Chapter 2

Understanding Peripartum Pelvic Pain

Implications of a patient survey

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CHAPTER 2

Abstract

Study Design: An analysis was made of the self reported medical histories of patients with peripartum pelvic pain (PPPP).

Objectives: To compile an inventory of the disabilities of patients with peripartum pelvic pain. To analyze factors associated with the risk to develop the disease. To formulate a hypothesis on the pathogenesis, and specific preventive and therapeutic measures.

Summary of Background Data: Pregnancy is an important risk factor to develop chronic low back pain. Understanding the pathogenesis of pelvic and low back pain during pregnancy and delivery could be useful to understand and treat non specific low back pain.

Methods: By means of a questionnaire, background data were collected among patients of the Dutch 'Association for patients with pelvic complaints in relation to symphysiolysis'. Results were compared with the general population. Subgroups were compared with each other.

Results: PPPP seriously interferes with many activities of daily living such us standing, walking, sitting and all other activities in which the pelvis is involved. The majority feels a relapse around menstruation and a subsequent pregnancy. Occurrence of PPPP was associated with twin pregnancy, first pregnancy, higher age at first pregnancy, larger weight of the baby, forceps or vacuum extraction, fundus expression and a flexed position of the woman during childbirth; a negative association was observed with cesarean section.

Conclusions: We hypothesize that PPPP is caused by strain of ligaments in the pelvis and lower spine due to a combination of damage to ligaments (recently or in the past), hormonal effects, muscle weakness and the weight of the fetus.

Introduction

Pregnancy and childbirth elicit important psychosocial as well as physical changes. Pain in the pelvic or low back region are possible complications. In only a small percentage of these patients a clear diagnosis can be made (e.g. radicular compression, meralgia). In the majority the problems cannot be defined by objective methods, frequently resulting in suggestive and non-sense labels such us' pregnancy sciatica' and 'pelvic insufficiency'. When objective signs are found, such as separation of the pubic bones or enlarged mobility of the pelvic girdle, the relationship with symptoms remains speculative. We prefer to use the descriptive term Peri Partum Pelvic Pain (PPPP), defined as: pain in the pelvic region (with or without irradiation) which started during pregnancy or within the first three weeks after delivery, and for which no clear diagnosis is available to explain the symptoms.

The reported period-prevalence of pelvic and back pain during pregnancy ranges between 48 and 56%.[3,11,21,25] The pain is considered severe in 9 to 15%.[3,21] In a longitudinal study, pain at the time of delivery was reported by 67% of the women and by 37% 18 months postpartum, whereas 22% had ongoing back pain before pregnancy.[24] In retrospective studies among young and middle-aged women with chronic low back pain, 10 to 28% stated that their first episode of back pain occurred during a pregnancy.[4,36]

Pelvic pain is prominent around the sacroiliac (SI) joints and the symphysis. It frequently extends to other parts of the pelvis, the upper legs and, exceptionally, the lower legs.[11,25] PPPP is influenced by a variety of postures and movements.[1,10,21] Many patients show a characteristic waddling gait. Except for heavy physical loading and previous low back pain, no predisposing factors are known.[3,25]

The idea that an increased lumbar lordosis during pregnancy is responsible for PPPP is persistent,[10,11,16,18] however, in most women lordosis is smaller during pregnancy than post partum.[9,33] It is still tempting to speculate that complaints arising during pregnancy are, at least in part, caused by the weight of the fetus and uterus, altering the load on muscles, tendons and joints. Muscle weakness and insufficiency of pelvic ligaments could contribute to overload and pain.[11]

An additional explanation could be increased laxity of ligaments due to hormones.[32] MacLennan et al. found a higher serum-relaxin level in pregnant women with PPPP than in controls.[20] Mobility of the peripheral joints measured at the finger joints increases during pregnancies; it reaches higher levels in multiparous women than during the first pregnancy.[7,26] Increased mobility[1,17] and widening[1,14,17,19,37] of the pubic symphysis was well documented before the hazards of X-ray were realized. Anatomical studies in former days, when mortality during pregnancy and labor was not exceptional, show increased mobility of the SI joints[5]; often an increased amount of articular fluid was found.[2,29] Such an increase will influence the stability of the SI joints, since in these joints friction is important for stability.[39,40]

