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Low Back Pain and Physical Activity during Pregnancy: A Longitudinal Prospective Study

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Abstract

Background: Low back pain (LBP) is an increasingly reported condition, and physical activity (PA) may play an important role. The aim of the present study was to evaluate the proportion of pregnancy-related LBP and its association with type and intensity level of PA during pregnancy.

Methods: A longitudinal prospective study was carried out with a cohort of 118 pregnant women. Participants were evaluated in all trimesters. LBP was assessed with a self-reported questionnaire and participants were categorized according to its occurrence. The type and intensity of PA were evaluated using the *Pregnancy Physical Activity Questionnaire* and categorized into tertiles. Binary logistic regression models were constructed to verify the relationship between LBP and type, the intensity of PA in all trimesters, and LPB pre-pregnancy.

Results: LBP was reported by 40.7%, 52.2% and 66.7% of the subjects in the first, second, and third trimesters, respectively. No significant associations were found between LBP and type and intensity of PA. However ,women who had LBP before pregnancy, compared to those who did not, had higher odds of expressing LBP during pregnancy (OR= 3.85, 95% CI: 1.344-11.025).

Conclusions: LBP is a common condition and increased during pregnancy. Results of this study suggest that type and intensity of PA are not associated with emerging of LBP during pregnancy.

Key-Word: Pregnancy; Low back pain; Physical activity; PPAQ

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Background

Low back pain (LBP) it's a very common condition and frequently affects women during pregnancy and has a great impact on their daily lives [1,2], in terms of quality of life, public health costs and productivity [2,3]. According to several studies, the development of LBP during pregnancy is related to low physical activity (PA) levels of pregnant women [4–6]. PA and exercise provide physiological benefits for pregnant women, without compromising fetal growth or adversely impacting pregnancy, labor and delivery [7–9]. PA is of the utmost importance to life-long health and PA levels tend to decrease during pregnancy, community health promoters should evaluate whether lack of PA during pregnancy somehow influences the presence of pregnancy-related LBP, so that appropriate strategies for prevention and treatment can be established [10,11]. The evidence for the facts described is scarce, thus, the present study aimed to assess the prevalence of LBP and its association with type and intensity of PA during pregnancy.

Subjects and Methods

Study Design

A longitudinal prospective study was carried out at 11 health care centers in Portugal throughout September 2009 to November 2011. Women were invited to participate in the study during their first trimesters and were reassessed during their second and third trimesters.

The inclusion criteria used in this study were: women with confirmed pregnancies and less than 15 weeks of gestation (WG) for the first trimester, women with 15 to 28 WG for the second trimester and women with more than 28 WG for the third.

Women were considered ineligible if they had any of the following characteristics: diabetes, hypertension, heart disease or chronic disease; multiple gestation; age less than 18 or over 40 years; lack of competence in the Portuguese language or cognitive inability to answer a questionnaire [12].

One hundred eight-five women were eligible for inclusion in the present sample (Figure 1). Thirty-seven women were excluded. Thirty (20.3%) were dropped during the follow-up period for not completing questionnaires correctly. The net sample consisted of 118 pregnant women.

