MUSCULOSKELETAL PAIN IN PREGNANCY

DO AUSTRIAN WOMEN KNOW ABOUT THE OSTEOPATHIC APPROACH?

Master Thesis zur Erlangung des Grades
Master of Science in Osteopathie

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PREFACE

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ABSTRACT

BACKGROUND: My intention was to evaluate the prevalence of pregnancy related pain in the musculoskeletal system in Austria and the knowledge about osteopathic treatment during pregnancy. If there is data which accounts for a need, an advertising campaign should be undertaken.

METHODS: A self administered questionnaire was distributed among pregnant women in obstetric primary care units of three Austrian hospitals granting a broad spectrum of social strata.

RESULTS: Pain in the musculoskeletal system is mentioned by 73.3% (95%CI: 65.1%-80.1%) of the pregnant women. 68% of the pregnant women have pain in the lumbar spine, in the pelvis or in both (95%CI: 60 - 75%), 50% only in the lumbar spine (95%CI: 42 - 59%) and 46% only in the pelvis (95%CI: 38 - 54%). These results are largely independent from the hospital and thus from living conditions, from age , trimenon and parity. Two thirds of these women have pain several times a day and 6.1% permanently. A significantly higher prevalence of longer periods of back pain (several times a day or permanent pain) can be observed in multiparous women. No significant dependencies of pain frequencies on trimenon, social structure and age could be observed..

No more than approximately 36% of the women already have sought therapeutic aid against pain, 70% of the women consider to have other or additional therapies to reduce pain and additional 5% would accept therapies during pregnancy, if necessary. In case of pain, massage, remedial gymnastics and acupuncture are popular strategies.

In total, only a third of the women state to have knowledge about osteopathic treatment and less than half of the woman think to have the possibility of osteopathic treatment. The most important information source about osteopathic treatment are relatives and friends. Midwives and physiotherapists contribute to a much smaller extent to knowledge about osteopathic treatment and information contribution of medical doctors is negligible. Data from a private clinic indicate that recommendations by physiotherapists, midwives and medical doctors are essential for an increase of the knowledge and acceptance of osteopathic treatment by the pregnant women.

CONCLUSION: Since prevalence of pregnancy related pain, which can be treated efficiently with osteopathic methods, and the risk of persisting back pain post partum is high, an information campaign should be started to enhance the knowledge about possibilities of osteopathic treatment for pregnant women but even more important for their health care providers. Publications of study results in international scientific magazines, should be intensified in order to encourage prenatal care providers to recommend osteopathic treatment.

KEY WORDS: pregnancy, low back pain, pelvic pain, osteopathic treatment, knowledge

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1. Introduction and Purpose of the Study

There is evidence of the high prevalence of low back and pelvic pain in pregnant women in various international publications.

According to Lisi (2006, 7), "*low back pain is a common complaint in pregnancy, with a reported prevalence of 57% to 69% and incidence of 61%. Although such pain can result in significant disability, it has been shown that as few as 32% of women report symptoms to their prenatal provider, and only 25% of providers recommend treatment".*

Osteopathic treatment for pregnancy related low back pain is underrepresented in Austria. Only few pregnant women know about the possibility of an osteopathic approach in dealing with symptoms of low back and pelvic pain.
The osteopathic approach has an even lower impact in suburban regions of Austria.
My intention is to evaluate the prevalence of pregnancy related pain in Austria and knowledge about osteopathic treatment during pregnancy. If there is data which accounts for a need, information campaigns for health care providers (obstetricians and midwives etc.) could improve the knowledge and acceptance of this valid treatment form.

2. Literature on Pregnancy Related Pain

Most research is done on low back pain and pelvic pain during pregnancy. Articles about other pregnancy related problems of the musculoskeletal system are only rare.
Generally, studies can be subdivided into four thematic groups, dealing with the prevalence of, the risk factors for, consequences of and finally therapeutic strategies against pregnancy related pain and their efficiency. The efficiency of osteopathic treatment in pregnancy related back and pelvis pain and midwives' and obstetricians' opinions about osteopathic treatment in Great Britain will be summarised in an own chapter.

2.1. The Prevalence of Pregnancy Related Pain

Anticipating the following chapter, there is a great variance in reported prevalence and incidence of pregnancy related low back and pelvic pain, depending on parity, the considered pain intensity and different stratification strategies.

According to MANTLE ET AL. (1977) amongst 180 women delivered in The London Hospital, **48% experienced backache** during pregnancy, in one third of these it was severe.

In 2005, MARTINS AND SILVA found a higher prevalence of pregnancy related back pain.
They performed a survey in the Primary Health care Units of the city of Paulinia (Brazil, n=203) in order to evaluate the prevalence of **back pain**, identify the location and the association between age, week of pregnancy, nervous injury and the presence of pain prior to pregnancy.
Prevalence of back pain was 79.8%; location in the lumbar region was reported by 80.8% and in the sacroiliac joint by 49.1% of the pregnant women. Pain was more frequent among younger women. Prevalence of back pain did not increase with progress of pregnancy (MARTINS AND SILVA, 2005).

There are several studies by OOSTGAARD, who did not only evaluate the prevalence of back pain, but also risk factors for developing back pain, its consequences post partum and the efficacy of training programs. In this chapter, only the data about prevalence will be summarised (for other results see the according chapters).

