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ORIGINAL ARTICLE / *ARTIGO ORIGINAL*

Occurrence of combined pain in the lumbar spine, pelvic girdle and pubic symphysis among pregnant women in the extreme south of Brazil

Ocorrência de dor combinada na coluna lombar, cintura pélvica e sínfise púbica entre gestantes do extremo sul do Brasil

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ABSTRACT: ***Objectives:*** To estimate the prevalence and characterize the occurrence of low back pain (LBP), posterior pelvic girdle pain (PPGP) and pubic symphysis pain (PSP) among pregnant women resident in Rio Grande, RS. ***Methods:*** This was a cross-sectional study of all postpartum women who gave birth in 2016. Two pictures were used to investigate the presence of LBP, PPGP and PSP, both isolated and combined. Multinomial logistic regression was used to evaluate the factors associated with each symptom. ***Results:*** LBP was reported by 42.2%, PSP by 4.9%, and PPGP by 2%, while LBP + PSP was reported by 9%, LBP and PPGP by 2.8% and PPGP + PSP by 1.1%, and pain in all three regions was reported by 3.9% of the sample. The more advanced the age of the pregnant women, the risk for LBP and of LBP combined with one of the pelvic girdle regions was reduced, while the risk for PPGP + PSP was increased. Depression during pregnancy increased the risk for all symptom combinations. ***Conclusion:*** This study provided a detailed description of the occurrence of the evaluated outcomes and its associated factors. Studies like this are rare in Brazil, especially a census with low rates of losses and refusals. The high prevalence of the evaluated symptoms suggests that it should be investigated routinely in prenatal care, taking into account the age of the pregnant women, depressive symptoms and those experiencing combined or intense pain.

Keywords: Low back pain. Pelvic girdle pain. Prevalence.

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RESUMO: ***Objetivos:*** Estimar a prevalência e caracterizar a ocorrência de dor lombar gestacional (DLG), dor na cintura pélvica posterior (DCPP) e dor na sínfise púbica (DSP) entre gestantes residentes em Rio Grande, RS. ***Métodos:*** Estudo transversal realizado com todas as puérperas com parto em 2016. Foram utilizadas duas figuras para investigar a presença de DLG, DCPP e DSP de forma isolada ou combinada. Regressão logística multinomial foi usada para avaliar os fatores associados a cada sintoma. ***Resultados:*** DLG foi referida por 42,2% das entrevistadas, DSP por 4,9%, e DCPP por 2%, enquanto DLG + DSP por 9%, DLG + DCPP por 2,8%, DCPP + DSP por 1,1% e dor nas três regiões por 3,9% delas. Quanto maior era a idade da gestante, menor foi o risco de DLG e de DLG combinada a uma das regiões da cintura pélvica e maior o risco de DCPP + DSP. Depressão na gestação aumentou o risco de todas as combinações dos sintomas. ***Conclusão:*** Este estudo realizou uma descrição mais detalhada da ocorrência dos desfechos avaliados e de seus fatores associados. Estudos como este são raros no país, sobretudo com baixas taxas de perdas e recusas. A elevada prevalência dos sintomas avaliados sugere que sua investigação seja rotineira nas consultas de pré-natal, atendo-se a idade das gestantes, sintomas depressivos e a dores combinadas e intensas.

Palavras-chave: Dor lombar. Dor da cintura pélvica. Prevalência.

INTRODUCTION

Musculoskeletal pain is one of the most common problems related to pregnancy. More than two thirds of pregnant women experience low back pain and almost a fifth suffer from pelvic pain[1,2]. The two conditions can occur separately or together (low back and pelvic pain) and tend to increase as the pregnancy progresses[3].

About 30% of all women who report low back pain during pregnancy have symptoms severe enough to compromise their daily activities, affect quality of life and require frequent rest periods, causing them to leave work[1]. These symptoms experienced during pregnancy also influence the birth and can limit mobility in childbirth and increase the risk of interventions, and are often the reason for requesting a cesarean delivery, as well as being related to the early induction of childbirth. In addition, for half of symptomatic pregnant women, the pain persists for one year, while for 20% the symptoms persist for up to three years[2,4 - 7].

It is believed that the increased incidence of low back and pelvic pain in pregnancy is a consequence of some factors including altered posture, increased lumbar lordosis (exaggerated curvature of the lower spine) to balance the increase in the anterior weight of the uterus, loosening of the ligaments in the pelvic area and fluid retention in connective tissue[2].

