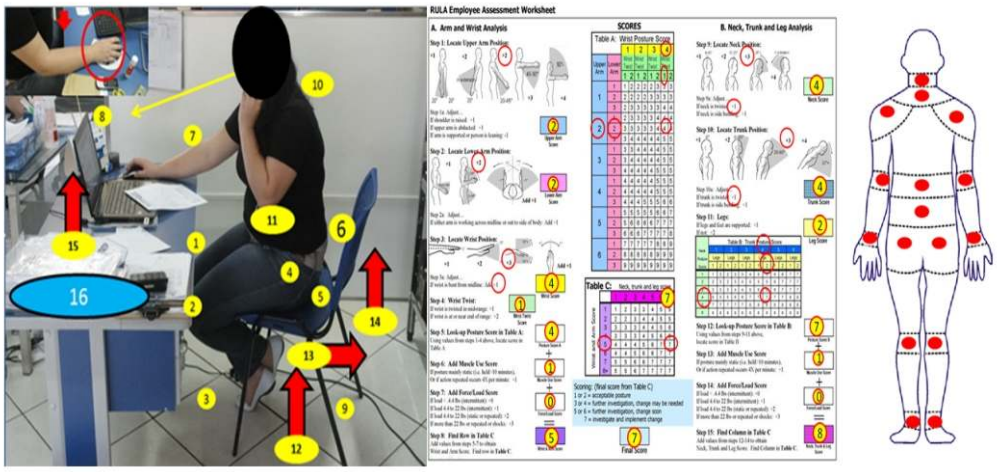

Figure 02 - Workplace (2) - RULA Worksheet - CORLET Diagram Source: Authors

The workplace shown in Figure 02 requires a specific office chair, with adjustment for height and leg length, lumbar support, 5 wheels and armrests (ABNT, 2006). Footrest, wrist support (mouse) and support for reading documents should also be provided, avoiding discomforts in these regions.

The work area should be organized according to the worker's reach, providing the most used objects close to their body and those less used during the workday no so close (PROTO; ZIMBALATTI, 2010) In this sense, unnecessary wear of wrist, hand and shoulder joints will be avoided. In addition to correction ergonomics, awareness ergonomics should also be performed, since the desk is poorly organized. Regarding the desk, there are corner in its ends, which may block circulation, affecting the

performance of arms, wrists and hands (IIDA, 2005).

The desk height for this worker is adequate, but the chair this high compared to the estimate of the leg height, thus reinforcing the need for an adjustable chair (REIS, et al, 2012). Under this condition, legs are placed behind and the backrest is not used, favoring the emergence of low back pain. When using the mouse, the arm performs an abduction with ulnar and radial deviation, wrist flexion and extension, contributing to the compression of dermatomes of the median and ulnar nerve, which has a strong relationship with Carpal Tunnel Syndrome and Ghion Channel Syndrome, common pathologies among typists working under this condition (REIS and MORO, 2012; SALIM, 2003; VAN DEN GERG, T., et al, 2009). Regarding the analysis of workplaces performed by RULA method by MCatamney; Corlett (1993), both showed score 7, indicating that changes should be made immediately, according to discomfort complaints presented by the CORLET discomfort diagram in which the worker reported the presence of pain in all joints.

CONCLUSION

Both workplaces analyzed had similar ergonomic risks, i.e., they do not meet the Regulatory Standard 17, since the dimensions of the furniture, as well as the distribution of accessories required for the development of the Human-Computer Interaction are inadequate to the psychosocial characteristics of workers surveyed. In this sense, this research concludes that in both workplaces analyzed, the Human-Computer Interaction is ergonomically incorrect, which may lead to injuries. In this sense, workplaces should be immediately corrected, so workers can develop their tasks with comfort, health and safety.

