

Heavy physical work and low back pain: the reality in urban cleaning

Trabalho físico pesado e dor lombar: a realidade na limpeza urbana

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ABSTRACT: Low back pain (LBP) is a major public health issue. There is lack of research on this disorder affecting urban cleaning workers. A cross-sectional study was conducted to describe the prevalence of LBP, occupational and extra-occupational characteristics, as well as associated factors in these workers. A census was performed with 624 workers in Salvador, Brazil, using a questionnaire administered by an interviewer in 2010. Cases of LBP were defined by reported symptoms of pain in the previous 12 months, lasting more than a week or with monthly minimum frequency, which led to restrictions at work or to seeking medical attention, or in cases when respondents had a severity score ≥ 3 on a numerical scale from 0 to 5. Physical demands at work were measured on a numerical 6-point scale with 14 variables. Psychosocial demands were measured using the Job Content Questionnaire. Sociodemographic factors, lifestyle habits and domestic work were evaluated. Multiple logistic regression (LR) was used to identify factors associated with LBP, for which the prevalence was 37.0%. Among them, 62.8% of workers felt pain in the last 7 days. LBP was associated with longer working hours, flexion and trunk rotation, psychosocial demands, working directly in collection and low schooling. Dynamic work (walking, running) served as a protective factor. It was concluded that many workers develop their activity at the presence of pain. The results emphasize the need for preventive measures through multifactorial approach encompassing adaptations in physical environment and changes in work organization.

Keywords: Low back pain. Epidemiology. Urban cleaning. Cumulative trauma disorders. Human engineering. Musculoskeletal system.

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RESUMO: Lombalgia é um dos maiores problemas de saúde pública. Existe uma lacuna nos estudos sobre este agravo em trabalhadores de limpeza urbana (TLU). Estudo de corte transversal foi realizado para descrever prevalência de lombalgia, características ocupacionais, extra-ocupacionais e fatores associados a este agravo em TLU. Foi feito censo com 624 trabalhadores, em Salvador, utilizando questionário aplicado por entrevistador, em 2010. Casos de lombalgia foram definidos como dor lombar referida nos últimos 12 meses, durando mais que 1 semana ou tendo frequência mínima mensal, que determinou restrição ao trabalho ou busca por atenção médica ou apresentou intensidade ≥ 3 em escala de 0 a 5. Demandas físicas no trabalho foram medidas em escala numérica de 6 pontos para 14 variáveis. Demandas psicossociais foram medidas utilizando o Job Content Questionnaire. Fatores sociodemográficos, de hábitos de vida e trabalho doméstico foram avaliados. Regressão logística múltipla (RL) foi utilizada para identificar fatores associados à lombalgia, cuja prevalência foi de 37,0%, e entre os casos, 62,8% cursavam com dor nos últimos 7 dias. A lombalgia se associou ao maior tempo de trabalho, à flexão e rotação do tronco, às demandas psicossociais, ao trabalho direto na coleta e à baixa escolaridade. O trabalho dinâmico (andando, correndo) atuou como fator de proteção. Concluiu-se que muitos trabalhadores desenvolvem sua atividade na presença de dor. Os resultados apontam para necessidade de medidas de prevenção através de abordagem multifatorial que inclua adequações no ambiente físico e modificações na organização do trabalho.

Palavras-chave: Dor lombar. Epidemiologia. Limpeza urbana. Transtornos traumáticos cumulativos. Engenharia humana. Sistema musculoesquelético.

INTRODUCTION

Low back pain is one of the major public health issues in several industrialized and developing countries, not only due to its high prevalence and incidence, but also because of the labor incapacity it generates, the intensive use of health services it causes and the number of missed working days. Therefore, it is an important cause for the concession of disability insurance^{1,2}.