The risk factors most commonly associated with low back pain include history of back pain in previous pregnancies and prior back pain prior to pregnancy, maternal age, multiparity, smoking, high stress levels, physical stress and trauma to the back or pelvis before pregnancy[8 - 10]. Pelvic pain is associated with multiple pregnancy, first pregnancy, increased

fetal weight, using forceps or vacuum extraction and lithotomy position of the woman during childbirth [11].

Given the difficulty in locating the precise signs and symptoms of back pain and pelvic girdle, with literature often highlights the overlapping of these conditions[2]. Although some more recent studies have evaluated each occurrence in isolation, little is known about the intensity of these musculoskeletal symptoms, nor the level of disability resulting from them[4,5,12].

Regarding cases in Brazil, there are few studies on low back and pelvic pain, especially studies representative of the population of origin, and, in general, only the presence of low back pain is evaluated, using convenience samples and a reduced number of participants, which can compromise the validity of the findings[13 - 16]. The identification of the occurrence and the better understanding of these conditions during pregnancy helps to design and evaluate prevention strategies, since, for a portion of the women affected, symptoms do not decrease. On the contrary, after pregnancy the condition progresses to chronic pain[11].

This aim of this study is to estimate the prevalence and characterize the occurrence and factors associated with low back pain (LBP), posterior pelvic girdle pain(PPGP) and pain in the pubic symphysis (PSP) during pregnancy in pregnant women living in the municipality of Rio Grande, RS, in 2016.

METHODS

This cross-sectional study gathered information from all puerperal women living in the city of Rio Grande who gave birth at the only two local maternity hospitals, Hospital Universitário Dr. Miguel Riet Corrêa Júnior, in the Federal University of Rio Grande, and Associação de Caridade Santa Casa do Rio Grande, between January 1 and December 31, 2016.

All mothers of newborns with at least 500 grams or 20 weeks of gestation were included. A single, pre-coded questionnaire was used to evaluate the sociodemographic, behavioral and reproductive characteristics and maternal morbidities, in addition to collecting data on the use of health services, prenatal care and childbirth. The REDCap application via tablet was used to apply the questionnaire[17].

Four interviewers trained in the human sciences were selected and trained to apply the questionnaires. The training lasted 40 hours and was carried out by postgraduate students, who are supervisors of the study. At the end of the training, a pilot study was carried out in the month prior to the commencement of data collection in the two hospitals. The interviewers visited the wards in maternity wards of eligible mothers every day and applied the questionnaire within 48 hours after delivery.

Two figures were used to assess the occurrence of LBP, PPGP and PSP. The first had the drawing of a woman in a supine and dorsal position with the regions of the cervical,

thoracic, lumbar and posterior pelvic spine painted in green, blue, red and orange, respectively. The posterior pelvic girdle comprised the sacroiliac region (beginning of the intergluteal line) up to the lower gluteal fold. The other figure consisted of a drawing of a woman in the supine and prone position with the pubic area shaded in red lines. The presence of LBP, PPGP or PSP was classified according to the location of the pain indicated by the interviewee in the figures.

Additionally, the month when the pain started, frequency and the intensity of that pain were investigated. To evaluate the intensity of pain, a visual analogic scale was used which went from zero to ten, zero being no pain and ten the worst possible pain. Absenteeism, characterized by women who missed work because of symptoms, was only examined for those who reported LBP.

A Venn diagram was used to describe the prevalence of types of pain individually and combined. For descriptive analysis, the outcome variable was created and categorized as: absence of pain, only LBP, PPGP + PSP and LBP + PPGP + PSP. The proportions and the respective 95% confidence intervals of each of the outcome categories were examined according to the maternal age (sampled numerical and categorized form 12 to 19 years of age, 20 to 29 years of age, and 30 years or more), smoking (never smoked, ex-smoker or smoker), presence of diabetes, depression and number of pregnancies (number of times the woman became pregnant, including unsuccessful pregnancies).

As the outcome has five categories, crude and adjusted multinomial logistic regression was used to investigate the factors associated with each symptom and to estimate the relative risks. For the adjusted analysis, a hierarchical model with two levels was applied. At first, it was inserted into the variable maternal age, and secondly, it was added to the remaining variables (smoking, diabetes, depression and number of pregnancies). Wald's test for heterogeneity and linear trend were used for dichotomous and ordinal exposures, respectively. The statistical significance was 5%.