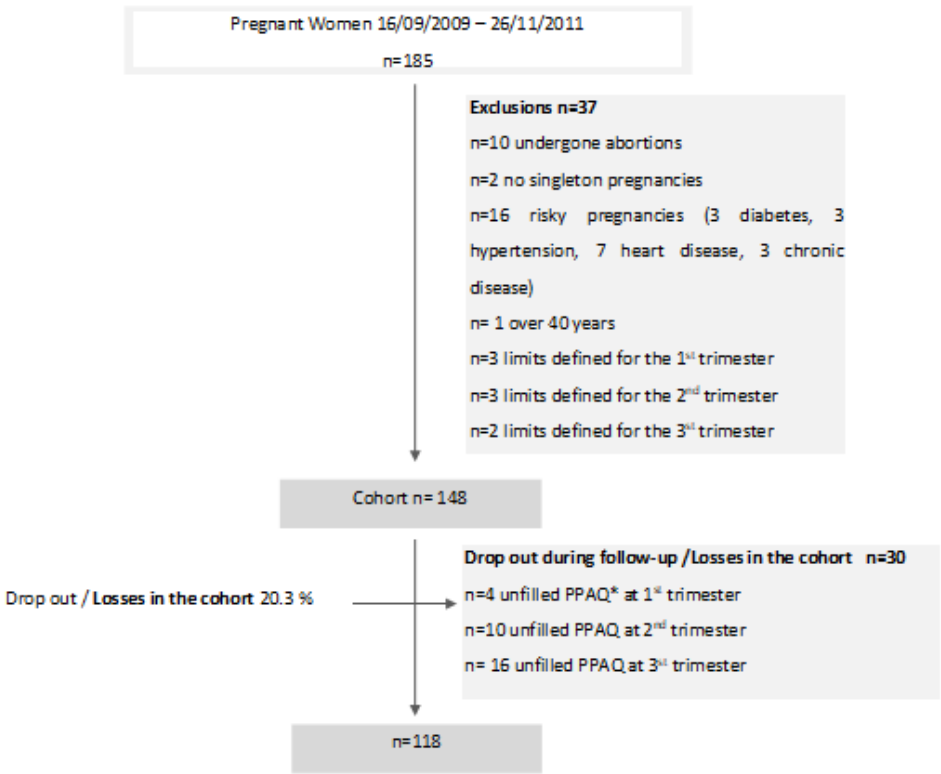

Figure 1: Chart of exclusions and losses in the cohort

There were no significant differences between the net sample and losses, the two groups had similar baseline characteristics.

Assessment Instruments

Data were collected during each trimester of pregnancy by trained nurses who administered structured and self-reported questionnaires.

Pre-pregnancy BMI was estimated from self-reported pre-pregnancy weight and height, using the formula: $BMI=weight(kg)/height^2(m^2)$. Pre-pregnancy BMI was categorized according to Institute of Medicine [13] guidelines: *underweight*, *normal weight*, *overweight* and *obese*.

LBP was assessed using closed-ended questions that had been included in previously reported questionnaires. A woman was considered to have point LBP if she gave a positive answer to the specific question, *Have you ever felt LBP (pain in the lower back) during this gestational trimester?* If women answered this question affirmatively, they were asked to report the gestational week in which the pain began. A woman was considered to have period LBP if she gave a positive answer to the previously mentioned question in at least one of the three trimesters of pregnancy. A woman was considered to have pre-pregnancy LBP if she affirmatively answered the question, *Have you ever felt LBP (pain in the lower back) before becoming pregnant?*

Physical Activity (PA) Measurement

PA levels were determined using the Pregnancy Physical Activity Questionnaire (PPAQ)[12], a self-reported questionnaire that evaluates the type, duration and frequency of PA performed by pregnant women. Each activity was classified according to intensity – sedentary (<1.5 METs), light (1.5-3.0 METs), moderate (3.1-6.0 METs) or vigorous (>6.0 METs), and according to type – household/ caregiving, occupational and sports/exercise.

Procedures

Eleven local health centers agreed to participate. The assessment instruments were individually administered during maternal health consultations that were held in each pregnancy trimesters.

Ethics

Ethical approval for the present study was obtained from the relevant institutional ethics committees.

Statistics

Descriptive data are presented as means and standard deviations. Associations between variables were analyzed via statistical inference. Yates continuity correction was used for analysis of 2x2 contingence tables. Binary logistic regression models were constructed to verify the relationship between LBP and type, intensity of PA in all trimesters and LBP pre-pregnancy. Statistical significance was defined as a *P*-value <0.05. Statistical analysis was conducted using PASW statistic v. 18 (SPSS, Chicago, Illinois, USA).

Results

The baseline characteristics of the sample are shown in Table 1. The final sample included 118 pregnant women, with a mean age of 28.8±4.85 years. About half of women had only primary education; 78.0% were employed full time. Half of women were primigest, and 34.2% were overweight/obese prior to becoming pregnant. There were no significant differences between women with and without LBP when it came to age, educational level, marital and professional status, monthly income, pre-pregnancy BMI and number of gestations ($p>0.05$ for all). Groups were only statistically different in terms of pre-pregnancy LBP (79.2% vs. 28.8%, $p<0.001$).