In OSTGAARD ET AL. (1991) the 9-month period prevalence of **back pain** was 49%, with a point prevalence of 22-28% from the 12th week until delivery. Because 22% of the women had back pain at the 12th week of pregnancy, the 6-month incidence was 27%. During this study 855 pregnant women were followed from the 12th week of pregnancy, every second week, until childbirth.

In another study, OSTGAARD ET AL. found a similar prevalence of **serious back or posterior pelvic pain** in 47% of the participating 407 pregnant women (OSTGAARD ET AL., 1994).

In a prospective, consecutive cohort analysis of the regression of the incidence and intensity of **back and posterior pelvic pain** from mid-pregnancy to five months after delivery, OSTGAARD ET AL. found a prevalence of back or posterior pelvic pain of 43% (n=368). The women were observed until five months after delivery. Standardized clinical examination protocols and questionnaires were used.
Posterior pelvic pain was experienced by 124 women (34%), and back pain was experienced by 40 women (11%) during pregnancy. After delivery, however, back pain was more common. Pain intensity was higher among women with posterior pelvic pain during pregnancy, whereas after delivery pain intensity was higher among women with back pain. A correlation was found between the presence of high pain intensity during pregnancy and little regression of pain after delivery (OSTGAARD ET AL.,1996).

ENDRESEN (1995) describes the prevalence of **back pain** in pregnancy in Norway. The answers to 5400 questionnaires were collected from Norwegian women shortly after delivery, and the occurrence of posterior pelvic pain and low back pain in relation to various characteristics was studied.
21% of primipara had had both posterior pelvic pain and low back pain, whereas 51% had had neither.
The figures in multipara were 31% and 33%. After stratification by parity the frequency of both types of pain decreased with increasing age.

That means that in accordance with the data from OOSTGARD approximately 50% of the women develop back and pelvic pain. Multipara show these symptoms to a higher extent.

Also BERG ET AL. find a prevalence of **low back pain** of approximately 50% among a sample of 682 pregnant women from Ostgoterland, Sweden. According to BERG ET AL., 79 women (11.2%) were even unable to continue their work because of severe low back pain. The most common reason for severe low back pain was dysfunction of the sacroiliac joints. Physically strenuous work and previous low back pain were factors associated with an increased risk of developing low back pain and sacroiliac dysfunction during pregnancy (BERG ET AL., 1988).

In Israel, according to ORVIETO ET AL. (1994), two hundred and fourty-six of 449 women (54.8%) reported **low back pain** in the present pregnancy.

WANG ET AL. (2004) describe a prevalence of **low back pain** during the current pregnancy of 68.5% in New Haven County, Connecticut (n=950 surveys).
In spite of different areas of the body considered, these data are comparable with the results of another Swedish study by MOGREN AND POHJANEN, who find a prevalence of **low back pain and pelvic pain** during pregnancy of 72% (n = 891). Most cases reported both anterior and posterior pelvic pain (MOGREN AND POHJANEN, 2005).

These data show a higher prevalence than OSTGAARD ET AL.,1996, who also explicitly describe "low back pain and pelvic pain" in Sweden and report only 43%.
Especially the expression "low back pain" and thus also "low back and pelvic pain" are used without a standardised definition, which might be a reason for the differences. Another reason might be different thresholds of pain intensity, when pain is considered.

This is also an aspect WU ET AL. describe in a critical review. They come to the result, that about 45% of all pregnant women and 25% of all women postpartum suffer from **posterior pelvic pain and/or pregnancy-related low back and pelvic pain**. These values decrease by about 20% if mild complaints are excluded.
In WU ET AL. (2004) the average pain intensity during pregnancy is 50 mm on a visual analogue scale; postpartum, pain is less. During pregnancy, serious pain occurs in about 25%, and severe disability in about 8% of patients. After pregnancy, problems are serious in about 7%. Of all patients, about one-half have posterior pelvic pain, one-third pregnancy-related low back and pelvic pain, and one-sixth both conditions combined.

Another aspect is investigated in BJORKLUND AND BERGSTROM (2000). The authors compare the prevalence of **pelvic pain** among pregnant women in Sweden and low-income countries. Four observational studies, comprising a total of 752 women, were carried out in circumstances ranging from wealth to poverty. In Uppsala, Sweden, and in Rufiji, Tanzania, the women were interviewed in late pregnancy. In Jakobstad, Finland, and in Zanzibar Town, Zanzibar, the women were approached after delivery before discharge.
The reported prevalence of **pelvic pain** in pregnancy was 49% in Uppsala and 66% in Rufiji, 77% in Jakobstad and 81% in Zanzibar Town, with an overall similarity of location and degree of pain. That means, no geographical differences were found in perceived pelvic pain among pregnant women, irrespective of the socio-economy of the countries.

ALBERT ET AL. (2002) performed a prospective epidemiologic cohort study in order to determine the incidence of clearly defined **pelvic joint pain** in pregnancy. All pregnant

women booked for delivery at two Danish hospitals over a one-year period were offered to participate in the study in week 33 of gestation. Women who reported daily pain from pelvic joints, which could be objectively confirmed, were divided, according to symptoms, into five subgroups: four classification groups (**pelvic girdle syndrome, symphysiolysis, one-sided sacroiliac syndrome, and double-sided sacroiliac syndrome**) and one miscellaneous. A total of 1460 women formed the incidence cohort based on geographic criteria. A total of 293 women (20.1%) were found to have pelvic joint pain divided in one of the four classification groups: pelvic girdle syndrome 6.0%, symphysiolysis 2.3%, one-sided sacroiliac syndrome 5.5%, and double-sided sacroiliac syndrome 6.3%.