In many countries, the urban cleaning activity is performed manually, thus exposing the worker to a series of occupational risks, especially those related to physical work overload, as in the case of musculoskeletal impairment^{3,4}. The role of the physical load caused by frequent trunk flexion and rotation, lifting and/or carrying load, whole body vibration and heavy physical work in the occurrence of low back pain has been widely documented. In the past few years, studies have focused on the psychosocial demands at the workplace⁵.

Epidemiological studies in different occupational categories have been conducted in different countries, however, there is a gap when it comes to studies that approach the prevalence of low back pain with clear case definition, especially those performed with active individuals. Inconclusive epidemiological studies are also due to the lack of contrast required in the exposure to risk factors, which makes it difficult to determine the associations

in more homogeneous occupational groups. Besides, the inadequate control of confusing factors and the inaccurate categorizations of exposure may mask the results⁶.

Therefore, an epidemiological study was conducted with the objectives of estimating the prevalence of low back pain, and specifying its frequency, severity and duration of pain, besides the sociodemographic, occupational, extra-occupational characteristics and the factors associated with low back pain in a population of urban cleaning workers.

METHODS

This is a cross-sectional study involving a population of 657 urban cleaning workers (UCW) in Salvador. It was chosen to conduct a census with the maintenance and operation staff from the company that provides the service to the city.

A questionnaire was used for data collection, and direct measurements of weight and height were taken in the beginning, during and at the end of the work shift in a reserved place. The used questionnaire, elaborated by Fernandes⁷, was adapted for the population of UCW, considering their own characteristics. This questionnaire was composed by the following items: sociodemographic aspects; current and former occupational history; habit of smoking; intake of alcohol; use of medications; presence of comorbidities; practice of physical exercises and sports; household chores; questions about musculoskeletal symptoms; and issues related to physical and psychosocial demands at work.

The questionnaire incorporates the amplified version of the Nordic Musculoskeletal Questionnaire (NMQ)⁸, which is an instrument that assesses the presence of pain or discomfort in the previous 12 months in anatomic regions of the musculoskeletal system, as well as its severity, duration and frequency.

Cases of low-back Musculoskeletal Disorders (MSD) were defined as the sensation of pain in the past 12 months lasting over one week or minimum monthly frequency, not caused by acute lesion, associated with one or more of the following criteria: level of severity ≥ 3 in a scale from 0 to 5, with anchors on the extremities (no discomfort to unbearable discomfort); search for medical care due to the problem; absence at work (official or not); changing work due to health restrictions^{8,9}. Cases of low-back pain referred to complaints about pain in this region in the past 12 months, without the aforementioned severity criteria. Besides the low-back region, the questionnaire included the following body segments: fingers, hands, fists, forearms, elbows, neck, shoulders, upper back, hips and thighs, knees, legs and ankles. The prevalence of musculoskeletal pain referred only to the presence of pain in one or more of the cited regions in the previous 12 months and, in the case of MSD, pain in the respective body segment that met the aforementioned criteria.

The inclusion of issues related to the severity of symptoms aimed at increasing the specificity of the pain case. However, considering that some studies described in literature do not adopt such criteria, it was also chosen to register pain in the last 12 months for comparison purposes⁹.

The questionnaire investigated the physical demand at work by means of questions answered by the workers as to frequency, duration or intensity of exposure, in a scale from 0 to 5, with anchors on the extremities, about the work posture, repetitive movements and handling loads.

The psychosocial demands at work were measured by the incorporation of the Job Content Questionnaire (JCQ)^{10,11}. In the analysis, the scores were obtained for psychological demand, control social support and dissatisfaction at work.

For measures of weight and height, obtained with the objective of calculating the body mass index, a portable scale and a stadiometer were used as instruments.

In the statistical approach of data, the prevalence of low-back MSD was analyzed (dependent variable), as well as the means and their respective standard-deviations for most of the independent variables and the percentage of exposure for the other variables. After the descriptive stage, a multivariate logistic regression analysis was conducted using the Epi-Info 6.04 and the R statistical software, respectively.