Table 1: Descriptive Characteristic of Sample at Baseline

	n	Total	LBP		P value[1]
			Yes(n=48)	no (n=70)	
Age (years)	118				
[18, 30]		76(64.4)	34(70.8)	42(60.0)	0.312
[31, 40]		42(35.6)	14(29.2)	28(40.0)	
Educational level	118				
Mandatory or Less		58(49.2)	22(45.8)	36(51.4)	0.836
Secondary		44(37.3)	19(39.6)	25(35.7)	
College/University		16(13.6)	7(14.6)	9(12.9)	
Marital status	118				
Married/ Cohabitate		102(86.4)	41(85.4)	61(87.1)	0.788
Single/ Divorced		16(13.6)	7(14.6)	9(12.9)	
Professional status	118				
Employed /Student		92(78.0)	39(81.3)	53(75.7)	0.476
Unemployed		26(22.0)	9(18.8)	17(24.3)	
Monthly Income (€)	102				
<500		29(28.4)	11(26.2)	18(30.0)	0.548
[500 -1250[		47(46.1)	22(52.4)	25(41.7)	
≥1250		26(26)	9(21.4)	17(28.3)	
Pre-pregnancy BMI	117				
Underweight		4(3.4)	-	4(5.8)	0.424*
Normal Weight		73(62.4)	29(60.4)	44(63.8)	
Overweight/ Obese		40(34.2)	19(39.6)	21(30.4)	
Pregnancy weight gain**	116				
undergainer		30(25.9)	13(27.7)	17(24.6)	0.486
Appropriate gain		42(36.2)	14(29.8)	28(40.6)	
Over gain		44(37.9)	20(42.6)	24(34.8)	
Number of gestations	118				
Primigest		59(50.0)	24(50.0)	35(50.0)	1.000
Multigest		59(50.0)	24(50.0)	35(50.0)	
Pre-pregancy low back pain	118				
Yes		46(39.0)	38(79.2)	8(11.4)	<0.001
No		72(61.0)	10(20.8)	62(88.6)	

Results expressed as number (%); LBP– low back pain; BMI – Body Mass Index.

[1]Comparison between subjects with and without low back pain, using χ^2 test.

*p value refers only to Normal Weight and Overweight/ Obese **measure at the end of study

Pregnancy-related Low Back Pain Prevalence

Pre-pregnancy LPB was reported by 39.0% of women. There was a progressive increase in the frequency of LBP during pregnancy: 40.7%, 52.2% and 66.7% in the first, second and third trimesters, respectively (Figure 1). The period prevalence of LBP was 76.3%.

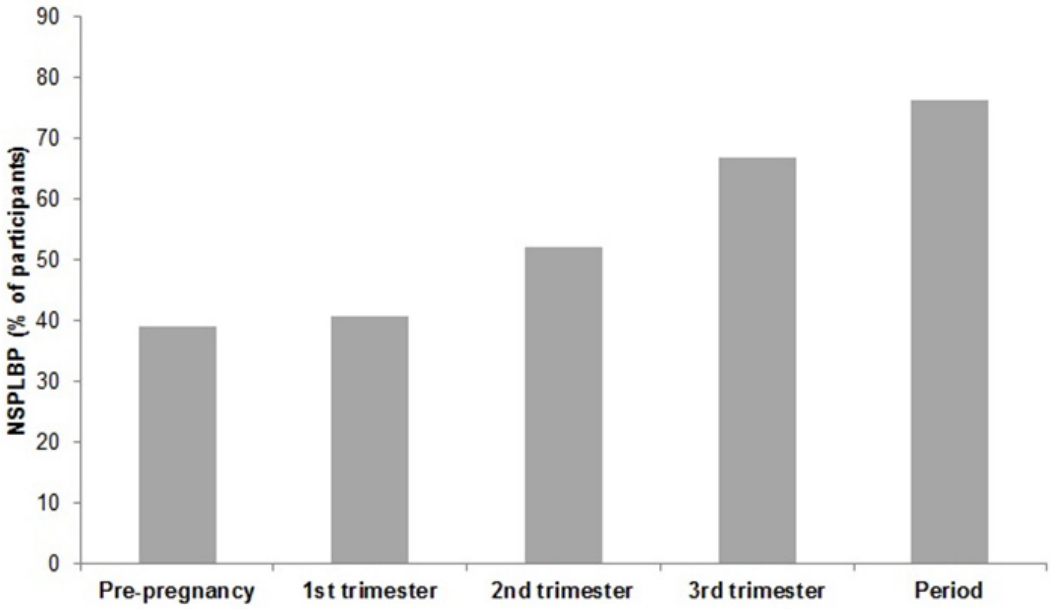

Figure 1: Prevalence of low back pain before and during pregnancy

(Pre-pregnancy: n=118; 1st trimester: n=118; 2nd trimester: n=115; 3rd trimester: n=117)

As regards the incidence of LBP, there were 10, 28 and 24 new cases in the first, second and third trimesters, respectively. Concerning the time during pregnancy at which symptoms of LBP began in new cases, a mean of 5.9±4.73 WG was found in the first trimester, 18.0±6.15 WG in the second trimester and 28±5.32 WG in the third trimester. However, first appearance of pain symptoms was reported throughout pregnancy, from the gestational age of 1 week until 37 WG.

