Predictive factors of chronic lower back pain risk in women: population-based study

Fatores preditivos de risco de lombalgia crônica em mulheres: estudo de base populacional

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ABSTRACT

BACKGROUND AND OBJECTIVES: Low back pain is a common condition in women. In addition to that, women have a higher risk of chronic pain. However, the factors associated with chronic low back pain are still controversial. Thus, this study's objective was to evaluate the predictive factors associated with a higher risk of chronic low back pain.

METHODS: A cross-sectional population-based study was conducted on a sample of 636 Brazilian adult women aged 20-69 years who reported symptoms of low back pain in the last two weeks. The level of risk of chronic low back pain was measured by the validated Brazilian version of Subgroups for Targeted Treatment (STarT) score.

RESULTS: The risk of chronic low back pain was classified as low, medium, and high in 330 (51.9%), 202 (31.8%), and 104 (16.4%) women, respectively. After adjustments, the main factors associated with a higher risk of chronic low back pain were: aged 50 years or older (OR=2.67; 95%CI: 1.43-4.96), low household income (OR=2.23; 95%CI: 1.34-3.72), 4 years of education or less (OR=2.17; 95%CI: 1.35-3.48), sedentary lifestyle (OR=2.97; 95%CI: 1.59-5.55), smoking (OR=1.61; 95%CI: 1.07-2.44), and multiparity (OR=2.84; 95%CI: 1.45-5.57). Skin color, marital status, and obesity were not associated with a higher risk of chronic low back pain.

CONCLUSION: This study indicates that the predictive factors associated with a higher risk of chronic low back pain in women included advanced aged, socioeconomic disadvantage, poor health behaviors and multiparity.

Keywords: Causality, Chronic pain, Low back pain, Women.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A dor lombar é uma condição comum em mulheres. Além disso, essa população apresenta maior risco de dor crônica. No entanto, os fatores associados à dor lombar crônica ainda são controversos. Assim, este estudo teve como objetivo avaliar os fatores de predisposição associados ao maior risco de dor lombar crônica.

MÉTODOS: Foi realizado um estudo transversal de base populacional em uma amostra de 636 mulheres adultas brasileiras com idades entre 20 e 69 anos que relataram sintomas de dor lombar nas últimas duas semanas. O nível de risco de dor lombar crônica foi medido pela versão brasileira validada do escore *Subgroups for Targeted Treatment* (STarT).

RESULTADOS: O risco de dor lombar crônica foi classificado como baixo, médio e alto em 330 (51,9%), 202 (31,8%) e 104 (16,4%) mulheres, respectivamente. Após os ajustes, os principais fatores associados ao maior risco de dor lombar crônica foram: idade de 50 anos ou mais (RC=2,67; IC95%: 1,43-4,96), baixa renda familiar (RC=2,23; IC95%: 1,34-3,72), 4 anos de estudo ou menos (RC=2,17; IC95%: 1,35-3,48), estilo de vida sedentário (RC=2,97; IC95%: 1,59-5,55), tabagismo (RC=1,61; IC95%: 1,07-2,44) e multiparidade (RC=2,84; IC95%: 1,45-5,57). A cor da pele, o estado civil e a obesidade não foram associados a um maior risco de dor lombar crônica.

CONCLUSÃO: Este estudo indicou que os fatores de predisposição associados a um maior risco de lombalgia crônica em mulheres incluíram idade avançada, desvantagem socioeconômica, comportamentos de saúde inadequados e multiparidade.

Descritores: Causalidade, Dor crônica, Dor lombar, Mulheres.

INTRODUCTION

Lower back pain (LBP) is a highly prevalent disease with social consequences and economic implications for the health system[1,2].

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The prevalence of LBP is higher in women, and this population have a higher risk of chronic pain[3-6].

The LBP process begins with an acute phase that may progress to resolution or become chronic. This condition depends on the response of the pain and its psychosocial impact[3,7]. Previous studies have also demonstrated that important sociodemographic, lifestyle, and reproductive factors are associated with the occurrence of persistent LBP. Individuals with advanced age and with socioeconomic disadvantage are more vulnerable to the occurrence of LBP[5,8-10]. In addition, low level of physical activity[11], smoking[8,12] and multiparity are also related to a higher probability of LBP[9,13].