In general, **approximately 50 %** (according to most Scandinavian studies) **- 80%** (MARTINS AND SILVA, 2005) **of the pregnant women experience back pain**, irrespective of the socio-economy of their mother countries (BJORKLUND AND BERGSTROM, 2000).

2.2. Risk Factors for Pregnancy Related Pain

Due to the high prevalence of pregnancy related low back and pelvic pain, there is also a lot of literature about risk factors for pregnancy related pain. In this chapter the outcomes of some studies will be summarised.

According to ENDRESEN (1995), the largest **occupational risk factor of posterior pelvic pain and/or low back pain** was having to twist or bend several times an hour. After stratification by parity the frequency of both types of pain decreased with increasing age. Partial regression coefficients for parity, smoking, and weight of newborn were significantly larger with posterior pelvic pain than with low back pain. That means, the association of posterior pelvic pain and low back pain to occupational exposure is similar but the statistical explanatory pattern, and thus possibly the etiology, is different (Norway, n=5400).

In contrary, according to MANTLE ET AL. (1977) the prevalence of **back pain** increases with increasing age. MANTLE ET AL. describes also an increase of the prevalence of **back pain** with increasing parity. No evidence was found of an association between backache during pregnancy and height, weight, 'obesity index', weight gain, or baby's weight. Slightly less backache was reported amongst patients attending antenatal physiotherapy classes but the figures do not provide clear evidence of any protective effect of this attendance.

Also MOGREN AND POHJANEN (2005) describe increasing parity as a risk factor for **low back and pelvic pain** (n=891).
Additional risk factors are a history of hypermobility and reported periods of amenorrhea. Women with low back and pelvic pain have a significantly higher prepregnancy weight, end-pregnancy weight, and prepregnancy and end-pregnancy body mass index.
Age at menarche and use of oral contraceptives are not associated with low back and pelvic pain.

In Israel, ORVIETO ET AL. (1994) conducted a study in order to assess the frequency, manifestations and the contribution of various factors to the development of low back pain during pregnancy (n=449). Factors which were found to be significantly associated with an increased risk to develop low back pain during pregnancy included low socioeconomic class, existence of low back pain before the first pregnancy, during previous pregnancy, and interim pregnancies. Moreover, in nulliparous women, body

mass index (BMI) was found to be significantly higher in women suffering from low back pain. A tendency was observed between posterior/fundal location of the placenta to the presence of low back pain during pregnancy. This tendency was also observed among parous but not among nulliparous women. Among pregnant women with low back pain, pain radiation correlated significantly to fetal weight. Moreover, this correlation was also of statistical significance in nulliparous women with anterior placental location.
Age and the number of prior pregnancies were not found as risk factors for **low back pain**. These results differ from MANTLE ET AL. (1977) and ENDRESEN (1995). In accordance with MOGREN AND POHJANEN (2005) gestational age, average maternal height, weight and body mass index are no risk factors, either.
Furthermore, previous abortion/s, instrumental delivery, previous caesarean section, or a history of epidural anaesthesia during a previous labour are no risks to develop low back pain in the subsequent pregnancy (ORVIETO ET AL., 1994).

According to OSTGAARD ET AL. (1991) back pain localized to the **sacroiliac areas** increases with pregnancy progress, but does not in other spinal areas. **Back problems** before pregnancy increase the risk of back pain, as do young age, multiparity, and several physical and psychological work factors.

Also WANG ET AL. (2004) describe risk factors of **low back pain (LBP)** during pregnancy (n=950). According to them, the prevalence is not affected by gestational age (P =0.56). Low back pain during the current pregnancy is predicted by age (younger women are more likely to develop it; P =0.004), history of low back pain without pregnancy (P =0.002), during menstruation (P =0.01), and during a previous pregnancy (P =0.002).

Additionally, there are two articles dealing with possible hormonal influences:

BJORKLUND ET AL. (2000) investigated whether the duration of previous use of combined oral contraceptives (COC) is associated with disabling during pregnancy and **back or pelvic pain** persisting eight months after delivery (n=161).
They describe pain in a previous pregnancy as a risk factor. No association between the duration of COC use and back or pelvic pain during pregnancy can be found, but the results indicate that non- or short term users of COC have an increased risk of persistent pain after delivery compared to long term users.

KRISTIANSSON ET AL. (1998) investigate the influence of ovarian stimulation in in-vitro fertilization (IVF) on the prevalence of **back pain** with onset during pregnancy. They find a two times higher prevalence rate of sacral pain in late pregnancy among IVF pregnant women ($P < 0.0001$), as well as a significantly higher prevalence rate of positive results of pelvic pain provocation tests performed in late pregnancy ($0.0001 < \text{or} = P < \text{or} = 0.015$), as compared with that of the spontaneously pregnant women. Among the IVF pregnant women, there was a significant positive correlation between relaxin concentrations in early pregnancy and the outcome of pelvic pain provocation tests ($0.44 < \text{or} = r < \text{or} = 0.51$, $P < 0.05$). In addition, the serum relaxin concentration was the factor that best explained differences in sacral pain prevalence. When the influence of serum relaxin concentration on back pain prevalence was taken into account, women carrying multiple pregnancies had no more pain than women carrying singletons, and IVF pregnant women had no more pain than spontaneously pregnant women. These results support the hypothesis that relaxin is involved in the generation of pelvic pain in pregnant women.

