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ORIGINAL ARTICLE

Previous physical activity decreases the risk of low back pain and pelvic pain during pregnancy

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Abstract

Aims: The aim of the study was to investigate physical activity prior to pregnancy, occupation, and treatment in women with low back pain and pelvic pain (LBPP) during pregnancy. **Methods:** All women who gave birth at two hospitals in northern Sweden from 1 January 2002 to 30 April 2002 were invited to complete a questionnaire on their obstetric and gynaecological history, actual pregnancy, and delivery. The sample was analysed with calculation of odds ratios (OR) and their 95% confidence intervals (CI). Cox regression analyses were performed. Women with LBPP reporting a pain maximum of 7 or more on a visual analogue scale (0–10 cm) were considered to have “high pain score LBPP” (hps-LBPP). **Results:** The response rate was 83% ($n=891$). A higher number of years of regular leisure physical activity (RLPA) decreased the risk of LBPP during pregnancy. The risk of hps-LBPP was increased for women who characterized their occupation as “mainly active” (OR=2.0, 95% CI: 1.1–3.5) and “physically demanding” (OR=1.9, 95% CI: 1.1–3.2). Visiting a physician as a result of LBPP was reported by 46.2%, and the mean number of visits was 2.0. One-third of women with LBPP had received treatment, as had half of women with hps-LBPP. **Conclusions:** A higher number of years of previous RLPA decreases the risk of LBPP during pregnancy. Occupations described as “mainly active” and “physically demanding” are associated with increased risk of hps-LBPP during pregnancy.

Key Words: Low back pain, occupation, pelvic pain, physical activity, pregnancy, treatment

Background

Low back pain and pelvic pain is a common condition during pregnancy, with prevalence reported to vary between 24% and 90% in different studies [1–5]. Peripartum pelvic pain interferes with most activities of daily living and with sexual life [6,7], and back pain is a severe problem in one-third of pregnant women [3]. The risk of relapse is estimated to be 85% during a subsequent pregnancy [6].

The literature on and recommendations for physical activity during pregnancy are substantial [8–11]. Leisure physical activity during pregnancy has been concluded to have mainly neutral or favourable effects [9]. Studies of occupational physical activity indicate an association between

heavy physical work and lower birth weight and shorter gestation [9]; however, the body of data on strenuous work and its effects on nutrition and adverse pregnancy outcomes is limited [12]. Although leisure physical activity during pregnancy has been investigated considerably, little is found in the literature on the effects of previous leisure physical activity and low back pain and pelvic pain during pregnancy.

A great variety of treatments exists for LBPP during pregnancy, probably reflecting both the absence of a single effective treatment and the range of LBPP symptoms during pregnancy. A systematic review concluded that no strong evidence exists regarding the effect of physical therapy interventions on the prevention and treatment of back and pelvic

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pain related to pregnancy [13], although some of the studies included showed beneficial effects of treatments such as individual physical training programmes [14], water gymnastics [15] and acupuncture [16].

Aims

The aim of this study was to investigate regular leisure physical activity (RLPA) prior to pregnancy, occupation, and treatment among women with LBPP during pregnancy.

Material and methods

All women who delivered in the Departments of Obstetrics and Gynaecology at Umeå University Hospital (UUH) and at Sunderby Hospital (SH) in the counties of Västerbotten and Norrbotten in northern Sweden were invited to complete a questionnaire containing questions on their obstetric and gynaecological history, actual pregnancy and delivery. Within approximately 24 hours after the delivery the woman received verbal and printed information on the aims and the consequences of participation in the study from an on-duty midwife. Voluntary participation was emphasized. If the woman gave her verbal consent, she received a questionnaire with a unique identification number. The questionnaire was usually collected before discharge from hospital; women who had not completed the questionnaire were given a prepaid envelope. Some patients who had given birth at UUH and who had been overlooked in the initial request to participate in the study were contacted by telephone. They were thus informed of the study and if they agreed to participate, they were sent a questionnaire by post. Missing cases at SH were not telephoned owing to lack of personnel.