To analyze the intensity of LBP, PPGP and PSP, or their combinations, the averages of the scores attributed by the interviewees and their respective 95% confidence intervals (95%CI) were calculated according to the quarter of pain onset, combinations of symptoms and frequency of pain. Additionally, regarding LBP, the mean pain intensity was measured according to the absenteeism variable. For comparisons of pain averages, analysis of variance (ANOVA) was used, followed by the Bonferroni test for multiple comparisons, or Student's t test[18]. All analyzes were performed using the Stata 1319 statistical package.

The original research project was approved by the Health Research Ethics Committee (CEPAS) of *Santa Casa de Misericórdia*, process nº 030/2015 . Informed verbal consent was requested from the interviewees and, upon acceptance, signature of the Free and Informed Consent Form. All participants were guaranteed the confidentiality of the information provided, voluntary participation and the possibility to leave the study at any time.

RESULTS

The sample consisted of 2,694 parturients, with a respondent rate of around 99%. Half of them were between 20 and 29 years old, 11% declared themselves as smokers and 4% had diabetes and/or depression. About 5 % of parturients had five or more pregnancies (Table 1). The LBP was more common in younger pregnant women (50%) and the first pregnancy (45%), while the PSP PPGP was more prevalent among those over

Table 1. Characteristics of parturient women and description of symptoms of gestational low back pain (LBP), pelvic girdle pain (PGP), pubic symphysis pain (PSP) and their combinations. Perinatal study. Rio Grande, RS, 2016.

Variables	N	%	Pain										p
			No Pain		LBP		PPGP/PSP		LBP and/or PPGP and/or PSP		LBP+PPGP +PSP		
			%	IC95%	%	IC95%	%	IC95%	%	IC95%	%	IC95%	
Age													
12–19	456	17.0	31.4	27.3 – 35.8	50.2	45.6 – 54.8	3.9	2.5 – 6.2	11.6	9.0 – 14.9	2.9	1.7 – 4.9	
20–29	1.333	49.6	30.6	28.1 – 33.1	45.0	42.3 – 47.7	7.6	6.3 – 9.2	12.9	11.2 – 14.8	3.9	3.0 – 5.1	< 0.001
≥ 30	898	33.4	40.8	37.6 – 44.0	33.9	30.9 – 37.1	10.8	8.9 – 13.0	10.0	8.2 – 12.2	4.5	3.3 – 6.0	
Smoke													
Never smoked	1.860	69.2	34.6	32.4 – 36.7	42.6	40.3 – 44.8	8.1	7.0 – 9.5	11.0	9.7 – 12.5	3.7	2.9 – 4.7	
Previously smoked	537	20.0	32.7	29.1 – 37.1	40.4	36.3 – 44.6	7.8	5.8 – 10.4	14.2	11.4 – 17.4	4.7	3.2 – 6.8	0.7
Smoker	292	10.8	33.2	28.0 – 38.9	43.2	37.6 – 48.9	8.2	5.6 – 12.0	11.6	8.4 – 15.9	3.8	2.1 – 6.7	
Gestational Diabetes													
No	2.563	95.5	34.3	32.5 – 36.1	42.2	40.3 – 44.1	8.0	7.0 – 9.1	11.8	10.6 – 13.1	3.7	3.1 – 4.6	0.5
Yes	121	4.5	31.4	23.7 – 40.3	42.2	33.6 – 51.2	9.9	5.7 – 16.8	9.9	5.7 – 16.8	6.6	3.3 – 12.8	
Depression while pregnant													
No	2.591	96.4	34.4	32.6 – 36.3	42.9	41.0 – 44.9	7.8	6.9 – 8.9	11.2	10.0 – 12.5	3.6	2.9 – 4.4	< 0.001
Yes	96	3.6	25.0	17.2 – 34.8	21.9	14.6 – 31.4	14.6	8.7 – 23.3	26.0	18.1 – 35.9	12.5	7.2 – 20.9	
Number of pregnancies													
1	1.156	43.0	32.3	29.6 – 35.0	45.4	42.6 – 48.3	7.0	5.7 – 8.7	12.1	10.3 – 14.1	3.2	2.3 – 4.4	
2 - 4	1.366	50.8	34.2	31.7 – 36.8	41.0	38.4 – 43.7	9.1	7.7 – 10.7	11.1	9.6 – 12.9	4.5	3.6 – 5.8	0.001
5 or more	169	6.2	45.6	38.1 – 53.2	29.6	23.1 – 37.0	7.1	4.1 – 12.1	14.2	9.7 – 20.4	3.5	1.6 – 7.7	

95%CI:95% confidence interval.