Summing up the results of the studies above, it can be said:

- The prevalence of **back pain** increases with increasing parity, history of hypermobility, reported periods of amenorrhea, back problems before pregnancy and several physical and psychological work factors (MOGREN AND POHJANEN, 2005).

- In some studies increasing age (MANTLE ET AL., 1977) and in others young age (WANG ET AL., 2004) are named as risk factors for **back pain**.

- Age at menarche and use of oral contraceptives were not associated with **LBPP** (MOGREN AND POHJANEN, 2005).

- Non- or short term users of COC have even an increased risk of persistent pain after delivery compared to long term users. No association was found between the duration of COC use and **back or pelvic pain** during pregnancy (BJORKLUND ET AL., 2000).

- In some studies women with **LBPP** have significantly higher prepregnancy weight, end-pregnancy weight, and prepregnancy and end-pregnancy body mass index (MOGREN AND POHJANEN, 2005).

- Other factors which were found to be significantly associated with an increased risk to develop **low back pain** during pregnancy include low socioeconomic class, existence of low back pain before the first pregnancy, during previous pregnancy, interim pregnancies and during menstruation (ORVIETO ET AL., 1994).

- In nulliparous women, body mass index (BMI) was found to be significantly higher in women suffering from low back pain (ORVIETO ET AL.,1994).

- A tendency was observed between posterior/fundal location of the placenta to the presence of **low back pain** during pregnancy. This tendency was also observed among parous but not among nulliparous women (ORVIETO ET AL.,1994).

- Among pregnant women with **low back pain**, pain radiation correlated significantly to fetal weight. Moreover, this correlation was also of statistical significance in nulliparous women with anterior placental location (ORVIETO ET AL.,1994).

- The age, number of prior pregnancies, gestational age, average maternal height, weight and body mass index were not found to be risk factors in **low back pain** (ORVIETO ET AL.,1994).

- There is no influence of previous abortion/s, instrumental delivery, previous caesarean section, or a history of epidural anaesthesia during previous labour to develop **low back pain** in the subsequent pregnancy (ORVIETO ET AL.,1994).

- The influence of parity, smoking, and weight of newborn are significantly higher with **posterior pelvic pain** than **low back pain** (ENDRESEN, 1995).

- The highest occupational risk factor of **posterior pelvic pain** and/or **low back pain** is having to twist or bend several times an hour (ENDRESEN, 1995).

- With similar relaxin concentrations, IVF pregnant women have no more **pelvic pain** than spontaneously pregnant women (KRISTIANSSON ET AL., 1998).

2.3. Persistent Pain and other Consequences of Pregnancy Related Back Pain

There is also a lot of literature about persistent pain after pregnancies, ranging from five months up to 12 years after delivery. Studies about the economical consequences of pregnancy related back pain (sick leaves) are next frequent, but to begin with, also subjective symptoms are evaluated:

OLSSON AND NILSSON-WIKMAR (2004) studied the influence of **back pain and physical ability on quality of life in late pregnancy.** One hundred and sixty women in the 34th-37th week of pregnancy and attending two different midwife receptions, were asked to fill out questionnaires including: general questions about background factors, the Disability Rating Index (DRI) to score the physical ability, and The Nottingham Health Profile (NHP) for assessing health-related quality of life. Two groups were defined, with and without back pain.
One hundred and thirty-six (85%) out of 160 screened women returned the questionnaire for evaluation. The 69 (51%) women with back pain rated significantly ($p < 0.05$) higher on the Disability Rating Index; on Nottingham Health Profile part I, sub scales sleep, energy, pain, physical functioning and total score; and on Nottingham Health Profile part II, aspects occupation, ability to perform jobs around the house, social life and hobbies compared with women without back pain.
Irrespective of back pain the pregnant women studied featured lower quality of life (QOL) compared with published data on healthy women. Among the women with back problems, who had the most impaired quality of life, the factors affecting quality of life were mostly related to physical ability.

HANSEN ET AL. (1999) describes and analyses the **relationship between subjective symptoms, daily disability, and clinical findings in women with symptom-giving pelvic girdle relaxation** in pregnancy. Out of 1600 pregnant women, 227 women (14%) are considered to have symptom-giving pelvic girdle relaxation during pregnancy. Symptom-giving pelvic girdle relaxation in pregnancy seriously interferes with many activities of daily living such as housekeeping, walking, working, and sexual life.

The aim of a study by MOGREN (2006) was to investigate **perceived health, sick leave, psychosocial situation, and sexual life among women experiencing low-back pain and pelvic pain (LBPP) during pregnancy.**
All women who gave birth at one of two hospitals in northern Sweden from 1st January 2002 to 30th April 2002 were invited to complete a questionnaire on their obstetric history, pregnancy, and delivery. Most women were married or cohabiting (98%), and reported a 'very good' or 'good' partner relationship (96%) and a satisfying sexual life before pregnancy (91%). Only a few women reported perceived health as 'quite poor' or 'poor' before pregnancy (2%); however, this proportion increased during pregnancy (13%). In general, satisfying sexual life declined during pregnancy, which was also the case for the assessment of perceived health during pregnancy. Women with low-back pain and pelvic pain during pregnancy had an increased risk of reporting poor health (OR = 3.05, 95% CI = 1.70-5.46). Overall, 68% of women had been on sick leave, and 22% had received maternity allowance. Women with low-back pain and pelvic pain reported sick leave in 72% of the participants.

