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## ERGONOMIC RISK AND FUNCTIONAL HEALTH CONDITION OF BANK TELLERS

*Risco ergonômico e condição de saúde funcional em bancários operadores de caixa*

*Riesgo ergonómico y la condición de salud funcional de operadores de caja bancaria*

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### ABSTRACT

**Objective:** To evaluate the ergonomic risk and functional physical condition of bank tellers. **Methods:** Quantitative, cross-sectional study, whose data collection happened during the months of September and October 2015, in a reserved room in the very bank branch. It consisted in the application of the “Ergonomics Census”, along with a questionnaire addressing variables regarding health characteristics, focusing on the musculoskeletal systems and occupational characteristics, which was applied to bank tellers of Criciúma and region. For the statistical analysis, the software SPSS was adopted, having the simple data displayed in frequency and using, for correlations, the Chi-square test, with a 95% confidence level. **Results:** The study evaluated 85 active workers, 57 (67.1 %) of which reported the presence of symptoms of pain/discomfort, and the most affected locations were: shoulder 44 (44; 51.8%), cervical (38; 44.7%) and dorso-lumbar spine (31; 36.5%). No association was found between pain/discomfort and the practice of exercises, nor between the first and the use of medicines to work. As for the presence of ergonomic inadequacies, 43 (50.6%) reported the presence of organizational ones; 32 (37.7%), environmental; and 23, (27.1%) physical inadequacies. Significant correlations were found between shoulder pain and physical inadequacy in the workplace ( $p=0.013$ ), and organizational inadequacy ( $p=0.040$ ) as well; between neck pain and organizational inadequacy ( $p=0.012$ ), and between dorso-lumbar spine and inadequacy of the working environment ( $p=0.044$ ). **Conclusion:** The percentage of bank tellers with musculoskeletal symptoms was high, which characterizes the activity as one of potentized risk, especially due to the organizational ergonomic conditions of work.

**Descriptors:** Cumulative Trauma Disorders; Workers; Ergonomics.

### RESUMO

**Objetivo:** Avaliar o risco ergonômico e a saúde funcional de bancários operadores de caixa. **Métodos:** Estudo quantitativo e transversal cuja coleta de dados ocorreu nos meses de setembro e outubro de 2015, numa sala reservada na própria agência bancária. Constituiu-se da aplicação do “Censo de Ergonomia”, juntamente com questionário com variáveis relacionadas a características da saúde, focado nos sistemas osteomuscular e características ocupacionais, sendo aplicado em caixas bancários de Criciúma e região. Na análise estatística, utilizou-se o programa SPSS, com dados simples expostos em frequência e, para as correlações, utilizou-se o teste Qui-Quadrado, com nível de confiança de 95%. **Resultados:** Participaram do estudo 85 trabalhadores ativos, dos quais 57 (67,1%) relataram presença de sintomas de dor/desconforto, sendo que os locais mais acometidos foram: ombro (44; 51,8%), cervical (38; 44,7%) e coluna dorso lombar (31; 36,5%). Não foi encontrada associação entre dor/desconforto e a prática de exercícios nem com o uso de medicamentos para trabalhar. Quanto à presença de inadequações ergonômicas, 43 (50,6%) relataram presença de inadequações organizacionais; 32 (37,7%), ambientais; e 23 (27,1%), físicas. Encontrou-se correlação entre dor no ombro e inadequação física no ambiente de trabalho ( $p=0,013$ ), bem como com a organizacional ( $p=0,040$ ); cervicalgia com inadequação organizacional ( $p=0,012$ ), e coluna dorso lombar com inadequações do ambiente de trabalho ( $p=0,044$ ). **Conclusão:** O percentual de caixas bancários com sintomatologia musculoesquelética mostrou-se elevado, caracterizando a atividade como de risco potencializado, especialmente pelas condições ergonômicas organizacionais de trabalho.