30 years of age (11%). The other combinations of symptoms were more frequent only among pregnant women who reported depression during pregnancy. The presence of pain in the three regions was much more common (12%) compared to those without depression (4%) (Table 1).

Figure 1 shows that 42.2% highlighted LBP (95%CI 40.3 - 44.1), 4.9% PSP (95%CI 4.2 - 5.8) and 2.0% PPGP (95%CI 1,6 - 2.7). Regarding the combined symptoms, 9.0% had LBP + PSP (95%CI 7.9 - 10.1), 2.8% LBP + PPGP (95%CI 2.2 - 3.4) and 1.1% PPGP + PSP (95%CI 0.8 - 1.5), and 3.9% described concomitant pain in the three regions, i.e, LBP + PPGP + PSP (95%CI 3.2 - 4.7). The intensity of LBP did not vary according to the trimester of symptom onset, however parturients with the combination of the three outcomes (LBP + PPGP + PSP), who missed work and who reported constant pain presented higher averages when assessing pain intensity. Regarding PPGP / PSP, the symptoms were more intense among parturients who reported the onset of symptoms in the first trimester and in those with three concomitant symptoms compared to those with only PSP (Table 2).

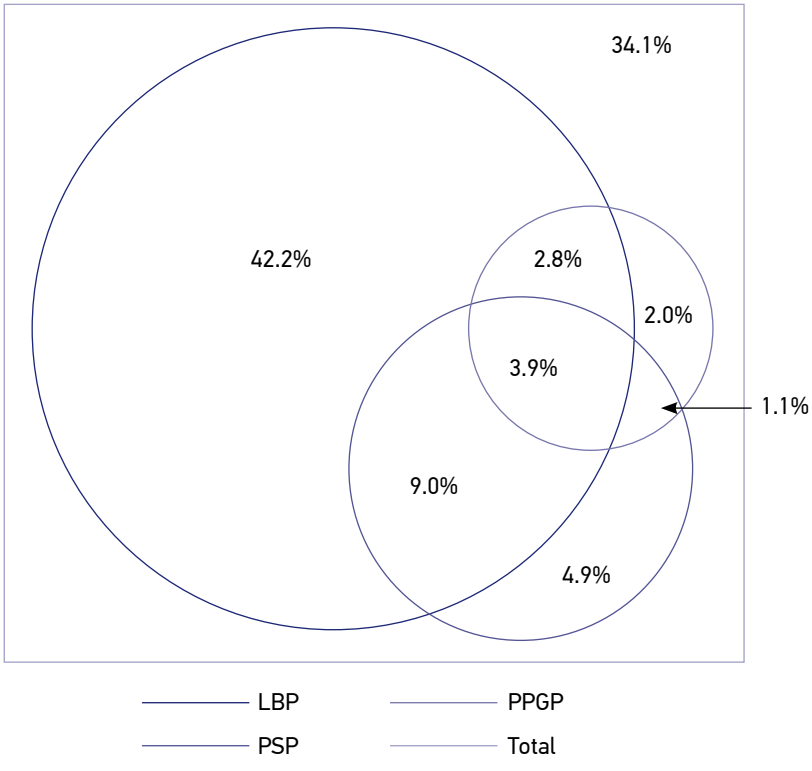

Figure 1. Venn: Combination symptoms of gestational low back pain (LBP), posterior pelvic girdle pain (PPGP) and pubic symphysis pain (PSP) during gestation in pregnant women Rio Grande, RS, 2016 (n = 2 .688) .

Table 2. Intensity of gestational low back pain (LBP), pain in the posterior pelvic girdle (PPGP) and pain in the pubic symphysis (PSP) according to the trimester of onset, combinations of symptoms, absenteeism and frequency of pain. Perinatal study. Rio Grande, RS, 2016.