SYDSJO ET AL. concentrate on the number of sick leaves only. They investigated the relative contribution of pregnant women to the **level of sickness absence**. In a cross-sectional study of all sick leave insured women aged 16-44 years (n = 24,481) in Linkoping, Sweden (117,000 inhabitants), data from two population-based research registers were used, one of sickness absence for the whole population, one of sickness absence among pregnant women in the same population and year. Pregnant women (5%) have a significantly higher cumulative incidence of sickness absence (0.64) compared with all women (0.18) and account for 20% of the women listed as absent because of sickness. The duration of the sickness absence is also significantly longer among pregnant women, 44.8 days compared with 9.7 days among all women. Practically all diagnoses among pregnant women are related to **back pain** (93%) (SYDSJO ET AL., 2001).

In another study, SYDSJO ET AL. (1998) explores whether the **increase in social benefits for pregnant women** introduced in Sweden between 1978 and in 1986 was associated with a **decrease in the use of sick leave caused by back pain** during the same period. Participants were women consecutively delivered in 1978 (n = 1524) and in 1986 (n = 1688). Between these two time points, the number of offered days of parental benefit increased and a new benefit, the pregnancy benefit, was introduced. Data were collected from the antenatal care and delivery records and from pregnant women's social insurance files.

From 1978 to 1986 the use of sick leave because of back pain during pregnancy increased. The number of employed pregnant women granted sick leave because of back pain increased from 11% in 1978 to 29% in 1986 (P < 0.001). Instead of an expected decrease in sick leave because of back pain during pregnancy, an increase in most occupations and especially among young women was observed.

In 2006, LARSSON ET AL. performed another study touching this item.
The objective of this study was if consuming of sick leave during pregnancy could possibly be explained by **attitudes to sickness absence held among obstetricians working in antenatal care**.
All obstetricians (n = 45) engaged in public antenatal care and at work in May 2001 in seven hospitals in South Eastern Sweden were asked to anonymously respond to questions/statements concerning their work, 87% participated.
In 60% of all contacts with pregnant women issues such as working conditions, sickness absence or benefit programs were discussed besides the actual pregnancy. In 46% the obstetricians stated that they could not exactly pinpoint a correct medical diagnosis motivating a sickness certificate asked for by the pregnant woman. As the majority of the obstetricians (74%) often did not like to conform to the pregnant women's wishes, unpleasant situations were not uncommon (56%). A conflict was experienced in the dual role the obstetrician held as the patient's confidant on one hand and as a representative or gatekeeper for the social security system on the other. Male and female obstetricians did not differ in their opinions on their handling of pregnant women with regard to taking sick leave but for one issue, back pain.
The high degree of work dealing with sickness absence and social benefits at the Antenatal Care Centers seems to have a negative effect on the obstetrician's evaluation of their work environment. The obstetricians' opinion is that pregnant women are sick-listed too frequently, but obstetricians comply as a rule to the women's wishes in order to avoid conflict (LARSSON ET AL., 2006).

OOSTGARD was involved in another study, dealing with the prevalence of back pain among women with a back-pain history:
OSTGAARD AND ANDERSSON (1991) followed 429 pregnant women who had back pain before pregnancy and 375 pregnant women with no previous back pain at regular intervals **from the 12th week of pregnancy until delivery**, recording back-pain complaints.
Overall, back pain occurred twice as often in the group with a **back-pain history** (period prevalence) (P less than 0.001). The point prevalence of back pain in weeks 12, 24, 30,

and 36 was three times higher in the group who had had back pain before pregnancy indicating that pain was not only more prevalent but also lasted longer in that group. Women who had been pregnant previously tended to have an increased risk of back pain, and there was a statistically significant correlation between multiparity and longer periods of back pain (P less than 0.001).

As mentioned in the introduction of this chapter, most literature deals with the prevalence post partum, showing that having back and pelvic pain during pregnancy has a bad prognosis for future pain after delivery, up to 12 years after delivery.

LARSEN ET AL. (1999) refer to the same cohort as HANSEN ET AL. (1999). They wanted to determine the incidence during pregnancy and the prevalence of **pelvic girdle relaxation two, six, and twelve months post partum**, identify possible predisposing factors and determine the frequency and duration of sicklisting, prospectively.
Women with **pelvic pain** meeting the inclusion criteria were examined by a rheumatologist. The affected women were seen again two, six, and twelve months post partum. All participants were asked about sicklisting in pregnancy.
The incidence during pregnancy was 14%, the prevalence two, six, and twelve months post partum were 5%, 4%, and 2% respectively. At least 37% of the women with symptom-giving **pelvic girdle relaxation** have been **sicklisted** in pregnancy due to pelvic pain, on average for twelve weeks.
Larsen concludes, that symptom-giving pelvic girdle relaxation is a considerable problem both in pregnancy and post partum.