**Descriptores:** Transtornos Traumáticos Cumulativos; Trabalhadores; Ergonomia.



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## RESUMEN

**Objetivo:** Evaluar el riesgo ergonómico y la salud funcional de operadores de caja bancaria. **Métodos:** Estudio cuantitativo y transversal cuya recogida de datos se dio en los meses entre septiembre y octubre de 2015 en una sala reservada de la propia agencia bancaria. Se constituyó de la aplicación del "Censo de Ergonomía" y un cuestionario con variables relacionadas con las características de salud, en específico sobre los sistemas osteomuscular y características ocupacionales que fueron aplicados en los operadores de caja bancaria de Criciúma y región. Se utilizó el programa SPSS para el análisis estadístico con datos simples expuestos en frecuencia y se utilizó la prueba Chi-cuadrado para las correlaciones con el nivel de confianza del 95%. **Resultados:** Participaron del estudio 85 trabajadores activos de los cuales 57 (67,1%) relataron síntomas de dolor/incomodidad y los sitios más acometidos fueron el hombro (44; 51,8%), la cervical (38; 44,7%) ya la columna dorso lumbar (31; 36,5%). No se ha encontrado asociación entre dolor/incomodidad y la práctica de ejercicios o el uso de medicación para trabajar. Respecto las inadecuaciones ergonómicas, 43 (50,6%) relataron inadecuaciones de organización; 32 (37,7%) del ambiente y 23 (27,1%) de inadecuaciones físicas. Se encontró relación entre el dolor del hombro y la inadecuación física para el ambiente de trabajo ( $p=0,013$ ) así como la inadecuación de organización ( $p=0,040$ ); el dolor de la cervical con la inadecuación de organización ( $p=0,012$ ) y la columna dorso lumbar y las inadecuaciones para el ambiente de trabajo ( $p=0,044$ ). **Conclusión:** El porcentaje de operadores de caja bancaria con sintomatología musculo esquelética se ha presentado elevada lo que caracteriza la actividad como riesgo potencial, en especial, por las condiciones ergonómicas de organización de trabajo.

**Descriptores:** Trastornos de Traumas Acumulados; Trabajadores; Ingeniería Humana.

## INTRODUCTION

The National Policy on Health Promotion (*Política Nacional de Promoção da Saúde - PNPS*) highlights in its general objective, which is formalized in the current document, the attention to the working conditions. This view becomes necessary because the world of work and its conditioning aspects are of significant importance for human health, as the other main dimensions of life<sup>(1)</sup>.

Because of the high competitiveness in the banking market, the sector has been undergoing several innovations<sup>(2,3)</sup>. The new situations to which bank employees are subject lead to new physical and mental demands, favoring the increase of repetitive strain injuries (RSI)/work-related musculoskeletal disorders (WRMSDs)<sup>(4)</sup>.

RSI/WRMSDs are understood as disorders affecting tendons, muscles, bones, joints, cartilages, and intervertebral discs, which may be of inflammatory or degenerative nature. Such conditions can lead, as a consequence, to the withdrawal from the occupational activity, to the reduction in functional capacity and to high costs for the public coffers - related to the unemployment insurance benefit and medical licenses<sup>(5)</sup>.

In Brazil, this index reaches 48.2% of all work-related disorders, and the musculoskeletal diseases comprise a very significant part of this percentage<sup>(6)</sup>. In 2000, in the state of Bahia, the occupational licensing rate reached 84.5%<sup>(7)</sup>.

Studies have demonstrated the high incidence of pathological symptomatology related to psychological and musculoskeletal factors in bank workers. The majority of these surveys were carried out through the application of questionnaires, which were applied to banker workers who performed a variety of functions, whether being active workers or individuals who were no longer working<sup>(8,9)</sup>.

In Brazil, there is an Ergonomics regulatory standard established on November 23, 1990, by the Ministry of Labor and Employment, last edited in 2007, which establishes the parameters defining the ideal working conditions, known as NR17. This norm aims at reducing work-related disorders and provide comfort, safety and efficient performance to workers in their activities<sup>(10)</sup>. There is a clearly evident deficiency in the compliance with the legal recommendations of the Ergonomic Workplace Analysis (EWA) as described in NR 17, and in the supervision by the responsible bodies, which renders it difficult to reach compliant working conditions<sup>(11)</sup>.