There are several instruments for the assessment of LBP[14]. However, a primary care back pain screening tool was developed and validated to identify and assess subgroups more prone to have chronic LBP: *Subgroups for Targeted Treatment* (STarT). The StarT Back Screening Tool[14,15]. Additionally, this tool measures the status and the impact of acute LBP in daily life activities and in the psychosocial aspects[16].

Considering the above-mentioned notes and the social context of a developing country, this study aimed evaluate the predictive factors associated with a higher risk of LBP assessed by the StarT screening tool in a population sample of adult women in Southern Brazil. The determination of these factors could help identify those at a high risk of developing chronic pain and plan preventive interventions.

METHODS

A cross-sectional population-based study was carried out in the urban area of a Southern Brazil city. A representative sample of women aged 20 to 69 years and who reported LBP in the previous two weeks was selected using multistage systematic sampling. First, 45 census tracts from the 371 existing tracts in the urban area of the municipality were selected based on the monthly income per capita in each sector. For each selected census tract, a census block and corresponding street corner were randomly selected to identify the household from which to initiate data collection. Houses were alternately selected (each time skipping the next two houses) until the total number of necessary households for each tract was reached.

The sample size for the assessment of the chronic LBP risk level was calculated using Epi Info 6.0 (CDC, Atlanta, USA). A total of 460 participants were estimated, considering a confidence level of 95%, a power of 80%, and a 25% increase to compensate for nonresponses (refusal/losses). The final sample after recruitment was composed of 636 women, with a proportion of 3:1 (controls vs. exposed), which resulted in a confidence level of 99% and a power of 80% for an odds ratio of two.

Interviews were administered by previously trained interviewers at the participants' homes. Women who were pregnant at the time of the study, who were intellectually disabled or had a history of lumbar fracture or surgery in the last six months were excluded. Telephone interviews were conducted with a randomly selected portion (10%) of the sample to verified data consistency. Individuals who refused to participate initially were later contacted at least twice on different days and time.

The level of risk of chronic LBP was assessed using the previously validated Brazilian version of the STarT Back Screening Tool[16]. The LBP was identified by the presence of pain or discomfort between the last rib and the lowermost level of the gluteal region. In addition, a figure illustration of the body region was used as previous indicated[17]. The STarT Back Screening Tool is composed of four primary questions related to pain, disability and comorbidity, and five questions related to the psychosocial impact of pain. As for results, a score is generated and posteriorly stratified in 'low risk' (≤3 points), 'medium' or 'high' risk if more than 3 points are scored. When the score results in 3 points or more, the psychosocial scale is used to classify 'medium' risk (zero-3 points in the psychosocial questions) and 'high risk' (4 points in the psychosocial questions)[16]. The STarT screening questionnaire was applied in all participants who reported the presence of LBP symptoms in the previous two weeks.

The following potential sociodemographic, lifestyle and reproductive characteristics were investigated: age categorized every 10 years; skin color; marital status; family income; level of education in years of study; level of physical activity, considering as 'active' those who reported a minimum weekly practice of 75 minutes of vigorous activity or 150 minutes of moderate activity assessed by the short version of the International Physical Activity Questionnaire (IPAQ)[18]; smoking; parity and nutritional status obtained by body mass index (BMI).

Statistical analysis

Data was presented as for absolute and relative frequency (percentage) and bivariate analysis was conducted using Pearson's Chi-squared test to measure the association between the independent variables and outcomes. Unadjusted and adjusted odds ratio (OR) with their corresponding 95% confidence interval (95%CI) were calculated by ordinal logistic regression, using the proportional odds model. The technique estimates the odds that the dependent variable will shift to a higher category as a function of increases in the independent variables. The assumption of proportionality in the model was assessed using the Brant test. The gologit2 command (STATA) was used with autofit to fit the coefficients of the categories of variables in which the proportional odds assumption was violated[19]. Only variables that showed a p-value lower than 5% ($p<0.05$) were maintained in the adjusted model (variables adjusted to each other). A two-tailed statistically significant difference was defined at 5% ($p<0.05$). All analyses were performed using Stata, version 12.0 (StataCorp LP, College Station, Texas, USA).