Identification number, unique questionnaire number, date of distribution, and date of collection of the questionnaire were recorded for each participant. If a woman declined participation her civic number was recorded for analysis of missing data. To be included in the study the women had to be delivered at a gestational age of at least 23 weeks with live or stillbirth. The study used a cross-sectional design, and was conducted over a period of four months. The first date of inclusion (date of delivery) was 1 January 2002 and the last date was 30 April 2002 in both departments.

Ethics

The study was approved by the Ethics Committee at the Umeå University (Dnr 01-335), and each woman gave her informed verbal consent.

Definitions and abbreviations

1. *Low back pain or pelvic pain during pregnancy (LBPP)* was defined as "recurrent or continuous pain for more than 1 week from the lumbar spine or pelvis" during actual pregnancy. A woman was considered to have had LBPP during pregnancy if she answered positively a specific question about LBPP with patient-drawn markings of localization of pain on a schematic diagram in the questionnaire (Figure 1). Women with LBPP were requested to report their highest pain score due to LBPP during their pregnancy *before* delivery on a visual analogue scale (VAS), where 0 denoted "no pain" and 10 denoted "worst imaginable pain". Patients with a maximum of 7 or higher on a self-rated pain score (VAS) were considered to have *high pain score LBPP* (hps-LBPP).
2. *Crude odds ratio*. Abbreviated as "COR".
3. *Crude relative risk*. Abbreviated as "CRR".
4. *Regular leisure physical activity*. Abbreviated as "RLPA".

Statistics

Mean values and standard deviations were calculated for parametric data. Independent-samples *t*-test and Pearson's chi-squared test were used to test the difference between two groups for parametric and categorical data, respectively. The sample was

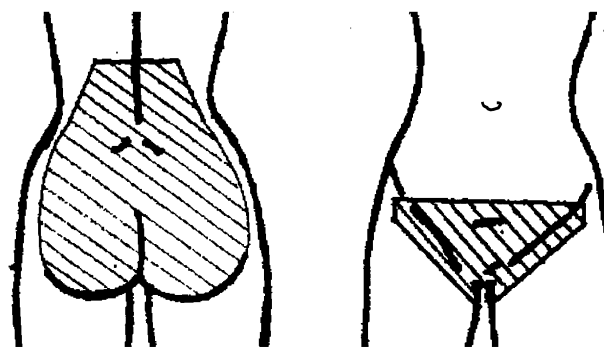


Figure 1. Reported localization of low back pain and pelvic pain during pregnancy.

analysed with calculation of odds ratios (OR) and their 95% confidence intervals (CI) in univariate and multivariate logistic regression for LBPP during pregnancy in relation to different background variables. In multivariate logistic regression OR^a denoted odds ratio with adjustment of place of delivery, and parity. Cox regression analyses were used to calculate the relative risk (RR) and its 95% CI in univariate and multivariate analyses. The period under investigation comprised from the woman's own birth date until inclusion as a participant in the study (i.e. date of delivery). To evaluate response consistency in the questionnaire, Cohen's kappa or the intra-class correlation coefficient was calculated for a subgroup of participants ($n=25$) who completed a second identical questionnaire.

Results

Main occupation before pregnancy

A minor percentage of the women were unemployed or searching for work (Table I). The participants were requested to characterize their occupation using different given labels in the questionnaire (Table I). The risk of developing hps-LBPP was increased for women who characterized their work as "alternating sedentary and active" (COR=2.06, 95% CI: 1.15–3.66, OR^a=1.97, 95% CI: 1.09–3.56) or "mainly active" (COR=2.02, 95% CI: 1.18–3.46, OR^a=2.01, 95% CI: 1.15–3.50) compared with women who characterized their work as "mainly sedentary". The risk of hps-LBPP was increased if the woman characterized her work as "alternating physically demanding and light" (COR=1.60, 95% CI: 1.01–2.50, OR^a=1.51, 95% CI: 0.94–2.40) and "physically demanding" (COR=1.92, 95% CI: 1.16–3.16, OR^a=2.02, 95% CI: 1.19–3.40). Characteristics such as "mentally stimulating/unstimulating" or "intellectually stimulating/unstimulating" did not influence the risk of either LBPP or hps-LBPP.