If complaints start immediately after a vaginal delivery it is obvious to assume that PPPP is caused by mechanical forces acting on the pelvic ring. On CT-scan performed within 24 hours of an uncomplicated vaginal delivery widening of the pubic symphysis was present in 42%, intra-articular gas in the symphysis in 28% and in the SI joints in 42% of the women. This implies that the joints underwent stretching.[13] Mechanical forces may also cause bleeding or synovial effusion into the joints.[12]

Recommendations to treat PPPP vary widely: rest, the use of a pelvic belt[1,3,28,38], local injections in the symphysis[31] and for severe cases, symphysiodesis with or without additional fusion of one or both SI joints.[23] The results of muscle and postural training and ergonomic advice are highly divergent.[9,22,28]

We may conclude that no consensus exists on the pathogenesis, treatment and prevention of PPPP.

A prospective study on the efficacy of therapy and prevention would be useful, but at first several questions have to be answered. The present study focuses on the following:

1. The kind and severity of complaints of patients with PPPP.
2. Factors associated with the risk to develop PPPP.
3. Therapeutic measures.

Clarification of these points will assist in formulating a hypothesis on the pathogenesis of PPPP and specific preventive and therapeutic measures.

Methods

The existence of a Dutch 'Association for patients with pelvic complaints in relation to symphysiolysis' offered the opportunity to contact a large number of motivated patients with PPPP. Most patients contacted the Patients' Association after an announcement in the magazine 'Today's Parents'. In the announcement the occurrence of pain in the symphysis region was emphasized. The magazine is predominantly read by young mothers; the great majority of them is well-educated and of Caucasian origin.

A questionnaire was sent to all patients who contacted the Patients' Association in the first 9 months after its foundation in 1990 (N = 622). The questions focused on the following themes:

1. Localization of the pain (this could be indicated by means of a drawing; see Figure 1).
2. Disabilities in relation to PPPP.
3. Possible influence of menstruation and a new pregnancy on the severity of the pain.
4. The time of onset of pain in relation to pregnancy and delivery and the duration of PPPP.
5. The age and height at the onset of problems, the weight before and after pregnancy and in which pregnancy the problems occurred.

6. The posture of the woman during delivery, the weight of the baby (babies), how the delivery was experienced and whether delivery was assisted by mechanical means (forceps, vacuum extractor, external compression on the abdomen) or cesarian section.
7. Therapeutic measures.

Patients were included if pain was felt in the symphysis region, the groins, the greater trochanter, the region of the SI joints and/or the lateral parts of the buttock (areas shaded in Figure 1). Excluded were patients with pain irradiating below the knee and patients in whom pain started before pregnancy or later than three weeks after childbirth.

Normally distributed data are presented as mean ± SD. For skewed distributions the median and range are presented. Unless another method is mentioned, frequencies are compared using the Chi-square test. $P < 0.05$ is considered significant.

Results

Of 622 patients 518 responded (83%). After applying the inclusion and exclusion criteria 394 women remained. The majority of them (96.7%) was born in the Netherlands.

Figure 1 summarizes the distribution of pain for all women. The number of regions indicated by the respondents ranged between 1 and 28, with a median of 7. It is noteworthy that the pubic region was indicated by 77% of the women. Other regions frequently indicated as painful were the groins (52 and 53%), the region of the posterior superior iliac spines (41 and 42%) and the coccyx (33%). Obviously there was no preference for the right or left side. Seventy-two women (18.2%) had pain exclusively at the anterior side of the body; 58 (15%) experienced pain in the median lumbar region (Figure 1). Activities of daily living which provoke pain are shown in Table 1. Of the 15 listed activities, 14 were painful in more than 45% of the women. Standing for 30 minutes was painful in 90%. It is noteworthy that 68% experienced pain during sexual intercourse. Only 8% of the women claimed pain when lying in bed for 30 minutes.

Apart from the influence of activities, pain was also influenced by menstruation and by new pregnancies. Seventy-two percent of the women claimed to have more pain around menstruation. Of the 394 women, 217 had one or more subsequent pregnancies; 85% of them experienced a relapse of PPPP during a new pregnancy.