The EWA presents itself as an alternative for prevention, leading to an increase in productivity and greater employee satisfaction during their activities. Composed of all the risks to which the employee is exposed during their activity (physical, mental and social risks) by means of an evaluation of the jobs<sup>(12)</sup>.

Organization, excessive workload demand, goal-striving stress, and highly repetitive activities are factors that affect functional health in bank workers<sup>(12)</sup>.

The mistrust of the veracity of the presence of some disorder is evident among the superior hierarchical class in the banking sector, according to a research conducted with workers who suffered from some illness<sup>(12)</sup>. The workers with these diagnoses feel depressed, distressed and experience a sense of impotence. This leads to the use of large quantities of medicines without effective results, further increasing the workers' sick leave length<sup>(13)</sup>.

The prolonged time of activities, along with the biopsychosocial factors to which bank workers are exposed, make it necessary to deepen the knowledge of the main causes of RSI/WRMSD in this category. Therefore, the objective of the present study is to evaluate the ergonomic risk and the functional health of bank tellers.

## METHODS

This study was characterized as cross-sectional and quantitative, involving the obtention of data resulting from the application of an ergonomic questionnaire in bank tellers.

The sample consisted of 85 bank workers, according to data from the Bank and Finance Officers Union of Criciúma and region. The cities of Criciúma, Urussanga, Nova Veneza, Içara and Cocal do Sul, in Santa Catarina, have approximately 500 bank workers, and it is estimated that about 140 will be in the job position of bank teller.

The sample comprised all the employees of the bank branches in the bank teller position, of both sexes and different age groups. Workers who were off work or on vacation were excluded from the survey. After this selection, the questionnaires were applied in a reserved room in the very bank branch.

The first contact related to performing the research occurred through the presentation of the research project by the researcher and advisor to the president and the health area head of the Bank and Finance Officers Union of Criciúma and region. After their assent to the development of the research, the tellers suiting the profile were contacted, the project proposal was explained, and those who agreed to participate signed the Informed Consent Form. Following that, they responded to the questionnaires. The study encompassed 17 bank branches in Criciúma and region during the months of September and October 2015.

The questionnaire used in the present study was based on the ergonomics instrument by Couto and Cardoso (2007)<sup>(14)</sup>, called the Ergonomics Census. The variables evaluated in this study referred to the following points: educational level; length of time working in the company; work shift; daily rest breaks and eating periods; posture adopted during the working hours; characteristics of the rhythm of the activities performed; environmental quality of the workplace (noise, temperature and lighting); presence of any discomfort or pain in the body; area of the body with discomfort/pain; characteristic of discomfort/pain; how long have the symptoms been felt; discomfort/pain degree of magnitude; use of medicines or other types of intervention needed to work; and whether the employee performs physical activities.

Data was tabulated and analyzed in the Statistical Package for Social Sciences (SPSS) version 20.0. The investigation of the existence of association between the quantitative variables was performed using Pearson's chi-square test and likelihood ratio, followed by residue analysis when statistical significance was observed, with a 95% confidence level.

The present study was carried out after approval of the Research Ethics Committee of Extremo Sul Catarinense University (*Universidade do Extremo Sul Catarinense*), under approval no. 1.202.806/2015, and the assent of the Letter of Permission/Term of Authorization signed by the president of the Bank and Finance Officers Union of Criciúma and region. In addition, the research was only performed after having the Informed Consent Form signed by the employees of the participating bank branches.

## RESULTS

The sample consisted of 85 bank tellers and, on the sociodemographic profile, it can be observed that the majority were men, working for more than 36 months in this activity and who practice physical activity (Table I).

Table I - Sociodemographic profile of bank tellers of Criciúma and region, Santa Catarina, 2015 (n = 85).

Variable	Mean ± SD
<b>Age (years)</b>	37.65 ± 10.94
<b>Sex</b>	n (%)
Male	47 (55.3)
Female	38 (44.7)
<b>Schooling</b>	n (%)
Complete high school	8 (9.4)
Complete technical education	2 (2.4)
Complete higher education	75 (88.2)
<b>Length of time working at the bank branch</b>	n (%)
Less than 12 months	3 (3.5)
13 to 36 months	8 (9.4)
25 to 36 months	5 (5.9)
More than 36 months	69 (81.2)
<b>Practice physical exercise</b>	n (%)
Yes	57 (67.1)
No	28 (32.9)

Legend: n = absolute number of participants, % = relative number, SD = standard deviation.