Physical activity prior to pregnancy

Four of five women reported RLPA during some period in their lives (Table II). A higher number of years of RLPA decreased the risk of LBPP and hps-LBPP during pregnancy in the Cox (primiparity) and logistic regression analyses (all parity) (Table III). The associations were strengthened when adjusting for age at start of RLPA (Table III). The reported physical activities

showed a great variety among the participants (not presented).

Treatment of LBPP during pregnancy

Visit to a physician due to LBPP was reported by 46.2% ($n=295$) of women with LBPP, and the mean number of visits was 2.0 (SD=1.5, range 1–12). Among women with hps-LBPP, 62.8% ($n=130$) had visited a physician (LBPP as cause of visit) and the mean number of visits was 2.4 (SD=1.8, range 1–12). Of women with LBPP, 32.7% ($n=209$) had received some treatment. The corresponding figure for hps-LBPP was 51.2% ($n=106$). Different types of treatment, self-reported effect of treatment, and highest mean VAS due to LBPP during pregnancy are presented in Table IV. We have previously reported that the highest mean VAS (due to LBPP during pregnancy) for the whole group was 5.8 [17]. Of those women with LBPP who received some treatment the majority had received more than one type of treatment.

Discussion

We have previously reported results from this sample regarding prevalence and risk factors for LBPP during pregnancy [17]. We found a high prevalence of LBPP (72%) among our participants, which is probably an overestimation of the true prevalence; however, a majority of pregnant women experience LBPP during pregnancy [17]. Parity, body mass index, history of hyper-mobility, amenorrhoea, and previous LBPP were factors influencing the risk of development of LBPP [17]. In the current paper we have explored the effects of background factors such as RLPA prior to pregnancy and occupation on the prevalence of LBPP. We have further investigated self-reported assessments of different treatments for LBPP during pregnancy.

Main occupation before pregnancy

Occupations before pregnancy described as "mainly active" and "physically demanding" were associated with increased risk of hps-LBPP during pregnancy. We did not investigate any change of occupation during pregnancy since most Swedish women whose occupation is associated with physical strain will receive sick leave or maternity leave [18], and few women will change occupations during a pregnancy. In a Norwegian study, women with low control over their work pace were found to have increased risks for disabling posterior pelvic pain and for low back

Table I. Main occupation and description of occupation before pregnancy. Pearson's chi-squared used to test the difference between two groups ("LBPP"^a in relation to "No LBPP", and "hps-LBPP"^b in relation to "No LBPP").