All of the independent variables in this study were dichotomized. The schooling variable was stratified as lower than complete high school and higher or equal to complete high school. Marital status was identified as married or living together and single or living alone; the presence of children was analyzed as children aged less than two years old and older than two years old or no children; body mass index (BMI) was considered as overweight or obesity and normal or low weight.

The intake of alcohol at least once a week was adopted as the cutoff point. With regard to physical activity, individuals were asked about what they did while not working in the company or at home. "Sedentary" subjects (exposure) were those who reported activities such as reading the newspaper or a magazine, watching television and studying. The report of competitive sports activity or actions like running, doing gymnastics, walking, bike riding, swimming, fishing and gardening were considered as non-exposure ("active"). The variables overtime, smoking and vibration were dichotomized as to the presence or not of the exposure registration.

Variables related to physical demands were summarized into three indexes. The first one refers to the posture in trunk flexion and rotation. The second one refers to dynamic work and includes the variables walking, running, standing up, crouching, and jumping from different levels. In both cases, median was established as the cutoff point. The third index, for handling load, was created from the variables lifting, pushing and pulling loads, with the adoption of the cutoff point above the first quartile, since it would better discriminate this variable. The sitting work was stratified by mean.

The high exposure for psychosocial demand was defined as high psychological demand, low control and low social support¹⁰. The registration of at least two of these criteria characterizes high exposure to psychosocial demand at work. Fulfilling at least two of the following criteria, psychological low demand, high control and high social support, characterizes low exposure¹².

For occupation, performing the activity of waste collection was considered as exposure, and not performing this activity, as non-exposure. The other variables were dichotomized by the mean.

The pre-selection of independent variables to enter the multivariate logistic regression model was based on the biological plausibility criteria of the associations, as well as on the univariate logistic regressions, considering a p-value of 0.25 in the likelihood ratio test for the significance of the coefficient¹³.

The backward model was adopted for the selection of variables. In this exploratory study, α equals to 0.16 was used to enter the model. The choice of a value between 0.15 and 0.20 for the inclusion of variables in this stage is highly recommended, considering that the choice of more rigorous significance levels can exclude important variables from the model¹³.

Since it is a census, and knowing that the methods of statistical inference apply only to the analysis of results obtained from a random sample^{14,15}, even though the intermediate stages of the logistic regression model required the adoption of alpha values for the selection and permanence of variables, the final results of the model were presented only through the measure of association, without considering confidence intervals.

This study was approved by the Research Ethics Committee of Hospital São Rafael, protocol n. 48/09.

RESULTS

From the total of 657 workers, there was a 5.02% loss, which corresponded to losses and workers on leave with disability insurance, who were not found for interview. The total population of the study was then comprised of 624 workers, all of whom were male. The 624 workers held the following occupations: 367 waste collectors, 118 drivers, 84 cleaning agents and 55 maintenance workers.

The prevalence of pain or discomfort in the past 12 months and of cases of MSD, both considering any segments of the body, was of 77.4 and 62.8%, respectively, in this category. For low-back pain and low-back MSD, according to the specificity criteria that were previously defined, prevalence of 45.5 and 37.0% was found, respectively, superior to the ones found for pain and MSD in other body segments (Table 1). Among the cases of low-back MDS, it was observed that 62,8% of the workers had pain in the last 7 days.

The mean age of the interviewed workers was of 33.9 years old. Out of these, 55.3% were black, 72.0% were married, 18.0% had children younger than 2 years old and 63.1% had not completed high school. The mean of weekly hours destined to household chores was of 4.9 (Table 2).

The intake of alcohol at least once a week was reported by 57.3% of the workers, and the habit of smoking was present among 14.6% of them. BMI was normal for 51.8% of the workers (Table 2).

Table 1. Prevalence of pain and musculoskeletal disorders in urban cleaning workers according to the body segment. Salvador, BA, Brazil, 2011 (n = 624).

