Juliana Scopel[I]

Fernando César Wehrmeister[II]

Paulo Antonio Barros Oliveira[I]

RSI/WRMSD in the third decade after restructuring of banking: new associated factors?

ABSTRACT

OBJECTIVE: To estimate the prevalence of cases suggestive of repetitive strain injury/work-related musculoskeletal disorders (RSI/WRMSD), three decades after restructuring of banking.

METHODS: This was a cross-sectional study on 356 employees in 27 bank branches of public and private banks in Porto Alegre, Southern Brazil, between April and August 2009. After crude statistical analysis, adjustments were made using a Poisson regression model with robust variance and a three-level hierarchy that incorporated the design structure and adjustments for the clusters. The results were stratified according to the size of the bank branch and were dichotomized (> 25; ≤ 25 employees).

RESULTS: The prevalence of cases suggestive of RSI/WRMSD was lower among the men (PR = 0.62; 95%CI: 0.47-0.81). Workers aged 26 to 45 years (PR = 2.51; 95%CI 1.02;6.14) presented greater prevalence of this outcome. Individuals with postgraduate qualifications (PR = 0.45; 95%CI 0.22;0.90) and length of time in the job between 5.1 and 15 years (PR = 0.62; 95%CI 0.47;0.81) presented protection against RSI/WRMSD. On stratifying the analyses according to size, it was found that age, income and length of time in the job remained associated in branches with 25 employees or fewer, while in branches with more than 25 employees, sex and schooling level were associated with the outcome.

CONCLUSIONS: The characteristics of importance in relation to bank employees who become ill due to RSI/WRMSD seem to be different today from those that were known historically. Greater attention to organizing work and management strategies should be taken into consideration in drawing up illness prevention programs for banking work.

DESCRIPTORS: Cumulative Trauma Disorders, epidemiology. Human Engineering. Working Conditions. Occupational Health. Cross-Sectional Studies.

[I] Programa de Pós-Graduação em Epidemiologia. Faculdade de Medicina. Universidade Federal do Rio Grande do Sul. Porto Alegre, RS, Brasil

[II] Programa de Pós-Graduação em Epidemiologia. Faculdade de Medicina. Universidade Federal de Pelotas. Pelotas, RS, Brasil

Correspondence:
Juliana Scopel
Centro de Documentação, Pesquisa e Formação em Saúde do Trabalho (CEDOP).
Rua Ramiro Barcelos, 2600, sala 424.
90035-003. Porto Alegre, RS, Brasil
E-mail: julianascopel@gmail.com

INTRODUCTION

Banks have gone through successive innovations in their work processes over the last three decades, as a means of facing up to the competitiveness of the globalized market.[2,10] These innovations have been accompanied by the introduction of new types of physical and psychosocial demands on bank workers, which have been reflected in increased occurrence of work-related illness among them since the 1990s, including repetitive strain injury and work-related musculoskeletal disorders (RSI/WRMSD). This "clinical syndrome"

is characterized by chronic disease, which may or may not be accompanied by objective alterations. These are mainly manifested in the neck, scapular belt and/or upper limbs, as a consequence from the work.[a]

Between 2000 and 2005, R$ 981.4 million was paid out in sickness benefit to 25,000 bank workers in Brazil who were off work due to RSI/WRMSD between 2000 and 2005. The mean length of time off work among these workers was one and a half years. Summing this time, the total number of days off work was 14.9 million. It was calculated that 520 bank workers were off work due to RSI/WRMSD per group of 10,000 workers between 2000 and 2004.[b]

These numbers may have been underestimated, given that a modification in the way of establishing the causal relationship between disease and work introduced by the National Institute for Social Security (*Instituto Nacional do Seguro Social, INSS*) in 2007 (the epidemiological-social security technical linkage) more than doubled the number of cases of RSI/WRMSD registered by the INSS between 2006 and 2008. An increase of 163% in the number of cases of shoulder injury (from 7,200 in 2006 to 18,900 in 2008) was observed. The numbers of cases of tenosynovitis and synovitis went from 9,800 cases in 2006 to 22,200 in 2007 (an increase of 126%).[c,d]

Studies conducted in Brazil since 1997[6,10,e] have identified prevalences of at least one episode of pain in the upper limbs ranging from 55% to 64% of workers, with an annual incidence rate of temporary incapacity related to RSI/WRMSD (off work due to this cause, at least once a year) of around 19 to 22 occurrences of time off work per 100 bank workers.

Follow-up studies that might make it possible to identify the factors suggestive of RSI/WRMSD are needed now, in the third decade of the bank restructuring process. The present study had the aim of analyzing sociodemographic and work organizational factors associated with occurrences of cases suggestive of RSI/WRMSD among bank workers.