Of the total group 262 women (66.5%) claimed that pain started during pregnancy. Pain could already be perceived during the first two months (in 12 women). The risk that PPPP developed was highest from the 3rd to the 7th month (in 84.3% of the cases; Figure 2). At the moment of the inquiry 88 women (22.2%) were free of pain. Their problems lasted between 2 and 72 months with a median of 6 months. In the subgroup

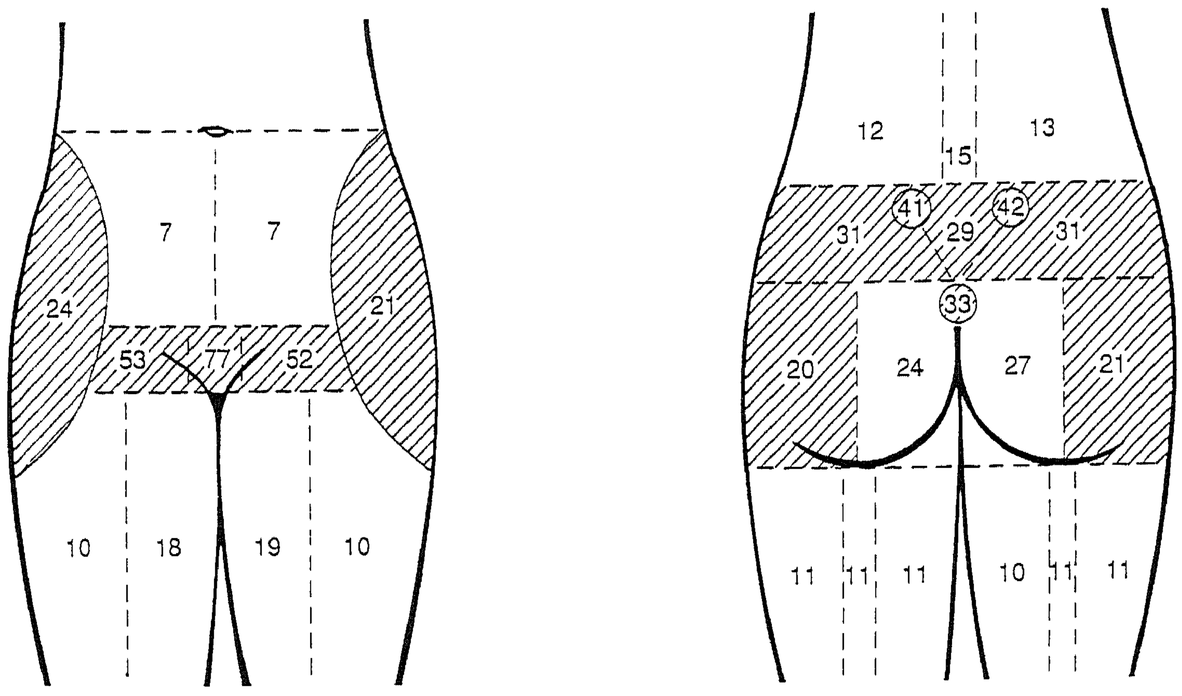

Figure 1. Percentages of the women (N = 394) experiencing pain in a specific area. Patients were included when pain was felt in at least one of the shaded areas.

Table 1. Activities of Daily Living that provoked pain (N = 394).

ADL	% of Patients
Standing for 30 minutes	90
Carrying a full shopping bag	86
Standing on one leg	81
Walking for 30 minutes	81
Climbing stairs	79
Turning over in bed	74
Sexual intercourse	68
Riding a bicycle for 30 minutes	63
Forward bending	62
Stepping into and out of bed	62
Driving a car for 30 minutes	52
Swimming	51
Sitting on a favorite chair for 30 minutes	49
Travelling by public transport	46
Lying in bed for 30 minutes	8

ADL = activity of daily living

with pain exclusively at the anterior side of the body the percentage free of pain was higher (53.7%) ($P = 0.000$) than in the total group, and in the subgroup with (a part of their) pain in the median lumbar region it was lower (8.9%) ($P < 0.009$). These

subgroups did not differ significantly from the rest of the group with respect to the other variables. In the women with ongoing pain (N = 306) the complaints lasted between 2 months and 27 years, with a median of 2 years.