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APPLICATION OF ERGONOMICS IN COMPUTERIZED WORKS: A CASE STUDY

ABSTRACT

This research was carried out with 2 working females (♀) the administrative sector in age from 25 to 27 years, with service time ≥ 3 years of a company in western Paraná, Brazil. The objective was to assess the ergonomic risks in Human Computer Interaction. The percentage of body discomfort through the diagram of Corlet and job by RULA (Rapid Upper Limb Assment) was observed. The statistics were performed using 5.0 Bioestatic program. The data of the discomforts showed that the region of the shoulders, spine, knees and feet, have values greater than 67%, and in the cervical spine and shoulders 100%. We conclude that the jobs analyzed, are ergonomically inadequate, which may provide the appearance of lesions in workers, ergonomics correction is necessary so that employees can develop your tasks with comfort, health and safety.

KEYWORDS: computer; ergonomics; human

APPLICATION DE L'ERGONOMIE EN POSTE DE TRAVAIL INFORMATISÉ: ÉTUDE DE CAS

RÉSUMÉ

Cette recherche a été menée avec deux femmes qui travaillent (♀) le secteur administratif en âge 25-27 ans avec un temps de service de ≥ 3 ans d'une entreprise dans la région ouest du Paraná, au Brésil. L'objectif était d'évaluer les risques ergonomiques en Interaction Homme-Machine. Pourcentage observé de l'inconfort du corps à travers le schéma et le travail Corlet par RULA (Rapid Upper Limb harcèle-). Les statistiques ont été réalisées à l'aide 5.0 Bioestatic programme. Les données ont montré que le malaise de la région de l'épaule, genoux, colonne vertébrale et des jambes, ont des valeurs supérieures à 67%, et dans la colonne cervicale, et les épaules 100%. Il conclut que les études analysées sont ergonomiquement inapproprié, qui peuvent fournir l'apparition de lésions chez les travailleurs, la correction de l'ergonomie est nécessaire pour les employés à développer leurs tâches de confort, de santé et de sécurité.

MOTS-CLÉS: ordinateur; ergonomie; humain

SOLICITUD DE ERGONOMÍA EN ESTACIÓN DE TRABAJO COMPUTARIZADA: ESTUDIO DE CASO
RESUMEN

Esta investigación se realizó con dos mujeres que trabajan (♀) del sector administrativo de edad 25-27 años, con tiempo de servicio ≥ 3 años de una empresa en la región oeste de Paraná, Brasil. El objetivo fue evaluar los riesgos ergonómicos en Interacción Persona-Ordenador. Porcentaje observado de incomodidad cuerpo a través de la figura y obra de Corlet RULA (Rapid Miembro Superior Assment). Las estadísticas se realizaron utilizando 5,0 programa Bioestatic. Los datos mostraron que el malestar de la región del hombro, rodillas, columna vertebral y las piernas, tiene valores superiores a 67%, y en la columna cervical y hombros 100%. Llega a la conclusión de que los estudios analizados son ergonómicamente apropiado, que puede proporcionar la aparición de lesiones en los trabajadores, la corrección de la ergonomía es necesario que los empleados puedan desarrollar sus tareas con la comodidad, la salud y la seguridad.

PALABRAS CLAVE: equipo; ergonomía; humana

APLICAÇÃO DA ERGONOMIA EM TRABALHOS INFORMATIZADOS: ESTUDO DE CASO
RESUMO

Esta pesquisa foi realizada com duas mulheres que trabalham (♀) do setor administrativo em etária de 25 a 27 anos, com tempo de serviço ≥ 3 anos de uma empresa na região Oeste do Paraná, Brasil. O objetivo foi avaliar os riscos ergonômicos em Interação Humano-Computador. Observou-se o percentual de desconforto corporal através do diagrama de Corlet e trabalho por RULA (Rapid Membro Superior Assment). A estatística foi realizada utilizando o programa Bioestatic 5.0. Os dados dos desconfortos apresentaram que a região dos ombros, joelhos, coluna vertebral e dos pés, têm valores superiores a 67%, e na coluna vertebral cervical, e os ombros 100%. Conclui-se que os trabalhos analisados, estão ergonomicamente inadequado, o que pode proporcionar o aparecimento de lesões nos trabalhadores, assim uma correção ergonomica é necessário para que os funcionários possam desenvolver suas tarefas com conforto, saúde e segurança.

PALAVRAS-CHAVE: computador; ergonomia; humano