METHODS

This was a cross-sectional study on 356 employees at 27 branches of public and private banks in Porto Alegre, Rio Grande do Sul (Southern Brazil), conducted between April and August 2009. The number of active banks and bank branches in the city in April 2008 was

identified, along with the number of employees per branch. There were 9,384 bank workers, according to data from the Annual Report on Social Information (RAIS, 2008).[f] Outsourced workers, self-employed service providers and trainees were excluded.

The branches were categorized into six size-related strata, to form a representative sample of the population: small (< 10 employees), medium (10 to 25 employees) and large (> 25 employees), and in relation to the nature of the bank (public or private). The branches were numbered in each stratum and entered into a draw performed using the PEPI 4 software to make up the number of employees. Proportional probabilistic sampling was used, taking the number of employees per stratum into consideration. The branches were drawn in such a way as to obtain 30% more employees than what was calculated for the sample, given that in the pilot study, 70% of the questionnaires handed out were returned. The 515 employees of the branches that had been randomly selected were invited to participate.

A union representative from the bank workers' professional category accompanied the researchers on their first visit in order to facilitate access to the branch management and to the employees. The questionnaires were returned in sealed envelopes after one week, on average. Employees who were not located, or were away from work (vacation or signed-off for health reason, for example), or who refused to participate, were considered to be losses.

A simple questionnaire was used to analyze sociodemographic and work organizational data, along with the "RSI-like condition" questionnaire, validated by Lacerda[6] (2005), as a screening test to identify cases suggestive of RSI/WRMSD. Tests were considered to be positive if they contained affirmative responses for: 1) presence of any of the following symptoms in one or both upper limbs: feeling of heaviness, discomfort, weakness or pain in the fingers, hands, forearms, upper arms, shoulders and/or neck; 2) presence of the symptoms for more than a month; 3) daily or almost daily frequency; and 4) the relationship of these symptoms to the activities performed at work, independent of any occurrence of symptoms outside of work.

The instrument was pretested with regard to functionality and adequacy. A pilot study was conducted in two medium-sized branches (one in a public bank and the

[a] Brasil. Instrução normativa INSS/DC nº 98 de 05 de dezembro de 2003. Aprova Norma Técnica sobre Lesões por Esforços Repetitivos-LER ou Distúrbios Osteomusculares Relacionados ao Trabalho–DORT. Diario Oficial Uniao. 10 dez 2003.
[b] Confederação Nacional dos Trabalhadores do Ramo Financeiro. Bancos estão em 1º no ranking de LER/DORT em trabalhadores. São Paulo 2007.
[c] Ministério da Previdência Social. Anuário Estatístico da Previdência Social. Brasília; 2007. p. 1-862.
[d] Ministério da Previdência Social. Previdência Social. Anuário Estatístico da Previdência Social. Brasília; 2008. p. 1-868.
[e] Sindicato dos bancários de Porto Alegre. Censo Bancário: avaliação de saúde dos bancários do Rio Grande do Sul. Porto Alegre: Sindicato dos bancários de Porto Alegre; 1997.
[f] Ministério do Trabalho e Emprego. RAIS - Relação Anual de Informações Sociais. Brasília; 2008. [cited 2008 Aug 24] Available from: http://www.rais.gov.br/RAIS_SITIO/oque.asp.

other in a private bank), in order to obtain an estimate of the number of employees available and willing to participate. The data were double-entered into a database in the Epi Info software, version 3.4.3. They were checked using the Check Epi Info routine and corrected according to the original records. The data relating to the pilot study were not included.

The sample size calculation for this study was based on the prevalence of musculoskeletal symptoms in the upper limbs that lasted for three or more months (40%),[2,6,e,g] an alpha error of 5% and power of 80%.

The Stata 11.0 statistical software (Stata Corp., College Station, United States) was used to analyze the data. Descriptive statistics on the sample were produced using the absolute and relative frequencies with their respective 95% confidence intervals (95%CI). The factors associated with symptoms suggestive of RSI/WRMSD were tested by means of the chi-square and linear trend tests, when appropriate.

Multiple analysis was performed using Poisson regression to obtain prevalence ration (PR) estimates with their respective crude and adjusted 95%CIs.[1] This analysis was conducted using a three-level hierarchical model. The variables were included in accordance with a theoretical determination model for controlling for distal confounding factors in the chain. Variables with $p < 0.25$ were included in the multiple model. The first level consisted of demographic variables (age and sex); the second, socioeconomic variables (schooling, income, function and length of time at the bank); and the third, factors relating to the activity performed (length of working day, amount of overtime per week, repetitive actions performed and productivity requirements). Variables that after adjustment presented $p < 0.20$ were kept in the model, since these would be potential confounding factors.