Body segment	Pain in the last 12 months		UCW [#]	
	n	%	n	%
In some body region (upper limbs, lower limbs or spine)	483	77.4	392	62.8
Upper distal extremities (elbow, forearm, fist or hand)	169	27.1	127	20.4
Neck, shoulder or upper back	237	38.0	176	28.2
Neck	98	15.7	66	10.6
Shoulder	152	24.4	111	17.8
Upper back	89	14.3	69	11.1
Elbow or forearm	62	9.9	46	7.4
Fist or hand	132	21.2	96	15.4
Leg, ankle or foot	159	25.5	118	18.9
Thigh or knee	165	26.4	124	19.9
Spinal region	284	45.5	231	37.0

[#]Refers to pain in the last 12 months, lasting a week or more or minimum monthly rate associated with one or more of the following items: severity ≥ 3 on a scale of 0 to 5; seeking medical attention, absence from work, job change due to health restriction.

With regard to occupational aspects, about 96.5% of the workers performed their activities in a fixed shift, and 85.1% did overtime. The total work time was of 19.1 years, and the mean time in the company was of 56.6 months. The mean weekly working hours was of 54.8 hours (Table 2).

The variables for physical demands are presented in Table 3. The work standing up or performing dynamic activities walking, running and jumping from different levels, as well as postures in trunk flexion and rotation, conducting repetitive movements with the hands and raising the arms above the shoulders are frequent among collectors. Besides, a higher exposure to handling load was registered among them when compared to the other occupations. Among drivers, the exposure to the work sitting down and to whole body vibration is frequent, being the latter also referred by collectors due to the truck movements.

The scores for psychosocial demands are presented in Table 4. A higher score was observed for the psychological demand among collectors. A higher control over work was registered among drivers and maintenance workers, and more social support was seen among cleaning agents. The latter, as well as collectors, had higher scores for dissatisfaction at work.

Table 2. Sociodemographic characteristic, lifestyle habits, occupational and extra-occupational characteristics of urban cleaning workers. Salvador, BA, Brazil, 2011.

Sociodemographic and life habits variables	Total population n = 624 (%)
Age (years, mean \pm SD)	33.9 \pm 8.3
Ethnicity	
White	46 (7.4)
Black	344 (55.3)
Yellow	10 (1.6)
Brown	212 (34.1)
Indigenous	10 (1.6)
Marital status	
Married or living together	448 (72.0)
Single or living alone	174 (28.0)
Children	
< 2 years old	110 (18.0)
\geq 2 years old	368 (60.3)
No children	132 (21.6)
Schooling	
\geq complete high school	229 (36.9)
< complete high school	392 (63.1)
Alcohol intake	
\geq Once /week	356 (57.3)
< Once/week	265 (42.7)
Smoking	
Yes	91 (14.6)
No	532 (85.4)
BMI	
Low weight	33 (5.3)
Normal	322 (51.8)
Overweight	204 (32.8)
Obesity	63 (10.1)

Table 2. Continuation.

Occupational and extra-occupational variables	Total population n = 624 (%)
Work regime	
Fixed shift	602 (96.5)
Rotating shift	18 (2.9)
Administrative hours	4 (0.6)
Overtime	
Yes	531 (85.1)
No	93 (14.9)
Total time of formal + informal work (years, mean \pm SD)	19.1 \pm 9.1
Time at the company (months, mean \pm SD)	56.6 \pm 53.0
Working hours at the company in the past week (mean \pm SD)	54.8 \pm 13.8
Hours of household chores in the past week (mean \pm SD)	4.9 \pm 6.7

SD: standard deviation; BMI: body mass index.

Table 5 reveals the results of the multivariate analysis. It is observed that low back pain was 1.65 times more frequent among those who were mostly exposed to trunk flexion and rotation. Those who performed more dynamic work were more protected for low back pain in relation to those who did not perform those activities. Workers exposed to a higher psychosocial demand had 1.63 times more low back pain than the ones who were not exposed.

It was also observed that workers who had more time of activity inside the company and with lower schooling had more low back pain in comparison to those with less time and higher schooling. Waste collectors had 1.66 times more low back pain than the ones who were not collectors (Table 5).