RESULTS

A total of 1128 women were initially interviewed in this population-based study, and from these, 636 (56.4%) reported LBP in the last two weeks prior to the interview date, being included in the final analysis. Table 1 shows the general characteristics of the investigated sample. Most women were aged 40-49 years old (64.5%), white skin color (74.1%), married (65.6%), family income less than one Brazilian minimum wage (64.2%), eight or

more years of education (55.6%), insufficiently active (88.4%), non-smoking (55.9%), with 1-2 childbirths (51.7%) and obese (38.3%) (Table 1).

The risk of chronic LBP was classified as low, medium, and high in 330 (51.9%; 95%CI: 48.0-55.8), 202 (31.8%; 95%CI: 28.1-35.4), and 104 (16.4%; 95%CI: 13.5-19.2) women, respectively. Taken into account the main results obtained in the bivariate analysis (unadjusted analysis), the factors associated with a higher risk of chronic LBP were age, skin color, household income, level of education, level of physical activity, smoking, parity, and nutritional status (Table 2).

The final adjusted multivariate regression model is shown in table 2. After adjustments, the main factors associated with a higher risk of chronic LBP were: age 50 years or older (OR=2.67; 95%CI: 1.43-4.96), low household income (OR=2.23; 95%CI: 1.34-3.72), 4 years of education or less (OR=2.17; 95%CI: 1.35-3.48), sedentary lifestyle (OR=2.97; 95%CI: 1.59-5.55), smoking (OR=1.61; 95%CI: 1.07-2.44), and multiparity

Table 1. General sample characteristics and the distribution by the level of risk of chronic low back pain in adult women in Southern Brazil (n=636)

Characteristics	n=636 n (%)	Level of risk of chronic lumbar back pain			p-value[a]
		Low n=330 n (%)	Medium n=202 n (%)	High n=104 n (%)	
Age (years)					<0.001
20-29	100 (15.7)	74 (74.0)	22 (22.0)	4 (4.0)	
30-39	126 (19.8)	78 (61.9)	30 (23.8)	18 (14.3)	
40-49	173 (27.2)	79 (45.7)	56 (32.4)	38 (22.0)	
50-59	141 (22.2)	60 (42.6)	49 (34.8)	32 (22.7)	
60-69	96 (15.1)	39 (40.6)	45 (46.9)	12 (12.5)	
Skin color					0.04
White	471 (74.1)	256 (54.4)	147 (31.2)	68 (14.4)	
Non-white	165 (25.9)	74 (44.8)	55 (33.3)	36 (21.8)	
Marital status					0.02
Single	107 (16.8)	64 (59.8)	31 (29.0)	12 (11.2)	
Married	417 (65.6)	221 (53.0)	124 (29.7)	72 (17.3)	
Divorced/widowed	112 (17.6)	45 (40.1)	47 (41.9)	20 (17.8)	
Family income in USD (n=620)					<0.001
>1100	147 (23.7)	52 (35.3)	62 (42.1)	33 (22.4)	
700-1100	180 (29.3)	91 (50.5)	54 (30.0)	35 (19.4)	
400-699	159 (25.6)	91 (57.2)	46 (28.9)	22 (13.8)	
<400	134 (21.6)	89 (66.4)	35 (26.1)	10 (7.4)	
Education level (years) (n=635)					<0.001
≤4	126 (19.8)	35 (27.8)	52 (41.3)	39 (30.9)	
5-8	156 (24.6)	64 (41.0)	64 (41.0)	28 (17.9)	
>8	353 (55.6)	230 (65.2)	86 (24.4)	37 (10.5)	
Physical activity level					<0.001
Active	74 (11.6)	59 (79.7)	12 (16.2)	3 (4.1)	
Insufficiently active	562 (88.4)	271 (48.2)	190 (33.8)	101 (18.0)	
Smoking history (n=632)					<0.001
Never smoker	353 (55.9)	202 (57.2)	105 (29.7)	46 (13.0)	
Ex-smoker	134 (21.2)	49 (36.6)	50 (37.3)	35 (26.1)	
Smoker	134 (21.2)	49 (36.6)	50 (37.3)	35 (26.1)	
Parity					<0.001
No children	96 (15.1)	68 (70.8)	21 (21.9)	7 (7.3)	
1 children	147 (23.7)	97 (65.9)	39 (26.5)	11 (7.4)	
2 children	181 (28.4)	92 (50.8)	65 (35.9)	24 (13.2)	
3 children	120 (18.8)	49 (40.8)	41 (34.1)	30 (25.0)	
≥4 children	92 (14.4)	24 (26.0)	36 (39.1)	32 (34.7)	
Nutritional status (n=634)					0.01
Normal (BMI<25kg/m^2)	182 (28.7)	106 (58.2)	52 (28.6)	24 (13.2)	
Overweight (25≤BMI<30kg/m^2)	209 (33.0)	115 (55.0)	58 (27.8)	36 (17.2)	
Obese (BMI≥30kg/m^2)	243 (38.3)	108 (44.4)	91 (37.4)	44 (18.1)	

[a] p-values for Chi-square test for heterogeneity of proportions; BMI = body mass index.