Variable	All subjects		No LBPP		LBPP		hps-LBPP	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Number of participants	891	(100.0)	252	(28.3)	639	(71.7)	207	(23.2)
Main occupation before pregnancy ^c	874	(98.1)	240	(95.2)	634	(99.2)	206	(99.5)
In full-/part-time work	600	(68.6)	179	(74.6)	421	(66.4)	125	(60.7)
Student	101	(11.6)	25	(10.4)	76	(12.0)	25	(12.1)
Parental leave	61	(7.0)	10	(4.2)	51	(8.0)	21	(10.2)
Unemployed/ searching for work	41	(4.7)	12	(5.0)	29	(4.6)	7	(3.4)
Sick leave	71	(8.1)	14	(5.8)	57	(9.0)	28	(13.6)
Pearson's chi-squared test					$p=0.091$		$p=0.002$	
Characteristics of occupation (A) ^c	869	(97.5)	238	(94.4)	631	(98.7)	202	(97.6)
Mainly sedentary	167	(19.2)	55	(23.1)	112	(17.7)	26	(12.9)
Mainly active	428	(49.3)	113	(47.5)	315	(49.9)	108	(53.5)
Alternating sedentary and active	274	(31.5)	70	(29.4)	204	(32.3)	68	(33.7)
Pearson's chi-squared test					$p=0.196$		$p=0.022$	
Characteristics of occupation (B) ^c	839	(94.2)	231	(91.7)	608	(95.1)	199	(96.1)
Physically demanding	223	(26.6)	53	(22.9)	170	(28.0)	61	(30.7)
Physically light	278	(33.1)	90	(39.0)	188	(30.9)	54	(27.1)
Alternating physically demanding and light	338	(40.3)	88	(38.1)	250	(41.1)	84	(42.2)
Pearson's chi-squared test					$p=0.073$		$p=0.026$	
Characteristics of occupation (C) ^c	808	(90.7)	224	(88.9)	584	(91.4)	187	(90.3)
Mentally stimulating	191	(23.6)	45	(20.1)	146	(25.0)	52	(27.8)
Mentally unstimulating	197	(24.4)	60	(26.8)	137	(23.5)	42	(22.5)
Alternating mentally stimulating and unstimulating	420	(52.0)	119	(53.1)	301	(51.5)	93	(49.7)
Pearson's chi-squared test					$p=0.292$		$p=0.168$	
Characteristics of occupation (D) ^c	824	(92.5)	229	(90.9)	595	(93.1)	190	(91.8)
Intellectually stimulating	387	(47.0)	111	(48.5)	276	(46.4)	94	(49.5)
Intellectually unstimulating	100	(12.1)	25	(10.9)	75	(12.6)	26	(13.7)
Alternating intellectually stimulating and unstimulating	337	(40.9)	93	(40.6)	244	(41.0)	70	(36.8)
Pearson's chi-squared test					$p=0.760$		$p=0.590$	

^aLBPP=low back pain and pelvic pain; ^bhps-LBPP=high-pain-score LBPP; ^cfirst row in each section represents the total number of subjects responding (the percentage presented is the proportion of all respondents).

pain [19]. We did not enquire about other occupational exposures that may also have contributed to the risk of LBPP during pregnancy.

Strenuous occupation has been found to be associated with adverse pregnancy outcomes such as low birth weight and lower gestational age although the body of data in this field is restricted [9,12]. In the literature low gestational age has not been associated with LBPP, and women with LBPP

had a similar gestational age to those women without LBPP in our study [17].

Physical activity prior to pregnancy

Many studies have investigated the general effects of physical activity on pregnancy; however, to our knowledge no previous study has investigated self-reported previous RLPA and risk of LBPP during pregnancy.

Table II. Regular leisure physical activity (RLPA) before pregnancy. Independent samples *t*-test used to test the difference between groups (“LBPP”^a in relation to “No LBPP”, and “hps-LBPP”^b in relation to “No LBPP”).

Variable	All subjects		No LBPP		LBPP		hps-LBPP	
	No.	%	No.	%	No.	%	No.	%
RLPA during some period in life	881	(98.9)	249	(98.8)	632	(98.9)	206	(99.5)
Yes	709	(80.5)	198	(79.5)	511	(80.9)	165	(80.1)
No	172	(19.5)	51	(20.5)	121	(19.1)	41	(19.9)
<i>t</i> -test					<i>p</i> =0.653		<i>p</i> =0.879	
	No.	Mean, SD range (years)	No.	Mean, SD range (years)	No.	Mean, SD range (years)	No.	Mean, SD range, (years)
Age at start of RLPA	677	12.6, 5.3 1–40	187	12.3, 5.0 1–26	490	12.8, 5.5 3–40	159	12.5, 5.4 3–40
<i>t</i> -test					<i>p</i> =0.303		<i>p</i> =0.708	
No. of years of RLPA	681	11.8, 7.0 1–38	191	12.9, 7.6 1–38	490	11.4, 6.8 1–30	157	11.4, 6.5 1–27
<i>t</i> -test					<i>p</i> =0.010		<i>p</i> =0.045	
	No.	Mean no of events, SD, range	No.	Mean no of events, SD, range	No.	Mean no of events, SD, range	No.	Mean no of events, SD, range
Maximum number of physical activity events per week during some period in life	696	4.2, 1.6 1–15	191	4.2, SD 1.7 1–15	505	4.2, SD 1.5 1–11	162	4.2, 1.5 1–9

^aLBPP=low back pain and pelvic pain; ^bhps-LBPP=high-pain-score LBPP.