Because of the complexity of the sampling design, the *svy* set of commands in the Stata 11.0 statistical package was used with the aim of taking the effects of the sampling design into account.

The variables that made up the model were the following: branch size, whether the bank was public or private, sex, age, marital status, schooling, income,
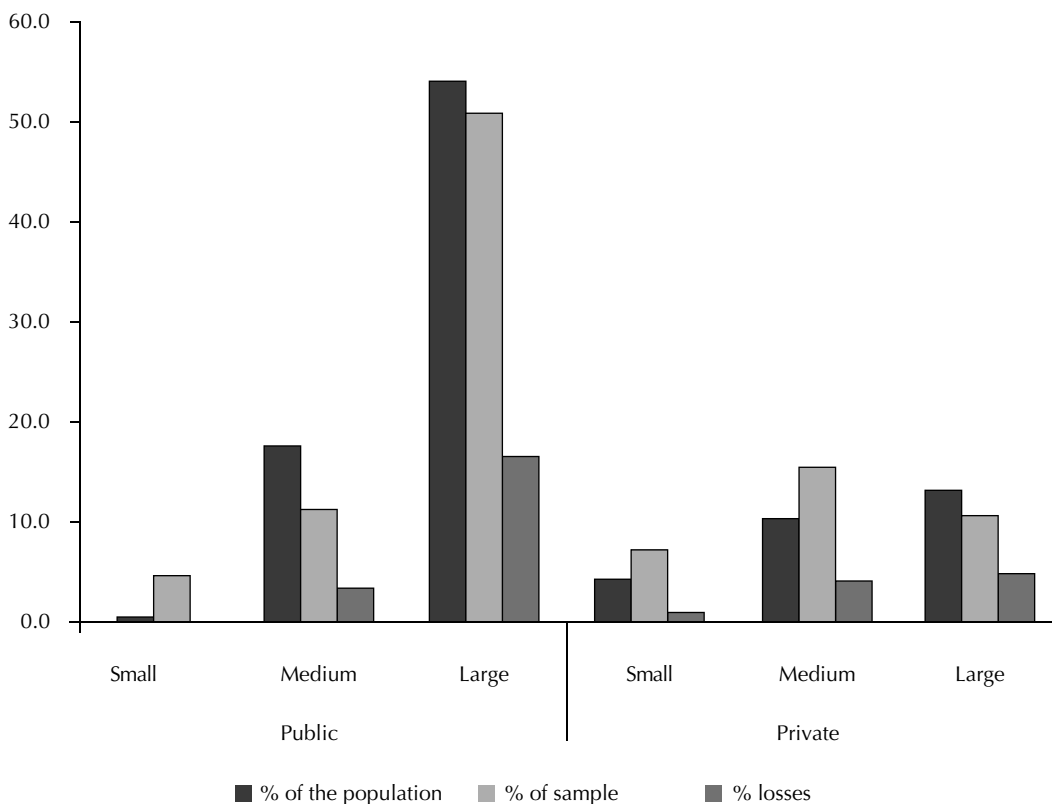
Figure. Distribution of the population, sample and losses according to strata. Porto Alegre, Southern Brazil, 2009.

g Health and Safety Executive. Health and Safety: statistics 2008/ 09. London; 2009 [cited 2009 Jul 25]. Available from: http://www.hse.gov.uk/statistics/overall/hssh0809.pdf

Table 1. Description of the sociodemographic and work organizational characteristics. Porto Alegre, Southern Brazil, 2009.