Table 2. Unadjusted and adjusted ordinal logistic regression, Oddis Radio, and 95% Confidence interval for the level of risk of chronic low back pain, according to the predictive factors investigated in adult women in Southern Brazil (n=636)

Characteristics	Unadjusted	p-value	Adjusted[a] Low vs (medium+high-risk)	p-value
	OR (95%CI)		OR (95%CI)	
Age (years)		<0.001		0.021
20-29	1.00 (reference)		1.00 (reference)	
30-39	1.91 (1.08-3.36)		1.41 (0.75-2.65)	
40-49	3.70 (2.18-6.26)		2.50 (1.36-4.60)	
50-59	4.10 (2.38-7.05)		2.67 (1.43-4.96)	
60-69	3.55 (2.01-6.30)		1.86 (0.93-3.72)	
Skin color		0.015		
Non-white	1.00 (reference)		--	
White	1.51 (1.08-2.12)			
Marital status		0.006		
Single	1.00 (reference)		--	
Married	1.38 (0.90-2.10)			
Divorced/widowed	2.01 (1.21-3.33)			
Family income, USD		<0.001		0.002
>1100	1.00 (reference)		1.00 (reference)	
700-1100	1.53 (0.96-2.44)		1.23 (0.74-2.03)	
400-699	2.10 (1.33-3.29)		1.54 (0.94-2.53)	
<400	3.39 (2.13-5.38)		2.23 (1.34-3.72)	
Education level (years)		<0.001		0.001
>8	1.00 (reference)		1.00 (reference)	
5-8	2.47 (1.72-3.55)		1.36 (0.91-2.05)	
≤4	4.59 (3.08-6.81)		2.17 (1.35-3.48)	
Physical activity level		<0.001		<0.001
Active	1.00 (reference)		1.00 (reference)	
Insufficiently active	4.27 (2.37-7.68)		2.97 (1.59-5.55)	
Smoking history		<0.001		0.007
Never smoker	1.00 (reference)		1.00 (reference)	
Ex-smoker	1.21 (0.83-1.75)		1.09 (0.73-1.64)	
Smoker	2.33 (1.60-3.40)		1.61 (1.07-2.44)	
Parity		<0.001		<0.001
No children	1.00 (reference)		1.00 (reference)	
1 children	1.22 (0.70-2.12)		1.05 (0.58-1.89)	
2 children	2.26 (1.35-3.80)		1.25 (0.70-2.24)	
3 children	3.81 (2.19-6.64)		1.77 (0.94-3.32)	
≥4 children	6.96 (3.87-12.5)		2.84 (1.45-5.57)	
Nutritional status		0.008		
Normal (BMI<25kg/m^2)	1.00 (reference)		--	
Overweight (25≤BMI<30kg/m^2)	1.18 (0.80-1.75)			
Obese (BMI≥30 kg/m^2)	1.65 (1.14-2.39)			

BMI = body mass index; OD = odds ratio; CI = confidence interval; [a] the 'low-risk' of chronic LBP category obtained by the STarT score was used as the reference group ('low-risk' vs 'medium+high-risk'). The final adjusted model was evaluated using the Brant test in order not to violate the proportional odds assumption. Only variables that showed a p-value lower than 5% (p<0.05) were maintained in the adjusted model (variables adjusted to each other).

(OR=2.84; 95%CI: 1.45-5.57). Sedentary lifestyle (insufficient level of physical activity) remained as the factor with the higher strength of the association with chronic LBP in the final adjusted model. The results for age, income, education, and parity showed a significant linear trend association with the level of risk of chronic LBP (Table 2). Skin color, marital status, and obesity were not associated with a higher risk of chronic LBP.