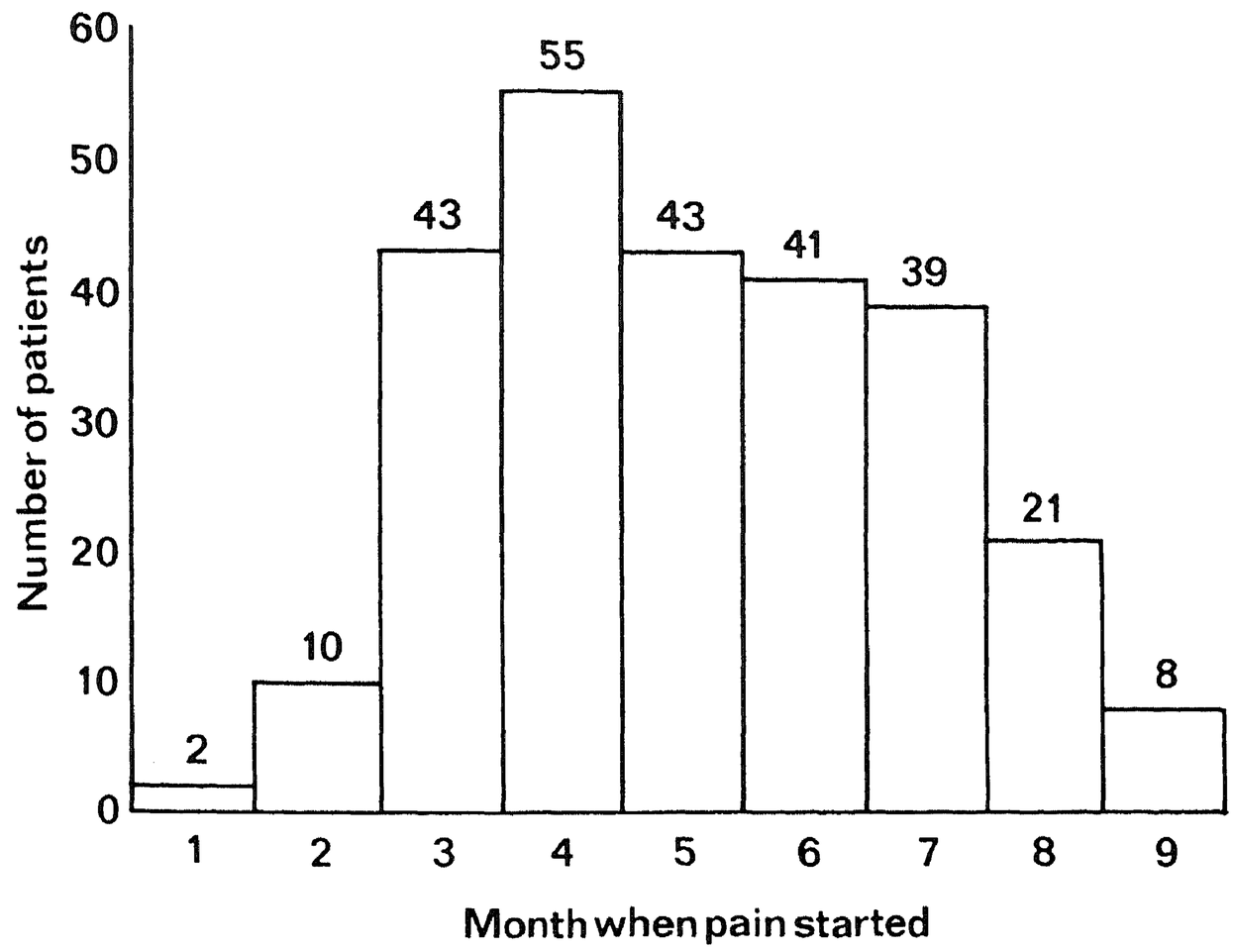

Figure 2. The month of pregnancy in which PPPP started (N = 262).

The complaints started in 89.1% of the patients in the period 1985-91, the median is 1989. In the following, possible risk factors will be compared with data on the general Dutch population in the year 1989 and if not available in 1988.