Variable	Total sample			Small and medium-sized branches			Large branches		
	n	%	% with RSI[a]	n	%	% with RSI[a]	n	%	% with RSI[a]
Sex									
Female	160	45.1	35.0	68	49.6	26.5	92	42.2	41.3
Male	195	54.9	21.5	69	50.4	23.2	126	57.8	20.6
Age (years)									
46 or over	89	26.2	38.2	33	25.2	42.4	56	26.8	35.7
26 to 45	196	54.7	25.5	72	55.0	20.8	124	59.3	28.2
Up to 25	55	16.2	16.4	26	19.8	15.4	29	13.9	17,2
Bank ownership									
Public	237	66.6	29.5	56	40.9	32.1	181	82.7	28.7
Private	119	33.4	23.5	81	59.1	19.8	38	17.4	31.6
Schooling									
Up to high school level	37	10.4	43.2	16	11.7	43.8	21	9.6	42.9
University-level	267	75.0	26.2	103	75.2	21.4	164	74.9	29.3
Postgraduate level	52	14.6	23.1	18	13.4	27.8	34	15.5	20.6
Income (in reais)									
1,500.00	117	33.7	21.4	48	36.3	12.5	69	32.1	27.5
1,500.01 to 2,500.00	113	32.6	29.2	46	34.9	26.1	67	31.2	31.3
More than 2,500.00	117	33.7	33.3	38	28.8	39.5	79	36.7	30.4
Function in bank									
Manager	112	32.1	29.5	57	42.5	31.6	55	25.6	27.3
Cashier/book-keeper	146	41.8	27.4	55	41.0	16.4	91	42.3	34.1
Others	91	26.1	25.3	22	16.4	27.3	69	32.1	24.6
Length of time in function (years)									
> 15	42	12.0	47.6	14	10.4	35.7	28	12.9	53.6
5.1 to 15	93	26.5	31.2	35	25.9	37.1	58	26.9	27.6
1.1 to 5	149	42.5	24.8	60	44.4	23.3	89	41.2	25.8
≤ 1	67	19.1	16.4	26	19.3	3.9	41	19.0	24.4
Length of working day (hours)									
≤ 6	92	26.7	23.9	43	32.6	9.3	49	23.0	36.7
6 to 8	194	56.2	28.9	64	48.5	26.6	130	61.0	30.0
> 8	59	17.1	27.1	25	18.9	40.0	34	16.0	17.7
Overtime per week[b]									
Not done/up to 2 hours	170	52.5	24.1	66	54.0	16.7	104	51.2	28.9
From 2 to 6 hours	80	24.7	26.3	40	33.1	27.5	40	19.7	25.0
More than 6 hours	74	22.8	35.1	15	12.4	46.7	59	29.1	32.2
Performing repetitive actions									
None	25	7.0	16.0	16	11.8	12.5	9	4.1	22.2
Sometimes	76	21.4	17.1	31	22.8	19.4	45	20.6	15.6
Always	254	71.6	31.9	89	65.4	29.2	165	75.3	33.3
Productivity requirements									
None	35	9.9	20.0	12	8.8	16.7	23	10.5	21.7
Sometimes	107	30.1	20.6	37	27.2	13.5	70	32.0	24.3
Always	213	60.0	32.4	87	64.0	31.0	126	57.5	33.3

[a] Adjusted according to clustering effect
[b] Maximum number missing = 32

Table 2. Crude and adjusted analysis between cases suggestive of RSI/WRMSD and associated factors. Porto Alegre, Southern Brazil, 2009.

Level	Variable	Crude analysis			Adjusted analysis		
		PR	(95%CI)	p*	PR	(95%CI)	p*
1	Sex			0.004			0.002[a]
	Female	1			1		
	Male	0.61	(0.46;0.83)		0.62	(0.47;0.81)	
	Age (years)			0.062			0.05[a]
	46 or over	1			1		
	26 to 45	2.33	(0.98;5.54)		2.51	(1.02;6.14)	
	Up to 25	1.56	(0.85;2.86)		1.66	(0.90;3.07)	
2	Schooling			0.077			0.039[b]
	Up to high school level	1			1		
	University-level	0.61	(0.38;0.96)		0.55	(0.37;0.82)	
	Postgraduate level	0.53	(0.29;0.97)		0.45	(0.22;0.90)	
	Income (in reais)			0.048			0.164[b]
	1,500.00	1			1	1	
	1,500.01 to 2,500.00	1.37	(0.65;2.87)		1.17	(0.63;2.16)	
	More than 2,500.00	1.56	(0.95;2.57)		1.43	(0.83;2.48)	
	Function in bank			0.430			
	Manager	1			-	-	
	Cashier/book-keeper	0.93	(0.61;1.43)		-	-	
	Others	0.86	(0.57;1.28)		-	-	
	Length of time in function (years)			0.004			0.002[b]
	> 15	1			1	1	
	5.1 to 15	0.65	(0.47;0.91)		0.64	(0.43;0.95)	
	1.1 to 5	0.52	(0.32;0.86)		0.61	(0.37;1.02)	
	≤ 1	0.34	(0.18;0.67)		0.41	(0.27;0.64)	
3	Length of working day (hours)			0.599			
	≤ 6	1			-	-	
	6 to 8	1.21	(0.82;1.77)		-	-	
	> 8	1.13	(0.59;2.17)		-	-	
	Overtime per week			0.115			0.306[c]
	Not done/up to 2 hours	1			1		
	From 2 to 6 hours	1.09	(0.64;1.86)		0.99	(0.55;1.78)	
	More than 6 hours	1.46	(1.00;2.10)		1.28	(0.90;1.82)	
	Performing repetitive actions			0.035			0.152[c]
	None	1			1		
	Sometimes	1.07	(0.26;4.47)		0.95	(0.20;4.54)	
	Always	1.99	(0.57;7.03)		1.57	(0.36;6.81)	
	Productivity requirements			0.197			0.372[c]
	None	1			1		
	Sometimes	1.03	(0.63;1.67)		1.42	(0.97;2.09)	
	Always	1.62	(0.71;3.68)		1.73	(0.70;4.26)	