Pregnancy-related Low Back Pain and Physical Activity

It was found that type and intensity of PA were not associated with LBP, except when it came to *household/caregiving* activities, where there were statistically significant differences between tertiles: during their second trimesters, women who were in the third tertile had a less LBP than women in the other tertiles (tertile 1 – 40.0%; tertile 2 – 38.3%; tertile 3 – 21.7%, p= 0,042- data not show).

We found no correlation between LBP and type and intensity of PA, however women who had LBP before pregnancy, compared to those who did not, had higher odds of expressing LBP during pregnancy (OR= 3.85, 95% CI: 1.344-11.025- data do not show).

Discussion

Several studies have attempted to understand the extent to which LBP affects pregnant women and impacts public health [14–16]. The present study found the period prevalence of LBP to be 76.3%. However, pre-pregnancy LBP seemed to be a significant risk factor for the development of LBP, possibly increasing LBP prevalence. The musculoskeletal changes found in women with pre-pregnancy LBP may thus be exacerbated during pregnancy, due to associated physiological changes [10,15,17].

Recently, Omoke et al, (2021) reported prevalence values that were lower than those found in the present study – 28.9% n=138 [18]. Nevertheless, the women were interviewed, during admission to the ward, 2 to 7 days after delivery, which can lead to memory bias. On the other hand, Mogren (2005) found the prevalence of lumbopelvic pain to be 71.7% (n=639), a value closer to the one found in the present study for period LBP [19].

The onset of symptoms may occur throughout pregnancy – at 1 WG at the earliest, and at 39 WG at the latest [19], however, are more frequent in third gestational trimester [20,21], this findings mirrors those of the present study. Although pregnancy-related LBP seems to develop during any trimester of

pregnancy, the factors underlying it may vary. The biomechanical changes that occur during pregnancy appear to be the main explanation [22] – mainly the anterior displacement of a woman's center of mass [7,23], which increases the momentum of forces applied to the lumbar spine [24]. Furthermore, abdominal muscles stretch to accommodate the expanding uterus, and thus their ability to perform their postural functions gradually decreases [24]. However, a considerable portion of women first experienced LBP during their first trimesters, when biomechanical changes are not yet significant [24]. This suggests that, in some cases, pain may also be related to hormonal changes –increase of the hormone relaxin, which causes the relaxation of connective tissue, leading to greater ligamental laxity [7,23], particularly in the lumbopelvic join [14,22].

A downward trend in PA levels during pregnancy was observed, as reflected by PPAQ total activity scores. However, PPAQ scores by intensity and type showed that the values found with the present Portuguese sample were higher than those found with other samples in other studies (e.g. in the US, [12], Vietnam [25] and Brazil [26]). This could be due to cultural differences in the samples.

LBP frequency was not proven to be associated with either type or intensity of PA levels during pregnancy. An association was only found between this condition and *household/caregiving*. Some authors have studied the possible influence of organized PA practice during pregnancy on the development of LBP, but their conclusions have not been in agreement [22]. Recently, randomized studies [27–29], were carried out to assess the effectiveness of a specific exercise program on the prevention or reduction of LBP, and found that it was beneficial[27–29]. Furthermore, other study concluded in a follow-up study (n=891) that a greater number of years of leisure PA before pregnancy decreased the risk of developing lumbopelvic pain during this period. The author suggested that women's pre-pregnancy physical conditions may be a stronger predictor of the development of LBP during pregnancy [19]. Moreover, it should be noted that most of the women in the present study reported having LBP before pregnancy, which means that they could have already had muscle imbalances that worsened during pregnancy.

These results suggest that PA itself may lead to health gains in those with specific conditions, such as diabetes and hypertension, overweight/ obesity but may not be enough for those with neuromusculoskeletal conditions, such as LBP. Indeed, pregnant women may need to perform more focused and specific exercises (muscles responsible for lumbopelvic stability). Health care providers will play key roles in monitoring pregnant women while providing holistic and personalized approaches.

This study's main limitation is its subjective assessment of PA. Although the PPAQ is a specific, self-administered way to assess PA among pregnant women, and despite its good psychometric characteristics, it is only able to measure pregnant women's perceptions of PA. However, the community context in which the study was carried out made it difficult to use objective instruments.

Thus, future studies should be carried out with larger samples, so that more assertive conclusions can be drawn about the influence of PA during pregnancy on gestational LBP.

Conclusion

LBP is a common condition among pregnant women and should thus be considered a major public health issue. The present study suggests that women who had LBP before pregnancy, compared to those who did not, had higher odds of expressing LBP during pregnancy. This condition is not associated with type and intensity of physical activity during pregnancy, except when it comes to *household/ caregiving* activities during a specific period.

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