DISCUSSION

The prevalence of low back MSD among UCWs was high, given the severity criteria adopted in this study. The high prevalence of pain in the past seven days was also noticed among the cases of low back MSD, which demonstrates that many workers perform their work activities at the presence of considerable symptoms. The results of most studies about the prevalence of musculoskeletal symptoms, especially in the low back segment, show the presence of pain in the last 12 months, without adopting severity criteria, thus finding moderate to high values for the prevalence of low back pain in different populations^{16,17}.

Table 3. Physical demands at work by occupation in urban cleaning workers. Salvador, BA, Brazil, 2011.

Variables of physical demand	Collectors	Drivers	Cleaning agents	Maintenance
(0 = never 5 = all the time)	(mean ± SD)			
Sitting position	0.3 ± 0.7	4.6 ± 0.8	0.3 ± 0.9	1.0 ± 1.3
Standing position	4.8 ± 0.7	0.6 ± 0.9	4.6 ± 1.1	4.1 ± 1.2
Walking	3.2 ± 1.8	0.3 ± 0.6	4.3 ± 1.3	3.8 ± 1.5
Running	4.5 ± 1.3	0.0 ± 0.1	1.2 ± 1.7	0.6 ± 1.1
Jumping from different levels	4.4 ± 1.3	1.6 ± 1.4	1.6 ± 1.7	2.4 ± 1.9
Crouch position	3.7 ± 1.5	0.1 ± 0.2	2.4 ± 1.6	2.8 ± 1.4
Trunk leaning forward	4.0 ± 1.3	1.8 ± 1.5	3.4 ± 1.3	2.7 ± 1.4
Rotated trunk	4.1 ± 1.3	2.0 ± 1.7	3.0 ± 1.6	2.3 ± 1.3
Arms lifted above the shoulder	3.8 ± 1.6	0.8 ± 1.2	2.9 ± 1.7	2.8 ± 1.6
Repetitive movements with the hands	4.8 ± 0.7	4.6 ± 0.9	4.5 ± 1.0	4.5 ± 0.8
Handling load				
Lifting	4.3 ± 1.1	0.1 ± 0.5	3.2 ± 1.6	3.0 ± 1.6
Pushing	3.9 ± 1.4	0.2 ± 0.8	2.7 ± 1.8	2.9 ± 1.6
Pulling	3.7 ± 1.5	0.1 ± 0.6	2.9 ± 1.9	2.8 ± 1.8
Whole body vibration				
Yes	222 (66.1%)	79 (73.1%)	29 (35.4%)	22 (46.8%)
No	114 (33.9%)	29 (26.9%)	53 (64.6%)	25 (53.2%)

In this study, the inclusion of questions related to the severity of cases enabled to reduce the classification error of the disease with the purpose of an epidemiological analysis and improved the specificity of the evaluation¹⁸.

Studies about the prevalence of low back MSD among UCWs are rare not only in Brazil, but also in other countries. A cross-sectional study conducted with workers of this category found a 45.6% prevalence of low back pain, which is similar to this study (45.5%). With regard to musculoskeletal pain in one or more of the nine defined regions of the body in the past 12 months, studies observed prevalence of 65¹⁷ and 54.7%¹⁹, which were inferior to those in this investigation.

Studies with workers from the industry found different values of low back pain prevalence, being 52% among workers of the assembly line and the petrochemical

Table 4. Distribution of scores by occupation for psychological demands, control, social support and job dissatisfaction in urban cleaning workers. Salvador, BA, Brazil, 2011.