A higher number of years of previous RLPA decreased the risk of LBPP and hps-LBPP during pregnancy. We did not enquire about leisure physical activities during pregnancy, which may also influence the experience, and perhaps the prevalence, of LBPP during pregnancy. The association between increasing number of years of previous

RLPA and decreasing risk of LBPP and hps-LBPP may have different explanatory factors. One of the crucial determinants in the development of LBPP during pregnancy may be the woman’s actual physical condition at the beginning of pregnancy. Previous physical training is clearly a determinant of actual physical status. Actual physical condition at

Table III. Impact of regular physical leisure activity (RLPA) on LBPP^a and hps-LBPP^b during pregnancy, univariate and multivariate Cox regression and logistic regression models.

Variable	Cox regression, primiparous women				Logistic regression, all women					
	Crude relative risk (CRR)		Adjusted for age at start of RLPA		Crude OR (OR)		Adjusted for parity		Adjusted for parity, and age at start of RLPA	
	CRR	CI 95%	RR	CI 95%	COR	CI 95%	OR	CI 95%	OR	CI 95%
LBPP										
No. of years of regular physical leisure activity										
1–5 years	1.00		1.00		1.00		1.00		1.00	
6–10 years	0.97	0.65–1.44	0.86	0.57–1.28	0.94	0.58–1.53	0.95	0.58–1.56	0.83	0.49–1.42
11–15 years	0.79	0.52–1.20	0.70	0.46–1.07	0.92	0.55–1.53	0.94	0.56–1.57	0.82	0.46–1.44
16–20 years	0.52	0.32–0.85	0.39	0.23–0.65	0.72	0.42–1.22	0.71	0.41–1.22	0.58	0.31–1.06
21–38 years	0.23	0.12–0.41	0.17	0.09–0.31	0.49	0.26–0.89	0.51	0.27–0.93	0.39	0.19–0.79
Hps-LBPP										
No. of years of regular physical leisure activity										
1–5 years	1.00		1.00		1.00		1.00		1.00	
6–10 years	0.76	0.32–1.79	0.67	0.27–1.62	1.03	0.56–1.88	1.00	0.53–1.85	0.84	0.42–1.67
11–15 years	0.67	0.28–1.58	0.60	0.24–1.47	0.78	0.40–1.50	0.81	0.41–1.58	0.66	0.31–1.42
16–20 years	0.56	0.24–1.28	0.44	0.18–1.08	0.97	0.51–1.84	1.08	0.55–2.09	0.83	0.38–1.80
21–38 years	0.13	0.04–0.44	0.10	0.02–0.39	0.35	0.14–0.84	0.36	0.14–0.89	0.24	0.08–0.67

^aLBPP=low back pain and pelvic pain; ^bhps-LBPP=high-pain-score LBPP.

Table IV. Self-reported treatments^a for LBPP^b during pregnancy and highest scored pain level (VAS) due to LBPP during pregnancy.

Variable	Total number treated	No effect (%)	Some effect (%)	Good effect (%)	Highest scored pain level (VAS) due to LBPP during pregnancy			
	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	Mean	SD	Range
Treatment by physiotherapist	61	13 (21.3)	32 (52.5)	16 (26.2%)	61	6.9	1.5	4–10
Transcutaneous nerve stimulation (TNS)	41	7 (17.1)	24 (58.5)	10 (24.4)	40	6.6	2.4	1.7–10
Pharmacological treatment	27	2 (7.4)	15 (55.6)	10 (37.0)	27	7.2	1.6	4–9.9
Acupuncture	34	3 (8.8)	5 (14.7)	26 (76.5)	34	8.2	1.4	3.5–10
Water gymnastics	70	4 (5.7)	32 (45.7)	34 (48.6)	70	6.6	1.8	1.7–10
Pelvic belt	130	37 (28.5)	71 (54.6)	22 (16.9)	129	6.8	1.9	1.3–10
Other treatments	10	–	5 (50.0)	5 (50.0)	10	6.9	2.4	2.9–10