*p value from Wald test
[a] Adjusted according to variables from level 1
[b] Adjusted according to variables from level 1 + schooling + income + length of time in function
[c] Adjusted according to variables from level 1 + schooling + income + length of time in function + overtime per week + performing repetitive actions + productivity requirements.

Table 3. Crude and adjusted analysis between cases suggestive of RSI/WRMSD and associated factors in small and medium-sized branches. Porto Alegre, Southern Brazil, 2009.

Level	Variable	Crude analysis			Adjusted analysis		
		PR	(95%CI)	p*	PR	(95%CI)	p*
1	Sex			0.644			
	Female	1			-	-	
	Male	0.9	(0.5;1.6)		-	-	
	Age (years)			0.023			0.023
	46 or over	1			1		
	26 to 45	2.8	(1.1;6.7)		2.8	(1.1;6.7)	
	Up to 25	1.4	(0.6;2.9)		1.4	(0.6;2.9)	
2	Schooling			0.556			
	Up to high school level	1			-	-	
	University-level	0.5	(0.2;1.1)		-	-	
	Postgraduate level	0.6	(0.2;2.5)		-	-	
	Income (in reais)			< 0.001			0.040[a]
	1,500.00	1			1		
	1,500.01 to 2,500.00	2.1	(1.3;3.3)		1.5	(0.7;3.6)	
	More than 2,500.00	3.2	(2.0;5.1)		1.9	(0.6;6.3)	
	Function in bank			0.224			0.450[a]
	Manager	1			1		
	Cashier/book-keeper	0.5	(0.3;1.0)		1.0	(0.3;3.6)	
	Others	0.9	(0.4;1.7)		1.3	(0.5;3.1)	
	Length of time in function (years)			< 0.001			0.045[a]
	> 15	1			1		
	5.1 to 15	1.0	(0.6;1.9)		0.9	(0.5;1.8)	
	1.1 to 5	0.7	(0.3;1.3)		0.7	(0.1;3.3)	
	≤ 1	0.1	(0.0;0.8)		0.2	(0.0;0.8)	
3	Length of working day (hours)			0.011			0.466[b]
	≤ 6	1			1		
	6 to 8	2.9	(0.9;9.6)		2.3	(0.6;8.9)	
	> 8	4.3	(1.1;16.2)		2.0	(0.3;13.8)	
	Overtime per week			0.048			0.183[b]
	Not done/up to 2 hours	1			1		
	From 2 to 6 hours	1.7	(0.7;3.7)		1.4	(0.7;3.0)	
	More than 6 hours	2.8	(1.2;6.3)		2.2	(1.2;4.2)	
	Performing repetitive actions			0.176			0.799[b]
	None	1			1		
	Sometimes	1.5	(0.2;14.8)		0.9	(0.1;7.2)	
	Always	2.3	(0.3;17.2)		1.2	(0.2;6.0)	
	Productivity requirements			0.075			0.655[b]
	None	1			1		
	Sometimes	0.8	(0.2;2.8)		2.0	(0.9;4.0)	
	Always	1.9	(0.5;6.8)		1.8	(0.9;3.5)	

*p value from Wald test.
[a]Adjusted according to age + income + function in bank + length of time in function.
[b]Adjusted according to age + income + length of time in function + variables from level 3.

Table 4. Crude and adjusted analysis between cases suggestive of RSI/WRMSD and associated factors in large-sized branches. Porto Alegre, Southern Brazil, 2009.