The age at which PPPP develops ranged between 19 and 40 years; the average was 28.6 ± 3.7 years in a normal distribution. The average age of the primiparous women was 27.9 ± 3.6 years, 0.5 years higher than expected for the Dutch population in 1989 (T-test 2-tailed $P < 0.05$).[8] The increase of weight during pregnancy ranged between 2 and 30 kg, with a median of 12 kg. The average height of the women was 168.9 ± 6.5 cm. The mean body-mass before pregnancy was 65.9 ± 10.5 kg. These values and their distributions are not different from those of women of the same age in the Dutch population.[35]

The average birth weight of 3.555 ± 0.525 kg is significantly higher than in the general Dutch population ($P = 0.000$, Table 2).[15] In 13 women (3.3%) it concerned a twin- pregnancy. When compared with the frequency of twins in the Dutch population (1.4%[35]) this percentage is significantly higher ($P = 0.001$).

In the subgroup in which pain started during childbirth or during the subsequent three weeks (subgroup 'delivery') (N=132) a small percentage of cesarian sections was

found and a high percentage of deliveries assisted by vacuum extraction, forceps or by manual pressure on the fundus of the uterus ('fundus expression'). The difference in the distribution is significant (P = 0.000) when compared with the patients in which pain started during pregnancy (subgroup 'pregnancy') and with the Dutch population (Table 3).

Table 2. Comparison of birth weights between patients and general population (N = 382), 1988.[15]*

Weight at birth (kg)	Study population (%)	Dutch population (%)
< 2.000	0.5	2.9
2.000-2.499	2.1	3.9
2.500-2.999	9.7	15.4
3.000-3.499	30.4	36.0
3.500-3.999	35.9	30.2
4.000-4.499	18.1	9.8
≥ 4.500	3.4	1.8
mean weight	3.555	3.375

* The weight of 14 babies is missing. Of the twins (n = 13), the mean weight of both was used. Chi-square 58.225 df = 6 P = 0.000.

Table 3. Percentage of assisted deliveries.*

Delivery	Subgroup† 'delivery' (N = 132) (%)	Subgroup‡ 'pregnancy' (N = 255) (%)	Expected (%)
Fundus expression	19.7	8.2	6.7
Vacuum-extraction or forceps	23.5	14.1	12.3
Cesarian section	0.8	6.3	8.1
Difficult	30.3	26.3	NA
Easy	18.9	38.8	NA
Other	6.8	6.3	NA

* Data missing for 7 patients.
† Peripartum pelvic pain began during delivery or during the subsequent 3 weeks.
‡ Peripartum pelvic pain began during pregnancy
Delivery *vs* Pregnancy subgroups, Chi-square = 183.694 df = 5 P = 0.000.
Delivery subgroup *vs* expected, Chi-square = 60.626 df = 3 P = 0.000.
Pregnancy subgroup *vs* expected Chi-square = 2.713 df = 3 not significant.
NA = no data available

In the subgroup 'delivery' an easy delivery was reported by 25 women. Table 4 shows a significant difference in the distribution of delivery positions between this group and the women with an easy delivery in subgroup 'pregnancy' (P = 0.000). The former gave birth less frequently in a half-sitting position with the feet placed on the bed and more frequently in a flexed position (with or without stirrups).

Table 4. Childbirth position of women reporting an easy delivery (cesarian sections excluded).

	Subgroup 'delivery' (N = 25 = 100%) (%)	Subgroup 'pregnancy' (N = 97 = 100%) (%)
Half sitting with the feet on the bed	4.0	22.7
Legs in gynecological stirrups	12.0	4.0
With maximal flexion of spine and hips	72.0	61.9
On a delivery chair	4.0	3.1
Other positions	8.0	8.2

Delivery *vs* pregnancy subgroups, Chi-square = 89.973 df= 4 P = 0.000.

In subgroup 'pregnancy' the percentage of primipara was 58.8% and in the subgroup 'delivery' 81.8%. These values are significantly higher than in all women who gave birth in 1988 in the Netherlands (44.6%).[15] (In both subgroups binomial test 2-tailed P = 0.000.)

Between subgroups 'pregnancy' and 'delivery' there were no differences with respect to age, height and weight of the women, nor with respect to the increase in weight during pregnancy, the weight of the baby, the kind, severity and duration of the complaints, the effectiveness of therapy and the percentage relapses around menstruation and during a subsequent pregnancy.