DISCUSSION

This cross-sectional study addressed sociodemographic, lifestyle, and reproductive factors that are associated with the prevalence of chronic risk levels in women reporting LBP. It was revealed that 16.4% of the investigated women had high risk for developing chronic LBP. In addition, this study indicated that the

predictive factors associated with a higher risk of chronic LBP in women included advanced age, socioeconomic disadvantage, poor health behaviors and multiparity.

The current scientific literature shows important relationships between sociodemographic factors and the occurrence of LBP. Advanced age is an important risk factor for chronic LBP[5,8-10]. Age increases the degenerative musculoskeletal process, which may result in a negative prognosis of LBP[10,20-22]. Additionally, individuals with chronic LBP are socioeconomically disadvantaged and with less educational level[8]. In this way, these individuals are often covered by government-sponsored health insurance and visit healthcare providers more frequently, resulting in socioeconomic disparities[8].

Regarding lifestyle factors, insufficient physical activity was highly prevalent in this women population. Although the association of LBP and a sedentary lifestyle is controversial in the literature[11], insufficient physical activity was the strongest predictive factor associated with high risk of LBP in the present study. However, substantial evidence supports the use of physical exercise in the primary and secondary prevention of chronic LBP, and as an adjunct treatment in individuals with active chronic pain[23]. Regular physical activity has been linked to the stimulation of brain regions involved in descending pain inhibition, thus decreasing their sensitivity to pain[24]. Smoking has also been linked to chronic LBP in previous studies[8,12]. This association can be explained by the chronic cough provoked by smoking, which increases the intra-abdominal and the intervertebral discs pressure. It was also hypothesized that the cigarette smoke-induced vasculopathy affects the nutrition of the intervertebral discs, which can lead to the development of discopathy. In addition, smoking may reduce the resistance of the lumbar back muscles.

The prevalence of LBP during pregnancy is well known and estimated to affect 50-80% of women in the last two trimesters of pregnancy[25,26]. Pregnant women were excluded from the survey, however, childbearing is associated with increased lifting and carrying, according to the mechanical and psychological demands related to children care[13]. Moreover, this study demonstrated that a history of multiparity is associated with a higher risk of chronic LBP. Similar findings previously reported that childbearing and childrearing increases the risk of LBP[9,13].

This study presented an original scientific research and important predictive factors associated with LBP in a representative population-based sample of young and middle-aged women living in the urban area of Southern Brazil city were investigated. The other strength of this study is that an adapted, translated, and validated screening tool to assess chronic LBP[14,16] was used. The STarT Back Screening Tool is specifically designed for primary care settings, identifying a risk category for LBP based on the signs and symptoms experienced at the time, taking into account physical and psychosocial issues associated with the pain[2,16]. These aspects are important, especially considering that the biopsychosocial model is widely accepted as the most heuristic approach to assess and manage chronic pain[27,28]. The biopsychosocial approach argues that the experience of pain is determined by the dynamic interaction between biological changes, psychological status and social context[28,29].

Despite the strengths, the results of this investigation must be interpreted with some limitations. Firstly, due to the cross-sectional design of the study, it does not establish a temporal relationship between events, and a reverse causation cannot be completely ruled out; therefore, the observed association between chronic LBP and physical inactivity, for example, should be treated with caution. It is very possible that women with LBP reduce their physical activity. Thus, it's suggested that further longitudinal research is warranted in order to investigate this relationship in other women samples. Secondly, the STarT Back Screening Tool is a stratification instrument used to indicate the potential risk for chronic pain, however, this instrument did not provide the condition diagnosis.

Furthermore, given that many of the women studied were in their reproductive years and have been menstruating, they could have reported menstrual pain as back pain. Moreover, the gologit2 command was applied considering the 'low-risk' of chronic LBP as the reference group ('low-risk' vs 'medium+high-risk'). This procedure was adopted to avoid loss of power in the analyzes, due to the low number of women in the highest category of chronic LBP. Finally, a screening question contemplating only the previous two weeks was used to learn if a participant experienced recent LBP. In fact, in this study there was no information on duration of chronic pain symptoms.

CONCLUSION

This study indicated that the predictive factors associated with a higher risk of chronic LBP in women include advanced age, socioeconomic disadvantage, poor health behaviors and multiparity. Additionally, a high prevalence for chronic LBP was revealed. Thus, due to the possible impact of LBP to society as well as the disability resulting from LBP, it's important to highlight the priority for the implementation of preventive healthcare programs.

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