In OSTGAARD ET AL. (1996) 164 of 368 pregnant women studied had back or posterior pelvic pain. The women were observed **until five months after delivery**. Standardized clinical examination protocols and questionnaires were used. One of every three pregnant women studied experienced posterior pelvic pain, and one of every nine women experienced back pain. Posterior pelvic pain was more intense during pregnancy, and back pain was more intense and more common after delivery. High pain intensity in pregnancy indicated a bad prognosis.

TURGUT ET AL. (1998) assessed a cohort of 88 pregnant women, aged 14-46 years, who had suffered from back pain during pregnancy, and delivered at Aydin Maternity Hospital in order to determine **the prevalence of back pain after delivery and its relationship to individual factors.**

The women had been followed up through pregnancy, and six months post partum filled out a questionnaire. Follow-up showed that back pain at the time of delivery and six months post partum was reported by 59.1% and 43.2% of the women, respectively. The difference in prevalence of back pain between young women and older ones was statistically significant (P=0.000). The number of previous pregnancies increased the risk of back pain (P=0.000), but there was no difference in prevalence of back pain between women with heavy work and without heavy work before pregnancy (P=0.310). Furthermore, women with a history of back pain before pregnancy were found to experience more intense pain **at six months post partum** compared to those without a history of back pain before pregnancy (2.1+/-1.0 and 0.4+/-0.4. respectively. P=0.000).

PADUA ET AL. (2005) performed a multicenter follow-up study in a sample of pregnant women using the Italian validated version of the Roland questionnaire to **assess the evolution of back pain after pregnancy and identify prognostic factors**. Each center had to re-evaluate initially enrolled women, with latency of **one year after delivery**. At follow-up, 53% of re-evaluated women had no back pain symptoms. Moreover, there was a significant improvement of patient-oriented assessment in women who suffered back pain after delivery. With regard to the predictive factors, the presence of back pain before pregnancy implied a 3.1-fold higher probability of improvement after delivery. In conclusion, women without history of back pain before pregnancy and who complain of these symptoms during pregnancy require greater attention, because they have a lower possibility for improvement. Conversely, in women with a history of back pain, pregnancy represents a transient period of worsening symptoms, probably due to the temporary para-physiological mechanical condition.

TO AND WONG (2003) **investigated factors associated with back pain symptoms in pregnancy and the persistence of pain two years after pregnancy.**
According to them, main factors associated with development of back pain are previous episodes of back pain while non-pregnant or pregnant. The occurrence of back pain during pregnancy does not affect the pregnancy outcome. The main risk factors associated with persistent back pain **at 24 months** appear to be the onset of severe pain at an early gestation in the index pregnancy, as well as the inability to reduce weight to their pre-pregnant level.
Consecutive patients in a low-risk obstetric population with singleton pregnancies were surveyed for back pain symptoms during pregnancy in the early postpartum period by a structured questionnaire. Data from this survey were then correlated with the details of labour and pregnancy outcome, as well as epidemiological, occupational and work data.

A follow-up questionnaire survey was administered 24 months after delivery to the group who reported back pain symptoms in the first survey. The absence/presence of persistent symptoms at 24 months was correlated with the characteristics of their pregnancy, as well as their daily life activities at the time of the survey.
A total of 326 patients with complete data were recruited. Two hundred and fifty (76.6%) reported one or more significant episodes of back pain during their pregnancy. Significantly more patients with pain in pregnancy had a history of previous back pain episodes when not pregnant (48% vs. 19.7%, $p < 0.001$), as well as during previous pregnancies (66% vs. 40%, $p < 0.025$), or in the postpartum period (40% vs. 6.6%, $p < 0.001$). There was no significant difference between those with or without pain in their pregnancy outcome. Complete data on 189 of the 250 study patients (75.6%) were available for analysis at 24 months after delivery. The incidence of persistent back pain symptoms was 21.1% (n = 40). Those with persistent pain were older, had significantly earlier onset of pain symptoms in the index pregnancy compared with those without pain at 24 months, and they also had their worse symptoms at an earlier week of gestation during the index pregnancy. Moreover, those with persistent pain had a higher weight gain at 24 months compared with their preindex pregnancy weight (6.8 kg, SD3.0) compared with those without further pain (4.0 kg, SD2.8) ($p < 0.01$), as well as less weight loss compared with their early postpartum weight (8.1 kg, SD4.8 vs. 1.1.5 kg, SD5.6) ($p < 0.01$).

According to NOREN ET AL. (2002), out of 799 pregnant women, 231 had back pain during the index pregnancy, and 41 women had pain **three years later**. Women with combined lumbar and posterior pelvic pain were significantly more disabled ($P<0.05$) and had significantly lower endurance in the lumbar back and hip abduction muscles ($P<0.01$). Some 5% of all pregnant women, or **20% of all women with back pain during pregnancy, had pain three years later**.