Table II depicts the workplace environment, taking into account its physical structure and the work organization in which the bank workers are inserted during their activities. Most tellers considered that the working environment had good lighting, no noise-related problems, adequate temperature, no physical and environmental inadequacies, and were suitable for lunch and rest.

Table II - Distribution of workplace environment data, Criciúma and region, Santa Catarina, 2015 (n = 85).

Variable	n (%)
<b>Lighting</b>	
Good	65 (76.5)
Regular	17 (20.0)
Bad	3 (3.5)
<b>Noise</b>	
High	13 (15.3)
Normal	64 (75.3)
Low	8 (9.3)
<b>Temperature</b>	
Cold	12 (14.1)
Normal	64 (75.3)
Hot	9 (10.6)
<b>Presence of inadequacy - physical</b>	
Yes	23 (27.1)
No	62 (72.9)
<b>Presence of inadequacy - organization</b>	
Yes	43 (50.6)
No	42 (49.4)
<b>Presence of inadequacy - environment</b>	
Yes	32 (37.6)
No	53 (62.4)
<b>There is place for lunch and rest. n = 8</b>	
Yes	57 (68.7)
No	26 (31.3)
<b>Prevailing posture at work</b>	
Seated	76 (89.4)
Alternating between sitting/standing	9 (10.6)
Hours worked, n = 80	6.45 ± 0.93

Legend: n: absolute number of participants; %: relative number; SD = standard deviation.

Table III presents the numbers in relation to the presence of pain/discomfort and the areas affected by them. It can be observed that 67.1% (n=57) reported pain/discomfort, with the shoulder as the most affected area (51.8%; n=44).

Table IV displays the results of the correlation between the presence of pain/discomfort and the practice of exercises, and the correlation between the use of medicines to work and the presence of pain/discomfort.

Finally, Table V presents the results of the correlation of the presence of pain/discomfort in the shoulder versus physical inadequacy, organizational inadequacy or inadequacy of the environment.

Table III - Pain and discomfort in bank tellers of Criciúma and region, Santa Catarina, 2015 (n = 85).

<b>Variable - Presence and affected areas</b>	<b>n (%)</b>
Pain/Discomfort	57 (67.1)
Shoulder	44 (51.8)
Neck	38 (44.7)
Vertebral column	31 (36.5)
Fists	23 (27.1)
Arms	19 (22.4)
Hands	17 (20.0)
Forearms	12 (14.1)
Elbows	8 (9.4)
Hip	8 (9.4)
Legs	7 (8.2)
Knees	6 (7.1)
Ankles/Feet	6 (7.1)
Thighs	2 (2.4)
<b>Variable - Pain/discomfort characteristic (n = 57)</b>	<b>n (%)</b>
Pain	40 (71.9)
Tiredness	32 (56.1)
Ache	23 (40.4)
Tingling/numbness	20 (35.1)
Loss of strength	16 (28.1)
Motion limiting	12 (22.8)
Snapping sound	10 (17.5)
Weight	9 (15.8)
Shocks	3 (5.3)

Legend: n = absolute number of participants.

Table IV - Distribution regarding the presence of pain or discomfort in the body segments versus the use of medicines and versus the practice of exercise, Santa Catarina, 2015 (n = 85).

	<b>Feeling of pain/discomfort in MMSS, vertebral column or MMII n (%)</b>		<b>p-value</b>
	<b>Yes</b>	<b>No</b>	
<b>Practice of exercise</b>			
Yes	38 (66.7)	19 (33.3)	0.913
No	19 (67.9)	9 (32.1)	
<b>Use of medicines</b>			
Yes	16 (94.1)	1 (5.9)	
No	24 (96.0)	1 (4.0)	0.481
Sometimes	17 (100.0)	0 (0.0)	

Legend: MMSS = upper limbs; MMII = lower limbs; n = absolute number of participants; % = relative number of participants.