Level	Variable	Crude analysis			Adjusted analysis		
		PR	(95%CI)	p*	PR	(95%CI)	p*
1	Sex			0.002			0.002
	Female	1			1		
	Male	0.5	(0.4;0.7)		0.5	(0.4;0.7)	
	Age (years)			0.357			
	46 or over	1			-	-	
	26 to 45	0.8	(0.3;2.0)		-	-	
	Up to 25	0.5	(0.1;2.6)		-	-	
2	Schooling			0.019			0.004[a]
	Up to high school level	1			1		
	University-level	0.7	(0.4;1.3)		0.7	(0.5;0.9)	
	Postgraduate level	0.5	(0.3;0.8)		0.5	(0.3;0.8)	
	Income (in reais)			0.735			
	1,500.00	1			-	-	
	1,500.01 to 2,500.00	1.1	(0.3;3.8)		-	-	
	More than 2,500.00	1.1	(0.5;2.3)		-	-	
	Function in bank			0.643			
	Manager	1			-	-	
	Cashier/book-keeper	1.2	(0.6;2.8)		-	-	
	Others	0.9	(0.4;1.9)		-	-	
	Length of time in function (years)			0.115			0.153[a]
	> 15	1			1		
	5.1 to 15	0.5	(0.4;0.7)		0.6	(0.3;1.0)	
	1.1 to 5	0.5	(0.2;1.0)		0.5	(0.2;1.3)	
	≤ 1	0.5	(0.2;1.0)		0.5	(0.2;1.2)	
3	Length of working day (hours)			0.152			0.181[b]
	≤ 6	1			1		
	6 to 8	0.8	(0.5;1.4)		0.8	(0.5;1.1)	
	> 8	0.5	(0.2;1.5)		0.6	(0.2;1.7)	
	Overtime per week			0.758			
	Not done/up to 2 hours	1			-	-	
	From 2 to 6 hours	0.9	(0.3;2.2)		-	-	
	More than 6 hours	1.1	(0.7;1.7)		-	-	
	Performing repetitive actions			0.128			0.346[b]
	None	1			1		
	Sometimes	0.7	(0.1;4.9)		0.6	(0.1;3.2)	
	Always	1.5	(0.3;8.3)		1.2	(0.2;6.1)	
	Productivity requirements			0.474			
	None	1			-	-	
	Sometimes	1.1	(0.6;2.1)		-	-	
	Always	1.5	(0.4;5.7)		-	-	

*p value from Wald test
[a]Adjusted according to sex + schooling + length of time in function
[b]Adjusted according to sex + schooling + length of time in function + length of working day + performing repetitive actions

function in the bank, length of time in the function, length of working day, amount of overtime per week, repetitive actions performed with upper limbs (fingers, hands, forearms, upper arms, shoulders and/or neck) and productivity requirements or pressure to finish tasks. The results were stratified according to branch size, which was dichotomized into small and medium (≤ 25 employees) and large (> 25 employees).

The number of bank workers in Porto Alegre participating in this study was 356. This corresponded to 69.1% of the 515 individuals eligible for the study. The remaining 159 individuals did not participate in the study for a variety of reasons, among which the main ones identified were that they were off work (5.24%), including due to maternity leave and vacations (1.36%). The reasons for refusal to participate, among the other workers, were not stated. The losses were greater in the private banks and in large-sized branches (Figure).

This project was approved by the Research Ethics Committee of the Universidade Federal do Rio Grande do Sul (UFRGS), under procedural no. 2007979, meeting no. 50, minute no. 130, dated June 18, 2009. The participants signed a free and informed consent statement. Anonymity was preserved at all phases of the study. The ethical principles laid down by the Declaration of Helsinki were followed.

RESULTS

Around 55.0% of the sample was male and between 26 and 45 years of age. Approximately 10% had continued their schooling until completion of high school, and the majority were employees in public banks. More than half of them had been performing their function in the bank for five years or less (61.6%), frequently performed repetitive actions (71.6%) and were subject to productivity requirements (60.0%). Most of the individuals working in branches with more than 25 employees were in public banks (82.7%) and had working days longer than six hours per day (76.0%). Employees in small and medium-sized branches did less overtime per week and 11.8% of these said that they did not perform repetitive actions (Table 1).

The prevalence of cases suggestive of RSI/WRMSD was 27.5% for the whole sample. Workers in public banks had greater prevalence of cases suggestive of RSI/WRMSD (29.5%) than shown in the private banks (23.5%), although the difference was not statistically significant (p = 0.227). Women were generally more affected, as were older individuals, those with higher salaries and those with longer time in the function. Bank workers who always performed repetitive actions and were frequently subject to productivity requirements

were also more affected by the symptoms of RSI/WRMSD (Table 1).

With the exceptions of function in the bank and length of working day, all the other variables remained in the adjusted model. After adjustments, sex, schooling and length of time in the function remained associated with the outcome. Men presented lower prevalence of cases suggestive of RSI/WRMSD (PR = 0.62; 95%CI 0.47;0.81). Individuals with postgraduate education had PR = 0.45 (95%CI 0.22;0.90), compared with those educated up to completed high school level. The shorter the time doing the function was, the lower the prevalence was. Employees performing the function for one year or less presented PR = 0.41 (95%CI 0.27;0.64), in relation to the employees performing the same function for more than 15 years. Age was at the threshold of statistical significance (p = 0.051), and income and performing repetitive actions lost their significance in the adjusted analysis (Table 2).