Many patients had heard one or more descriptive or suggestive terms as 'explanation' for their disease. In 277 cases (69.9%) the complaints were labelled as symphysiolysis. In 12 women sciatica or a discus protrusion was mentioned as possible cause for the pain. Sixty-eight percent of the women visited at least one medical specialist, in the majority a gynecologist or an orthopedic surgeon. Fifteen women (3.8%) consulted a psychiatrist or psychologist.

In Table 5 the reported effects of therapy are summarized. The use of a pelvic belt relieved the pain in about half of the pregnant patients and in about two-third of the patients after delivery. Of the 55 patients who used the belt during and after

pregnancy, 17 had better results after pregnancy and only 2 worse. About 65% of the patients treated with bed rest combined with exercises felt better or cured versus 40% treated exclusively with bed rest and 35% exclusively with exercises. Almost 70% of the patients who used medication or massage experienced relief of pain; however, the effect is temporary in a remarkably large percentage. Aggravation of pain following treatment occurred especially after exercises (without bed rest) and manual therapy (22.8% and 18.9%, respectively). Less than 5% of the patients was treated with surgery or local injections. These numbers are too small to draw conclusions.

Table 5. Reported effects of therapy (%)

Therapy	N	Worse	Unchanged	Temporarily better	Better or cured
Belt (after pregnancy)	147	10.2	22.4	24.5	42.9
Belt (during pregnancy)	91	14.3	33.0	35.2	17.6
Bed rest (without exercises)	145	9.0	22.1	29.0	40.0
Exercises	127	22.8	24.4	18.1	34.6
Bed rest with exercises	71	9.9	15.5	9.9	64.8
Medication	103	1.9	29.1	56.3	12.6
Massage	90	12.2	20.0	46.7	21.1
Manual therapy	90	18.9	20.0	36.7	24.4
Physiotechnic applications	56	8.9	50.0	28.6	12.5
Local injections (steroids)	16	12.5	25.0	50.0	12.5
Surgery	14	35.7	7.1	14.3	42.9
Local injections (sclerosing)	8	37.5	37.5	12.5	12.5

Discussion

It is questionable whether the inclusion and exclusion criteria are specific enough to exclude patients with specific physical or mental diseases. However, of the women of the Patients' Association whom we examine (more than 100 each year) PPPP is confirmed by exclusion of other known syndromes in more than 95%.

The accuracy of self reported events in a retrospective study is subject to recall bias. This holds especially for the moment pain started, and the use of fundus expression.

Comparison with other reports is difficult. Due to our selection it is expected that the percentage of patients with severe handicaps and poor therapeutic results will be high. Moreover, a substantial percentage of our patients had no pain at the posterior side of the body; these patients are mainly excluded in other reports.[3,10,11,21,25,28,36]

Localization of pain in PPPP

The percentage of patients in our study who indicate pain in the median lumbar region (Figure 1) is very small. Östgaard differentiated 'low back pain' during pregnancy from 'posterior pelvic pain';[28] the outcome in the first group was favored by a preventive program with muscle exercises and ergonomic advice, but not in the second. In our patient population the prognosis was worse in those with median lumbar pain. The high percentage of patients who indicate pain in the area of the posterior superior iliac spines warrants attention. In most patients such pain can be elicited by palpation of the dorsal sacroiliac ligaments. This supports the idea that PPPP may be caused by strain of ligaments.

One-third of the patients with PPPP experienced pain in the coccyx region (33%). To consider coccygodynia as a part of PPPP could shed new light on the understanding of this problem.

Kind of complaints

As could be expected, PPPP interfered with most activities of daily living (Table 1). The high frequency of the complaints is alarming: over 80% of the respondents reported increased pelvic pain during standing and walking. These disabilities could interfere in running the household, nurturing the baby, executing a job and sport activities. Lack of understanding by relatives and therapists could create serious psychosocial problems.

Factors associated with PPPP

It is interesting that 72% of the patients experienced a relapse around menstruation and 85% during a subsequent pregnancy. Whether the first symptoms of PPPP began during pregnancy or around delivery did not make any difference. These frequent relapses are possibly due to a detrimental hormonal influence after previous damage of the pelvis.