Table V - Correlation between Discomfort and Ergonomic Condition of Criciúma and region, Santa Catarina, 2015 (n=85).

	<b>Shoulder pain/discomfort - n (%)</b>		<b>p-value</b>
	<b>Yes</b>	<b>No</b>	
<b>Physical inadequacy</b>			
Yes	17 (73.9)	6 (26.1)	
No	27 (43.5)	35 (56.5)	0.013*
<b>Organizational inadequacy</b>			
Yes	27 (62.8)	16 (37.2)	
No	17 (40.5)	25 (59.5)	0.040*
<b>Workplace environment inadequacy</b>			
Yes	20 (62.5)	12 (37.5)	
Não	24 (45.3)	29 (54.7)	0.124
	<b>Neck pain/discomfort - n (%)</b>		<b>p-value</b>
	<b>Yes</b>	<b>No</b>	
<b>Physical inadequacy</b>			
Yes	13 (56.5)	10 (43.5)	
No	25 (40.3)	37 (59.7)	0.182
<b>Organizational inadequacy</b>			
Yes	25 (58.1)	18 (41.9)	
No	13 (31.0)	29 (69.0)	0.012*
<b>Workplace environment inadequacy</b>			
Yes	17 (53.1)	15 (46.9)	
No	21 (39.6)	32 (60.4)	0.225
	<b>Pain/discomfort in the vertebral column - n (%)</b>		<b>p-value</b>
	<b>Yes</b>	<b>No</b>	
<b>Physical inadequacy</b>			
Yes	10 (43.5)	13 (56.5)	
No	21 (33.9)	41 (66.1)	0.414
<b>Organizational inadequacy</b>			
Yes	20 (46.5)	23 (53.5)	
No	11 (26.2)	31 (73.8)	0.052
<b>Workplace environment inadequacy</b>			
Yes	16 (50.0)	16 (50.0)	
No	15 (28.3)	38 (71.7)	0.044*

n: absolute number of participants; %: relative number; \*p≤0.05.

## DISCUSSION

The results of the present study demonstrate a high prevalence (67.1%) of bank tellers with pain/discomfort. They have been working in the position for a relatively long time and the majority practice physical activity, denoting the workers' concern with their health.

As regards this concern with health, in the past decades, the attitude of taking care of the conditioning factors of life has been gaining strength, in order to reduce the vulnerability to becoming ill. Such attitudes contribute to reducing the vulnerability to chronic diseases and disability, representing a social change and, therefore, a change in general health<sup>(1)</sup>.

It has been demonstrated in the current research that most of the bank tellers in Criciúma and region regard the lighting in the workplace as appropriate. For identification of characters and details in documents, it is necessary that the lighting in the workstation be at an ideal intensity<sup>(14)</sup> and the ideal illuminance vary according to the type of work performed and the age of the worker. The ideal illuminance for computer stations should be between 450 and 550 lux, and activities under inappropriate lighting conditions can lead to visual fatigue, characterized by burning eye, eye pain, conjunctival redness, changes in blinking frequency, watery eyes, photophobia, diplopia, blurred vision sensation, among other alterations<sup>(14,15)</sup>.

Another aspects analyzed in the present study were room temperature and noise, and the majority of participants regarded as adequate the temperature (75.3%) and the noise (75.3%) in the workplace. The ideal working temperature is between 20 and 23°C, and the warmer the temperature in the workplace environment, the lower the tolerance for the worker's physical

and mental activities<sup>(16)</sup>. Though the human being has the capacity to adapt to different temperatures, not all conditions are considered adequate, which leads to a decrease in the effectiveness of the activities performed<sup>(16)</sup>.

Auditory stimuli, which do not contribute positively to the optimal performance of an activity, define the term noise. The ideal level for occupations requiring greater concentration, such as the work in computer workstations, is 65 decibels<sup>(17)</sup>.

The results of the present study show convergence with the findings of a publication addressing the organizational and psychosocial workloads as the ones that result in a greater influence on the illness pattern of the studied population. Among the variables included in the organizational type of workload, the ones that generate the greatest harm to workers' health are: stressful activities, inadequate remuneration, job insecurity, job devaluation, management styles, unsatisfactory medical examinations of the bank and disputes among colleagues<sup>(12)</sup>.