	Mean	95%CI	p
Semester of LBP commencement			
1st	6.8	6.5 – 7.1	0.30[a]
2nd	6.9	6.8 – 7.1	
3rd	6.8	6.6 – 6.9	
LBP and combinations*			
LBP	6.8[b]	6.7 – 6.9	0.01[a]
LBP and PPGP	6.8	6.3 – 7.2	
LBP and PSP	6.9	6.6 – 7.1	
LBP, PPGP and PSP	7.5[b]	7.1 – 7.8	
Abseentism because of LBP**			
No	6.8	6.7 – 6.9	< 0.001[c]
Yes	7.9	7.6 – 8.2	
Frequency of pain (LBP)**			
Constant	7.5	7.3 – 7.7	< 0.001[c]
Improved Sometimes	6.7	6.6 – 6.8	
Which trimester did PPGP/PSP*** start			
1st	7.3[d]	6.8 – 7.8	0.04[a]
2nd	6.8	6.5 – 7.1	
3rd	6.6[d]	6.6 – 6.8	
Frequency of pain (PPGP/PSP)[#]			
Constant	7.7	7.4 – 8.0	< 0.001[c]
Improved Sometimes	6.5	6.3 – 6.7	
PPGP/PSP and combinations[#]			
PPGP	6.8	6.3 – 7.2	0.02[a]
PSP	6.2[e]	5.8 – 6.6	
LBP and PPGP	6.8	6.3 – 7.3	
LBP and PSP	6.8	6.6 – 7.1	
PPGP and PSP	6.5	5.7 – 7.2	
LBP, PPGP and PSP	7.1[e]	6.7 – 7.4	

[a]Analysis of variance (ANOVA); [b]multiple Bonferroni comparisons: difference of means 0.7 p = 0.003; Student's t-test; [d]test of multiple Bonferroni comparisons: difference of means -0.7 p = 0.04; test of multiple Bonferroni comparisons: difference in means -0.9 p = 0.01; *only individuals with LBP and combinations (n = 1,554); **n = 1,549; ***n = 625; #n = 633.

In the adjusted analysis, the variables age and depression during pregnancy remained significantly associated with the outcomes. The older the mother's age, the lower the risk of LBP and the LBP/PPGP and/or the PSP. From the age of 20, the risk of PPGP/PSP was about twice as high, increasing with age. The report of depression increased the risk of having PPGP/PSP, LBP and/or PPGP and/or PSP and pain in the three regions, between 2.7 to 5.2 times (Table 3).The variables smoking and diabetes did not show a statistically significant association with the outcomes ($p > 0.20$).

DISCUSSION

About two thirds of the interviewees reported pain in at least one of the investigated anatomical regions. LBP was the most common, followed by the combinations of LBP + PSP and LBP + PPGP + PSP. The older the mother, the lower the risk of LBP and LBP combined with one of the pelvic regions, and the greater the risk of PPGP + PSP. Depression during pregnancy increased the risk of all combinations of symptoms, with depressed pregnant woman being at least five times more likely to experience pain in the three anatomical regions. The intensity of the symptoms was directly proportional to the number of anatomical regions affected.

Table 3. Factors associated with gestational low back pain (LBP), pain in the posterior pelvic girdle (PPGP), pubic symphysis pain (PSP) and their combinations. Perinatal study. Rio Grande, RS, 2016 (n = 2,688).

Variables*	LBP**			PPGP/PSP**			LBP e/ou PPGP e/ou PSP**			LBP + PPGP + PSP**		
	RR	95%CI	p	RR	95%CI	p	RR	95%CI	p	RR	95%CI	p
Age												
12–19	1			1			1			1		
20–29	0.92	0.72 – 1.17	<0.001*	1.99	1.17 – 3.40	0.02***	1.14	0.79 – 1.64	0.01*	1.40	0.74 – 2.66	0.84***
≥ 30	0.52	0.40 – 0.67		2.11	1.23 – 3.62		0.67	0.45 – 0.98		1.21	0.63 – 2.32	
Depression during pregnancy												
No	1	-	0.43	1	-	0.004	1	-	< 0.001	1	-	< 0.001
Yes	0.78	0.43 – 1.44		2.74	1.38 – 5.44		3.48	1.94 – 6.26		5.22	2.50 – 10.9	
Number of pregnancies												
1	1	-		1	-		1	-		1	-	
2 - 4	0.97	0.80 – 1.18	0.10***	1.05	0.76 – 1.45	0.35***	0.95	0.71 – 1.26	0.80***	1.31	0.83 – 2.06	0.82***
5 or more	0.62	0.41 – 0.92		0.56	0.29 – 1.11		1.01	0.59 – 1.72		0.73	0.29 – 1.87	