^aA majority of subjects have reported more than one type of treatment; ^bLBPP=low back pain and pelvic pain.

the start of pregnancy and predisposition to LBPP (such as LBPP during previous pregnancy, parity, and hyper-mobile joints) may be stronger predictors for development of LBPP during pregnancy than leisure physical training *during* pregnancy. The achieved general beneficial effects of physical activity and its specific effects on joints and muscles may prevent or decrease the pain and the functional symptoms of pregnancy-related LBPP. However, most probably the group of women with many years of RLPA may be less predisposed to LBPP during pregnancy, and thus capable of higher amounts of physical training. On the other hand, women with LBPP during pregnancy may have been encouraged to increase their RLPA after pregnancy with the aim of preventing future low back and pelvic problems.

Physical therapy and other treatments for LBPP during pregnancy

Studies on physical therapy during pregnancy have presented differing results such as positive effects of an individual physical programme [14] and of water gymnastics [15], and no difference in pain during pregnancy and the postpartum period related to physical therapy during pregnancy [20]. Whether physical therapy is effective for LBPP during pregnancy must be regarded as an unsolved question at the moment. Furthermore, physical therapy should not be considered a single entity since it includes various categories of treatment.

Approximately one-third of women in our study received some treatment for LBPP during pregnancy, and approximately half had visited a physician at least once. Women who had received treatments for LBPP scored a higher mean VAS

(due to LBPP during pregnancy) compared with the LBPP group as a whole [17]. Patients treated with acupuncture indicated the highest mean VAS, and acupuncture was assessed as having a highly positive effect. A pelvic belt was the most prevalent therapy, although it was not assessed as the most efficient by the participants. The reported methods of treatment work through different physical and biochemical mechanisms, and probably reflect the varied clinical picture of LBPP during pregnancy and the absence of clear-cut definitions of LBPP.

Methodological considerations

The validity of the data has been discussed extensively in a previous publication [17]. The sample comprised 1,071 eligible women and the participation rate was 83.2%. The non-respondents were of the same age, and had experienced the same number of pregnancies and births, and the same delivery methods [17]. Preterm births were more frequent among non-respondents [17]. Response consistency was evaluated by having a subgroup of participants ($n=25$) complete the questionnaire a second time, within approximately 2–3 weeks of the collection of the primary questionnaire. There was total agreement (Cohen's kappa 1.0) between the first and the second set of answers on the maternal birth year, date of delivery, birth weight, and method of delivery [17]. Characteristics of occupation were divided into four parts (A–D), and Cohen's kappa was 0.70, 0.59, 0.85, and 0.60, for groups A, B, C, and D, respectively. Cohen's kappa was 1.0 whether or not RLPA had occurred during some period in life. Intra-class correlation coefficient was 0.69 (95% CI=0.34–0.97) for mean age at the start of RLPA, and the corresponding figure for number of years of

RLPA was 0.92 (0.80–0.97). Strength of agreement is usually considered to be good at the level of 0.61–0.80 and very good at 0.81–1.00 [21].

The association between physical activity prior to pregnancy and decreased risk of LBPP during pregnancy should be interpreted with caution since there may be different sources of bias, such as for example recall bias and misinterpretation of the questionnaire by the respondents.

Conclusions

A higher number of years of previous regular leisure physical activity decreases the risk of LBPP during pregnancy. Occupations described as “mainly active” and “physically demanding” are associated with increased risk of hps-LBPP during pregnancy. One-third of women with LBPP receive treatment during pregnancy.

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