Occupation	Psychosocial demand			
	(mean \pm SD)			
Total population (n = 624)	Psychological demand	Control	Social support	Dissatisfaction
Collectors	40.0 \pm 6.2	58.1 \pm 9.2	23.4 \pm 4.3	0.36 \pm 0.26
Drivers	36.7 \pm 5.8	64.3 \pm 9.6	23.1 \pm 4.4	0.20 \pm 0.22
Cleaning agents	34.3 \pm 5.9	59.2 \pm 10.4	24.2 \pm 4.2	0.37 \pm 0.28
Maintenance workers	32.0 \pm 7.0	66.7 \pm 9.1	22.8 \pm 4.0	0.29 \pm 0.24

Limit values for psychological demand = 48 – 12; control at work = 96 – 24; social support = 32 – 8; job dissatisfaction = 1 – 0.

Table 5. Multivariate Analysis. Association between low back pain and variables in the final model in urban cleaning workers. Salvador, BA, Brazil, 2011 (n = 582).

Variables	RP
Time of work at the company	1.65
Trunk flexion-rotation	1.65
Dynamic work	0.59
Psychosocial demand	1.63
Occupation	1.66
Schooling	1.47

RP: Reason of Prevalence.

industry²⁰, and 28.9% for workers in the plastic industry⁹, and these results are inferior to the ones found in this study.

The mean age found among the UCWs in this study was compatible with the mean of other studies in the same category^{17,21}, thus showing the relatively Young profile of this category, which can reflect on physical demands of the developed tasks, leading to overload for the body.

The low schooling was observed in this category, which is in accordance with data referring to the population from Bahia (only 3.8% are have 15 or more schooling years). Besides, little more than half of the assessed population was composed of black people, who were considered as the ones with less schooling years when compared to other ethnicities²². Other studies with UCWs had similar results concerning schooling^{17,23}. According to Ilário²⁵, the UCWs represent disqualified work force, whose occupational background is usually

related to construction or other sort of manual labor. These data reflect the low schooling of this category and the difficulty and the difficulty to enter the work market in other fields. The possible consequence for that is the submission to difficult conditions in this activities and the low interlocation with the management for better work conditions.

The intake of alcohol among these workers is very high^{21,23,24}. This study demonstrated high frequency of alcohol intake at least once a week, and this result is compatible with other studies in the same category, which indicate the stressful activity of public waste collection as the precursor of the onset of alcohol intake, calling the attention to the risk of alcoholism among waste collectors^{23,24}.

A low frequency was found with regard to the habit of smoking in this study, when compared to others in this category^{17,24}. The prevalence of smoking can be related to the socioeconomic status, being more common among workers who perform manual work and those who are unemployed^{24,25}.

Another investigated characteristic was the body mass index, which proved to be normal for more than half of the workers, which can reflect the dynamic character of the urban cleaning activity.

Among the occupational characteristics, it was observed that the total work time demonstrates, based on the mean age of these individuals, the early insertion in the work market, and many of them began in the informal market, in little qualified activities. Besides, the mean time of 4.7 years in the company may reflect the high workforce turnover in this category²⁴.

The number of working hours per week among the UCWs is above the predicted working hours by the Federal Constitution of 1988 and by the labor legislation. Even though the workday determined by the company is of eight hours, the workers cannot fulfill the predicted working hours, given the volume of work. This is even more evident by the frequency of overtime reported by the workers. It is known that, due to the characteristics of production, the variability of working conditions and the means to execute the task, that the daily workload is extrapolated, even if paid as overtime³.

The mean hours spent in household chores in the previous week was similar to that found among men in the plastic industry²⁶. The little workload found in this study is probably due to the sociocultural construction of a behavior in which the household chore is seen mostly as a female activity, and also because of the hard working hours outside of the house, which is a characteristic of this category.

The high exposure to physical demands, such as handling load and trunk postures in flexion and rotation, is compatible with the one found among nursing workers²⁷ and superior to that registered among workers in the plastic industry²⁶ using the same instrument.

The self-registration of repetitive movements was high for all of the UCWs, which is a similar result to the one found in the aforementioned studies in other categories^{26,27}. However, based on a repetitive task concept, which is characterized by work cycles smaller that lasts less than 30 seconds, or fundamental cycles constituting more than 50% of the total work cycle²⁸, an activity that is much more globally dynamic than repetitive is observed in this category, especially among collectors. But this reflects the difficulty to use the repetitiveness

question, mostly interpreted as repetitive gestures of distal extremities and others, such as a work situation that is repeated on working days.