*Adjustment made by level (block): level 1: maternal age; level 2: level 1 + smoking, diabetes, depression during pregnancy and number of pregnancies. Smoking and diabetes showed no statistically significant association ($p > 0.20$); **the "no pain" group was the reference category for the outcome; RR: relative risk; 95%CI: 95% confidence interval; ***p from the linear trend test;

The proportion of women who had combined LBP with the other investigated symptoms (57.9%) was higher than that found and same municipality in 2013 (51.2%)[20] . This may indicate that the prevalence of LBP increased in Rio Grande between 2013 and 2016 and occurred despite the fact that the 2013 study did not discriminate overlapping pelvic girdle symptoms, which possibly resulted in an overestimation of the prevalence reported that year.

However, the difference between the instruments used in the two studies limits the comparability of the findings. Thus, it is important to keep monitoring the prevalence of LBP among pregnant women in the municipality in future perinatal studies in Rio Grande, continuing with the same version of the instrument used in 2016.

The occurrence of pain in the pelvis alone or in combination with LBP (23,.7 %) is similar to the findings of prospective studies conducted in different countries which included clinical exams to characterize the outcome and which show prevalence ranging from 16% to 20.1% [1,21-23].

In this study the characterization separated from the symptoms allowed a more detailed description between the outcomes according to some maternal characteristics. The age of the pregnant woman showed different repercussions regarding the occurrence of low back pain and pelvic pain and their combinations. LBP alone or combined with one of the symptoms of the pelvic girdle was more prevalent among younger women with a decreased risk of these symptoms as the pregnant woman's age increased.The biological immaturity of the musculoskeletal structures of the lumbar spine of younger women makes them more susceptible to increased overload resulting from pregnancy, which would explain the reduction in symptoms among older women[8,24] . On the other hand, older age was associated with an increased risk of pain in the pelvic girdle (PPGP + PSP). This result is not a consensus in the literature[3.25] , however, it is known that there is reduced joint flexibility with aging. Thus, the strain of joints of the pelvic girdle can cause worse pain among women older women[3] .

The report of depression during pregnancy was the strongest predictor of combined musculoskeletal pain in this study. The probability that the depressive pregnant woman will have pain simultaneously in all the studied regions was 5.2 times higher, a relationship also observed in other studies[8,26] This result is particularly worrying because the intensity of pain is greater when symptoms overlap, as verified in this study and corroborated by other authors[27,28]. Pain may become more common due to the psychological condition of the pregnant woman with depression. In addition, the greater intensity of symptoms can negatively affect mental health and cause limit daily living activities[20,25]. The simultaneous occurrence of symptoms in different regions, with persistent pain in the prenatal period may be triggering factors for chronic pain commonly associated with depression and anxiety[14] .

It is crucial to point out that due to the cross-sectional design of this study, the association between depression and the symptoms does not necessarily imply causality. Depression can be interpreted as a factor that increases the risk of pain or, on the contrary, it is a consequence

of pain. However, regardless of the direction of the effect, it is quite likely that there is a relationship between these conditions, which can be better explored in prospective studies. In any case, the results support the importance of assessing and treating, when indicated, depression before and throughout pregnancy.

Women with LBP and pain in the pelvic girdle, who missed work, in constant pain and who started having symptoms in the pelvic girdle in the first trimester are part of a group that needs to be identified and treated in the quest to reduce the intensity of symptoms. Results of previous studies say that the pain can be so intense that it becomes incapacitating, with long periods of absence from work, often generating sick leave[13]. In addition, they can be a prognostic factor for the persistence of symptoms in the postpartum period[3,29].

Two of the limitations of this study relate to the absence of a physical examination in establishing the assessed symptoms and the fact that the instrument originally adapted from the Nordic Questionnaire for Musculoskeletal Symptoms[30] has not been submitted to a validation study. However, the use of illustrations facilitated the identification of pain distribution and, thus, minimized possible errors in the location of symptoms.

CONCLUSION

The prevalence of pregnant women who mentioned at least one of the musculoskeletal symptoms evaluated was high. The differentiation between these symptoms in pregnant women is relevant both in the clinical setting, given the different negative implications they may have on the woman's life during pregnancy and the puerperium, and in the research, identifying the proportion of women affected.

Health professionals responsible for prenatal services are recommended to assess the presence of pain in the lumbar region and in the pelvic girdle of pregnant women who show combined pain, constant pain and who have depression, with special attention to the patient's age.

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