BRYNHILDSEN ET AL. (1998) performed a study in order to identify the **long-term risk for low back pain among women with previous severe low back pain during pregnancy**. In a previous study, 79 pregnant women developed low back pain severe enough to require sick leave. **Twelve years later** a questionnaire was sent to 62 of these women and 84 controls who did not develop severe low back pain during pregnancy. The questionnaire asked about occupation, low back pain in general and during later pregnancies, and sick leave due to low back pain. There were also questions regarding use of oral contraceptives and its possible relation to low back pain. The response rate was 84% in the back pain group and 80% among controls. The two groups were similar according to the percentage of women having had another pregnancy (33 of 52 (63%) versus 39 of 67 (58%)) but ten (19%) of the women with previous low back pain stated they had refrained from another pregnancy because of their fear of low back pain compared with only one control. **Almost all women (31 of 33) with previous severe low back pain experienced the same symptoms in a subsequent pregnancy**, compared with 17 of 39 (44%) controls. Even when they were not pregnant, women with previous low back pain suffered more often and used more sick leave due to low back pain (44 of 52 versus 43 of 67, chi2 = 5.68, $P < .05$). **The location** (sacroiliac joint or lumbar affection) **of the previous low back pain did not affect the long-term prognosis**. In a logistic regression model, previous low back pain during pregnancy was the only independent risk factor for low back pain during a subsequent pregnancy, whereas an occupation involving physical demand did not affect the results. However, together with previous low back pain during pregnancy, burdensome occupation increased the risk for current nonpregnant low back pain.

In a retrospective cross-sectional study of 1760 38- to 64-year-old women, SVENSSON ET AL. investigated the **association between low-back pain (LBP) and pregnancy and gynaecologic factors.** Fifty-one percent of the women in the prevalence group experienced an increase in their low back pain during menstruation. A higher number of abortions was found to be directly associated to low back pain in 38- to 49-year-old women. In 50- to 64-year-old women, two variables were directly associated to low back pain, a higher number of live births and a higher frequency of menopausal symptoms (SVENSSON ET AL., 1990).

The only study dealing with pregnancy related pain aside of back and lumbar pain was VULLO ET AL. (1996):

They performed a study in order to investigate the **prevalence and characterise the nature of lower extremity pain (leg, foot, and hip pain) in women of child-bearing age and to assess the impact of recent pregnancy on these symptoms.**

In this case-control study, 107 women postpartum (case subjects) and 91 nulliparous women (controls) completed a questionnaire regarding hip, knee, and foot pain and potentially influencing factors.

Postpartum subjects had more symptoms of leg and foot pain than did the controls (56% vs 37%; odds ratio (OR)=2.3; 95% confidence interval (CI), 1.2 to 4.7). A significant majority of pain (82%, $P<0.05$) began during the second and third trimesters. Postpartum subjects also had a significantly higher prevalence of hip pain (38% vs 23%; OR=3.2; 95% CI, 1.4 to 7.0) and foot pain (31% vs 22%; OR=2.2; CI, 1.1 to 4.5). History of previous pain complaints also were found to be risk factors for lower extremity pain during pregnancy for case subjects and in the past year for controls. There was a trend towards older age as a risk factor as well. Multiple pain complaints were more common among case subjects than among controls.

Lower extremity pain is common in women of childbearing age. Pregnant and postpartum women are more likely to develop new lower extremity symptoms than are nulliparous women. The timing of symptom onset in mid- to late pregnancy may suggest that biomechanical factors play a larger role than hormonal influences. Regular exercise appears to be neither protective against nor a risk factor for lower extremity pain during pregnancy.

That means, that also lower extremity pain (leg, foot, and hip pain) is more frequent after delivery than in nulliparous women.

In the following summary, consequences of pregnancy related back pain will be listed:

- Women with **back pain** rate significantly higher on the Disability Rating Index; on Nottingham Health Profile part I, sub scales **sleep, energy, pain, physical functioning and total score**; and on Nottingham Health Profile part II, aspects **occupation, ability to perform jobs around the house, social life and hobbies** compared with women without back pain. Irrespective of back pain the pregnant women studied featured **lower quality of life (QOL)** compared with published data on healthy women. Among the women with back problems, who had the most impaired quality of life, the factors affecting quality of life were mostly related to physical ability (OLSSON AND NILSSON-WIKMAR, 2004).

- Symptom-giving **pelvic girdle relaxation** in pregnancy seriously interferes with many activities of daily living such as housekeeping, walking, working, and sexual life (HANSEN ET AL., 1999).

- Most women with previous severe low back pain experience the same symptoms in a subsequent pregnancy , when not pregnant and some of them even refrain from another pregnancy because of their fear of low back pain. The location (sacroiliac joint or lumbar affection) of the previous low back pain does not affect the long-term prognosis. Together with previous low back pain during pregnancy burdensome occupation increases the risk for current nonpregnant low back pain (BRYNHILDSEN ET AL., 1998).

- High pain intensity in pregnancy indicated a bad prognosis for pain six months after delivery (OSTGAARD ET AL., 1996).

- The main risk factors associated with persistent back pain at 24 months appear to be the onset of severe pain at an early week of gestation in the index pregnancy, as well as the inability to reduce weight to their pre-pregnant level (TO AND WONG, 2003).

- Some 5% of all pregnant women, or 20% of all women with **back pain** during pregnancy, had pain **three years later**. Women with combined lumbar and posterior pelvic pain were significantly more disabled and have significantly lower endurance in the lumbar back and hip abduction muscles (NOREN ET AL., 2002).

- In a Danish study, the incidence of **pelvic girdle relaxation** during pregnancy was 14%, the prevalence two, six, and twelve months post partum were 5%, 4%, and 2% respectively. At least 37% of the women with symptom-giving **pelvic girdle relaxation** had been **sicklisted** in pregnancy due to pelvic pain, on average for twelve weeks (HANSEN ET AL., 1999).