With regard to psychosocial demands, high scores were observed for the psychological demand and social support among cleaning workers, higher than the ones found in industry²⁶ and in the health sector²⁷. This reflects the high demand and the accelerated rhythm found in this service, as well as the essentially collective work, especially inside the collection and cleaning teams. In these activities, there is the need for group cohesion, such as collective competence, so that they can perform their work and administrate situations of task variability^{29,30}. More work dissatisfaction at work and less control over it were registered among collectors and cleaning agents. In the collection service, drivers have more autonomy and decision making abilities over the activity³.

Physical and psychosocial demands at work were positively associated with cases of low back pain in this population. Besides these, other occupational factors, such as time of work in the company and being a waste collector were also positively associated. Among the non-occupational variables, the low schooling remained associated with low back pain.

The activity of waste collection is essentially manual³, which requires from the worker constant trunk flexion and rotation movements in the manipulation of waste volumes. Yang et al.³¹ found 2.16 times more low back pain among collection workers than among the ones in other activities in the same company, when adjusted by age, gender, education, smoking and time in the company, which corroborates the result of this study, in which low back pain was 1.66 times higher in this occupation when compared to the others.

The movement of throwing garbage bags during collection generates high shear strength over the low back region⁴. Besides, extreme flexion postures and the torsion of the trunk that are present in some activities related to handling waste are described in literature as being associated with low back pain complaints^{5,6}, and proved by the results in this study. Risk estimates for frequent flexion and rotation movements range from 1.3 and 8.1, and this interval is higher than the one found for load lifting (1.1 to 3.5) in a literature review⁵. Excessive posture desensitizes mechanoreceptors, which are in charge of neuromotor control, with consequent loss of the reflex contraction of stabilizing muscles and the increased load over the spine³².

Among the UCWs in this study, it was observed that the dynamic occupational work functioned as a protective factor for low back pain. This finding seems to be supported by literature, since the static activity is more damaging to the spine than the dynamic activity. The postural variation enables better disc nutrition, thus preventing its degeneration. Besides, physical aptitude components, such as muscular resistance, which are a characteristic of the dynamic activity, are pointed out as being important protective factors³³.

Consistent results in different study designs have been found for the relationship between low back pain and psychosocial aspects of work^{34,35}. The psychosocial demand has been associated with low back pain in the studied population, even after the adjustment for the other variables.

Some possible explanations of the relationship between psychosocial aspects and low back pain are the fact that the psychosocial characteristics of work may increase psychological tension, and, therefore, muscular activity and excretion of hormones, which contributes with the development or worsening of the symptoms^{5,34}. Psychosocial aspects can also decrease the pain threshold, thus causing increased report of symptoms³⁴. Likewise, low back pain can affect the perception about work or the way it is performed.

Other variables associated with low back pain were time of work in the company and schooling. The time of exposure to this activity contributes with low back pain, possibly due to the effect of cumulative trauma, which is very discussed in MSD studies⁵. As to schooling, no associations were found in studies with UCWs¹⁷. Some studies that reveal such an association usually do not present adjusted estimates for the physical work load⁶.

This study points out to the need for preventive and control measures concerning low back pain at work, through a multifactorial approach that includes adaptation in the physical environment and changes in aspects related to work organization. To provide an adequate physical environment, with proper equipment, tools and technology for the performance of tasks can contribute to reduce the need for extreme movements or the adoption of anomalous trunk postures. It is also important to introduce strategies that promote the expression of capacities, autonomy over the work chore, temporal management of the activity and group support in the context of organizational management.

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On pages 18, 20, 22, 24, 26, 28 e 30, where it reads:
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Should read:
PATARO S.M.S., FERNANDES R.C.P.