The normal height and weight of women with PPPP and normal weight gain during pregnancy is in accordance with the outcome of earlier studies.[10,21,30] The relatively high age of the primiparous women in this study could provide an explanation for the impression that the incidence of PPPP has increased during the last decades.[28] After all, the age of primiparous women increases dramatically (in the Netherlands with about 2 months each year[8]). However, the difference is small (0.5 year) and could be due to selection bias. Moreover, in other studies no association between age and PPPP is observed.[22,27]

A relatively high weight of the babies was also found in a study among patients of The Norwegian Patients' Association[30] but not in population studies on back pain and pregnancy.[10,21,27] Selection of severe cases in patients' associations could explain this controversy.

PPPP developing around childbirth is associated with an increase in assisted vaginal deliveries. Assisted deliveries mostly reflect mechanical problems during childbirth. The

percentage of cesarian sections is remarkably low. One cannot ignore the possibility that a better knowledge of mechanical problems during the second stage of childbirth could prevent PPPP in some cases. A high percentage of forceps deliveries is also observed in the patients of the Norwegian Patients' Association.[30] The normal percentage of cesarian sections in that study could be explained by the fact that no 'delivery' subgroup was analyzed.

The high frequency of delivery positions with a bent spine in the subgroup with complaints occurring in spite of an easy childbirth is remarkable. Since specific data on the general population are lacking, caution is needed. However, a flexed position during delivery might enhance the risk for PPPP.

The high incidence of PPPP around first pregnancy and delivery is striking. Combined with the high percentage of relapses during new pregnancies, it is expected that the prevalence of PPPP increases with parity. This is in accordance with observations in many other studies[21,25,36]; it is not clear, however, why no association between parity and PPPP is found in two studies.[3,10] We have the impression that PPPP starts during first delivery in almost all severe cases. For patients who state that pain started during pregnancy it may concern minor problems which deteriorate during childbirth. For patients who state that pain started during the second pregnancy, this pregnancy was very often preceded by a difficult delivery.

Therapeutic measures

A pelvic belt appears to be an effective expedient in the treatment of PPPP. A belt is less effective during pregnancy than after delivery. In our experience this holds for all therapeutic measures. In some patients application of a belt leads to increase of pain, in our experience mostly within 15 minutes. Logically the belt should be removed.

Frequently bed rest is prescribed. Nine percent of our study group states to have more pain after a period of bed rest. Our experience is that rigorous bed rest is beneficial when prescribed for a short period (one or two weeks). It is possible that muscle weakness is in the long run a deteriorating side-effect of rest. The theoretical influence of muscle force on stability of the pelvis is reported in the literature.[34,38]

Massage and medication are safe measures and give relief of pain in many patients, however mostly only temporary. The risk for deterioration is relatively high in manual therapy and exercises.

Causes of PPPP

There is little evidence to sustain the view that the increased load due to the weight of the uterus and fetus is the prime cause of PPPP. It sometimes starts in the first months of pregnancy and relatively few women develop PPPP during the last two months (Figure 2). In earlier reports the same pattern is found.[21,22,30] It is striking to see that the monthly incidence of PPPP during pregnancy shown in our study roughly parallels the increase of movement of the SI joints during pregnancy observed in an anatomical

study[6] and in X-ray studies.[1,14,37] The weight of uterus and embryo early in pregnancy can hardly influence the posture of the woman. In these women the change of the hormonal status could play a more important role. Perimenstrual increase of pain in 74% suggests the importance of hormones. Since 58.8% of the women who state that PPPP started during pregnancy is primiparous, 41.2% is multiparous and obviously had no problems during a previous pregnancy. In those cases it seems that the susceptibility for hormones is changed by a previous pregnancy or childbirth. It might be that a damaged pelvis is more sensitive for the influence of hormones.

A beneficial influence of a pelvic belt is frequently experienced, supporting the notion that PPPP results from strain of pelvic ligaments. We hypothesize that PPPP is caused by strain of the ligaments in the pelvis and lower parts of the spine. Overload is due to a combination of factors among which especially damage to pelvic ligaments (recently or in the past), specific hormonal effects, muscle weakness and the increased weight of fetus and uterus.

Based on the present study, a prospective study is designed to analyze the predicting factors for a successful treatment and prevention of PPPP.

Conclusions

PPPP interferes with most activities of daily living. The development and course of PPPP appear to be influenced by both hormonal and mechanical factors. For most patients the best results were obtained by bed rest combined with exercises. The use of a pelvic belt was especially effective after pregnancy. Generally the beneficial effect of medication or massage was temporary.

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