The average number of hours worked by the bank tellers in the study in question is 6.45 hours, with the majority of these workers performing their activities in the sitting position. In a study carried out in a city in the hinterlands of the state of Rio Grande do Sul, the average hours worked by the interviewees was 7.28 hours<sup>(18)</sup>. The physical and mental exhaustion derived from activities involving large sums of money, in which there is a need for high concentration and permanence of a sitting posture for most of the working day, represents a situation that can lead to irreversible vertebral column injuries, justifying the reduction of the working hours of bank employees from eight to six hours<sup>(19)</sup>.

A large part of the sample of the present study reported having some pain/discomfort symptoms, results that are superior when compared to the previous surveys performed with bank workers in general in the cities of Criciúma (34.18% of 158 public and private bank employees) and Porto Alegre (27.5% of 356 bank employees) in years 2003 and 2012, respectively<sup>(7,8)</sup>.

It could be observed in the current investigation that the body segments mostly affected were: shoulder, cervical area, vertebral column and wrist; and the main types of symptoms are: pain, tiredness, aching and tingling/numbness. A recent study with bank workers, conducted in a medium-sized municipality in the hinterlands of Paraná State, found the same body segments with similar symptoms<sup>(20)</sup>.

It has been reported that, after performing physical exercises during the working day, there is a decrease in musculoskeletal complaints by workers<sup>(21)</sup>. As observed in the present study, despite the result of the presence of RSI/WRMSD symptoms, the practice of physical exercise was high, but there was no statistically significant association between these factors.

By correlating the results of the variables, presence of pain/discomfort versus use of medicines to work, no statistical significance was found in the current study, which diverges from a study carried out with 1,117 bank employees, in which 49.9% reported taking some type of medicine. The discrepancy between the studies can be explained by the fact that the populations of bank workers were different, in different states. Furthermore, unlike the present study, which evaluated only the tellers position, in a comparative study the workers of all bank position were evaluated<sup>(22)</sup>.

In the present study, when the results of the variable presence of pain/discomfort in the shoulder versus the presence of physical, organizational and environmental inadequacy were tested for correlation, it was observed that there is a significant association between these variables. In a study with similar characteristics to this research, it was possible to observe that the evaluated workstations had excellent physical ergonomic characteristics, though 11% of the sample was diagnosed with WRMSD<sup>(23)</sup>.

The findings on the correlation between the presence of pain/discomfort in the neck versus the presence of physical, organizational and environmental inadequacy of the current study demonstrated that there is a significant association between pain/discomfort symptoms in the neck area and the presence of work organizational inadequacy. A study carried out in 2007 with bank tellers revealed a strong correlation between problematic situations in the workplace environment involving physical and organizational characteristics versus pain/discomfort/weight/numbness or limitation of movements and pain/burning in the back/neck<sup>(23)</sup>.

A significant association was found when correlating the presence of pain/discomfort in the vertebral column versus the presence of inadequacy of the workplace environment in the present study. In a survey carried out in computer workstations, the authors suggested that there is a discrete association between environmental inadequacies versus decreased functionality of the cervical spine<sup>(24)</sup>. This suggests future problem for the worker's health.

As a limitation of the present study, one can point the self-reported responses, which are dependent on the participants' perception of the evaluated phenomena.

The work of bank tellers presents a special criticality, being an activity that deserves attention regarding the creation and strengthening of health care and occupational safety policies, especially including banking companies, whether public or private, in their forms of organization, valuation of the quality of life in the workplace and retreating from the dangerous thresholds of the psychophysiological exhaustion.

## CONCLUSION

The bank employees who work as tellers in the cities evaluated have high rates of pain or discomfort symptoms, and the body segments most affected by health conditions are the upper limbs and the vertebral column.

In the same study, it was observed that the physical, environmental and, especially, the organizational characteristics of the work are related to the presence of the symptoms, according to the workers' perception. Moreover, the presence of inadequacies regarding the work organization was highlighted.

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