Sex and schooling did not enter the adjusted model for the small-sized branches. Age, income and length of time in the function remained associated with the cases suggestive of RSI/WRMSD after the adjustment, and individuals between the ages of 26 and 45 years had these symptoms 2.8 times more often (95%CI 1.1;6.7) than did those aged 46 years and over. Like in the analysis on the whole sample, the longer the time in the function was, the greater the prevalence of cases suggestive of RSI/WRMSD was (Table 3).

For the large-sized branches, the variables that entered the adjusted model were sex, schooling, length of time in the function, length of working day and performing repetitive actions (Table 4). Sex and schooling remained associated with the outcome. Men showed lower prevalence of symptoms of RSI/WRMSD, with PR = 0.5 (95%CI 0.4;0.7) than shown by women, and employees with university-level education (PR = 0.7; 95%CI 0.5;0.9) and postgraduate education (PR = 0.5; 95%CI 0.3;0.8) also showed lower prevalence. The other variables (length of time in the function, length of working day and performing repetitive actions) did not show associations.

The interaction between two variables relating to performance in the function (productivity requirement and performing repetitive actions) was tested, but did not show statistical significance.

DISCUSSION

The sample size for this study was calculated such that it would be representative of the city of Porto Alegre and might represent bank workers in general who were subjected to similar work. However, the loss and refusal

rate was just over 30%. The proportions of losses and refusals were greater in large-sized branches, which may have influenced the magnitude of the associations. The magnitude was more conservative because of this systematic error, with a chance of being larger if the refusals were proportional to the branch size. Another way to attempt to minimize this bias was to stratify the analysis according to branch size.

The estimated prevalence of cases suggestive of RSI/WRMSD was high (27.5%) in the present study, and close to what has been described in the literature. The prevalence among women (35%) was greater than among men (21.5%), and female sex was associated with the outcome in the analysis involving the whole sample, thus confirming the findings in the literature.[2,6,11,e] This was repeated when stratified analyses in large-sized branches were performed. Sex lost its association with cases suggestive of RSI/WRMSD when small and medium-sized branches were analyzed separately.

Age between 26 and 45 years presented a greater association with cases suggestive of RSI/WRMSD than shown by employees aged over 45 years in small and medium-sized branches. Other studies have shown that increasing age is a protective factor against RSI/WRMSD.[3,8,9,11] Age remained at the threshold of statistical significance (0.051) in the analysis that included the whole sample. The absence of association with the outcome among the employees over the age of 45 years may have been due to the healthy worker effect, in which the individuals who continue to work are the healthy ones. Workers with greater experience may also have individual strategies that alleviate or minimize overloads at work. More recent studies[6,10] have not presented any association between age and musculoskeletal symptoms, like in the analysis in large-sized branches. Variations in the characteristics of the populations and in the statistical methods used may explain these differences.

Function in the bank was not associated with the outcome, contrary to what was observed in the study by Lacerda, who found a greater association with the outcome among the cashiers and book-keepers.[6] This difference may be consequent to the restructuring of bank work, in which almost all the workers have become "salesmen of financial products and services",[h] and the separation of tasks between cashiers, book-keepers and other positions is almost residual. There has also been an effective reduction in the amount of time that bank workers dedicate to data entry. Until the 1990s, this was one of the main activities associated with the function of cashier and one of the main determinants of excessive repetitive actions.[e] The results from the present study suggest that there may have been changes in the outcomes, given that the variables of repetitive actions and cashier function were not associated with the cases suggestive of RSI/WRMSD.

There are also determinants associated with the broader situation of the financial market in Brazil. The loss of many jobs in this professional category over recent decades, as a result of reorganization of production and bank acquisition and merger processes, has led to a fear of unemployment and has increased the pressure through productivity requirements.[h,i] A significant proportion of banking activity has been transferred to non-banking segments that perform financial activities, which has inhibited job generation in banks. Prominent among these segments are bank equivalents, partnerships between banks and retail chains and credit-granting financial institutions, along with outsourcing. The workers in these segments are not considered to be bank workers, although they perform similar activities.[h]

The length of the working day and amount of overtime were not associated with cases suggestive of RSI/WRMSD. These factors, which were historically known and cited,[e,j] today do not constitute the main agents responsible for development of RSI/WRMSD, with the current ways of organizing bank work. New realities in the environment of bank work are now present at the beginning of this century. Research on this population needs to be continued, preferably with longitudinal studies, with a view to better understanding of how RSI/WRMSD affects workers.

Bank workers have particularly experienced job instability and intensification of work within a context that has combined intense restructuring of the international financial system and national banking systems with productive formations. What previously was a job for an individual's whole life has now acquired transitory characteristics[10] and demands requalification among bank workers.[5] Studies of qualitative nature may be important for explaining the changes to the work process and the existence of new working methods among workers, thereby explaining what type of musculoskeletal demands are needed within the context of recognition that the new organization has greater requirements for meeting targets and for higher productivity.

Cross-sectional studies have limitations inherent to the study design, given that the measurements are made at the same point in time.[4] Despite the high prevalence of cases suggestive of RSI/WRMSD, this may have been an underestimate, if the healthy worker effect is taken into consideration. This is a type of selection

bias found in epidemiological studies on occupational health, in which the workers doing activities tend to be healthier than those who are not doing activities because of health problems.[7] It was planned that in this study, employees who were off work or on leave would be identified. However, despite our efforts, it was not possible to identify them due to institutional difficulties. The symptoms were self-reported and were not validated by means of a clinical examination. Despite this, a questionnaire compared with the gold standard

(clinical examination) was used. When validated, this has found sensitivity of 90% and specificity of 87%.[6]

This new reality should have a significant impact on public and private policies for preventing work-related diseases among bank workers. Greater attention towards organizing work, and strategies for forming and managing the objectives and targets of organization, will have to take on a priority role in drawing up programs for accident and illness prevention in bank work.

REFERENCES

1. Barros AJ, Hirakata VN. Alternatives for logistic regression in cross-sectional studies: an empirical comparison of models that directly estimate the prevalence ratio. *BMC Med Res Methodol.* 2003;3:21. DOI:10.1186/1471-2288-3-21

2. Brandão A, Horta B, Tomasi E. Sintomas de distúrbios osteomusculares em bancários de Pelotas e região: prevalência e fatores associados. *Rev Bras Epidemiol.* 2005;8(3):295-305. DOI:10.1590/S1415-790X2005000300011

3. Ferreira Jr M, Conceição GM, Saldiva PH. Work organization is significantly associated with upper extremities musculoskeletal disorders among employees engaged in interactive computer-telephone tasks of an international bank subsidiary in Sao Paulo, Brazil. *Am J Ind Med.* 1997;31(4):468-73. DOI:10.1002/(SICI)1097-0274(199704)31:4<468::AID-AJIM14>3.0.CO;2-Y

4. Fletcher RH, Fletcher SW. Epidemiologia Clínica. Elementos Essenciais. 4.ed. Porto Alegre: Artmed; 2006.

5. Grisci CLI, Cigerza GC, Hofmeister PM, Becker JL. Nomadismo Involuntário na Reestruturação Produtiva do Trabalho Bancário. *Rev Adm Empres.* 2006;46(1):27-40. DOI:10.1590/S0034-75902006000100004

6. Lacerda EM, Nacul LC, Augusto LG, Olinto MT, Rocha DC, Wanderley DC. Prevalence and associations of symptoms of upper extremities, repetitive strain injuries (RSI) and 'RSI-like condition'. A cross sectional study of bank workers in Northeast Brazil. *BMC Public Health.* 2005;5:107. DOI:10.1186/1471-2458-5-107

7. Li CY, Sung FC. A review of the healthy worker effect in occupational epidemiology. *Occup Med (Lond).* 1999;49(4):225-9. DOI:10.1093/occmed/49.4.225

8. Pinheiro FA, Troccoli BT, Carvalho CV. Validação do Questionário Nórdico de Sintomas Osteomusculares como medida de morbidade. *Rev Saude Publica.* 2002;36(3):307-12. DOI:10.1590/S0034-89102002000300008

9. Santos Filho SB, Barreto SM. Atividade ocupacional e prevalência de dor osteomuscular em cirurgiões-dentistas de Belo Horizonte, Minas Gerais, Brasil: contribuição ao debate sobre os distúrbios osteomusculares relacionados ao trabalho. *Cad Saude Publica.* 2001;17(1):181-93. DOI:10.1590/S0102-311X2001000100019

10. Silva LS, Pinheiro TM, Sakurai E. Reestruturação produtiva, impactos na saúde e sofrimento mental: o caso de um banco estatal em Minas Gerais, Brasil. *Cad Saude Publica.* 2007;23(12):2949-58. DOI:10.1590/S0102-311X2007001200016

11. Yu IT, Wong TW. Musculoskeletal problems among VDU workers in a Hong Kong bank. *Occup Med (Lond).* 1996;46(4):275-80. DOI:10.1093/occmed/46.4.275