- The presence of back pain before pregnancy implied a 3.1-fold higher probability of improvement after delivery. In conclusion, women without history of back pain before pregnancy and who complain of these symptoms during pregnancy require greater attention, because they have less probability for improvement (PADUA ET AL., 2005).

- With persisting back pain, there might be a higher risk of an increase in low back pain during menstruation (SVENSSON ET AL., 1990).

- In a retrospective study a higher number of abortions was found to be directly associated to low back pain in 38- to 49-year-old women. In 50- to 64-year-old women, a higher number of live births and a higher frequency of menopausal symptoms were directly associated to low back pain (SVENSSON ET AL., 1990).

- There is no significant difference between those with or without pain in their pregnancy outcome (TO AND WONG, 2003).

- Pregnant and postpartum women are more likely to develop new **lower extremity symptoms** than are nulliparous women (VULLO ET AL., 1996).

- In Sweden, pregnant women have a higher cumulative incidence of sickness absence compared with all women and account for 20% of the women listed as absent because of sickness. The duration of the sickness absence is also significantly longer among pregnant women (44.8 days compared with 9.7 days among all women). Practically all diagnoses among pregnant women are related to pregnancy or back pain (93%) (SYDSJO ET AL., 2001).

- From 1978 to 1986 because of **back pain** during pregnancy an increase in sick leave in most occupations and especially among young women was observed in Sweden (SYDSJO ET AL., 1998).

And finally:

- The high degree of work dealing with sickness absence and social benefits at seven Swedish Antenatal Care Centers seems to have a negative effect on the obstetrician's evaluation of their work environment. The obstetricians' opinion is that pregnant women are sick-listed too frequently, but obstetricians comply as a rule to the women's wishes in order to avoid conflict (LARSSON ET AL., 2006).

Pregnancy related back and pelvic pain does not only influence the quality of live during pregnancy, but also after delivery.
Having back and/or pelvic pain during pregnancy has a bad prognosis for future pain after delivery.
The frequent sick listings are also an economic factor.

2.4. Therapeutic Strategies to Reduce Pain in the Musculoskeletal System and their Efficacy

According to LINDENSKOV ET AL. (1994) pregnant women want to talk to health professionals about their ailments to a large extent, preferably to a midwife. 15 - 58% of the women had been given advice, depending on the symptom by a general practitioner (GP), midwife or hospital doctor for prenatal care.

According to WANG ET AL. (2005) providers of prenatal health care (nurse educators, nurse midwives, and obstetricians) and pregnant women in New Haven county, Connecticut, USA are likely to use complementary and alternative medicine (CAM) treatment for **pregnancy-induced low back pain**.
The majority of pregnant women who participated in the survey (61.7%) reported that they would accept complementary and alternative medicine therapy as treatment for low back pain during pregnancy. Similarly, 61% of providers of prenatal health care in this sample report that they would consider using CAM as treatment for low back pain during pregnancy. Massage (61.4%), acupuncture (44.6%), relaxation (42.6%), yoga (40.6%), and chiropractic treatment (36.6%) are the most common CAM therapies recommended for low back pain in pregnancy by the providers of prenatal health care.

OSTGAARD ET AL. (1994) analysed different therapies **aimed at reducing back and posterior pelvic pain during pregnancy** (n=407) including an **education and training program.**
Compared to controls, pain-related problems and sick-leave frequency were reduced. Weekly physical exercise before pregnancy reduced the risk for back pain problems in pregnancy ($P < 0.05$). A non-elastic sacro-iliac belt offered some pain relief to 82% of the women with posterior pelvic pain. An individually designed program reduced sick leave during pregnancy, but working with groups was less effective. Differentiation between low back and posterior pelvic pain was essential.

In another study, OSTGAARD ET AL. also investigated **effects of a physiotherapy and patient education program attended during pregnancy**.
Slow regression of pain postpartum correlated with having a back pain history before pregnancy, ($r = 0.30$; $P < 0.05$), with high pain intensity during pregnancy ($r = 0.45$; $P < 0.01$), and with much residual pain three months after pregnancy ($r = 0.41$; $P < 0.01$). These correlations were not found in the intervention groups. Furthermore, frequency of back pain attacks at six years post partum correlated with frequency of attacks during

pregnancy ($r = 0.41$; $P < 0.01$) and with a vocational factor ($r = -0.25$; $P < 0.01$). Physiotherapy and patient education had no effects on back pain development among women without pain during pregnancy.
Back pain during pregnancy regressed spontaneously soon after delivery and improved in few women later than six months post partum. Expected correlations between back pain in relation to pregnancy and back pain six years later were not present in the intervention groups who had attended a physiotherapy and education program during pregnancy. The program had no prophylactic effect on women without back or pelvic pain during pregnancy (OSTGAARD ET AL., 1997).

NOREN ET AL. (1997) performed a prospective, consecutive, controlled cohort study. The authors analysed the impact of a **differentiated, individual-based treatment program on sick leave during pregnancy for women experiencing lumbar back or posterior pelvic pain during pregnancy** in order to reduce sick leave during pregnancy by means of individual information and differentiated physiotherapy. (In Sweden, the average sick leave due to back pain during pregnancy is seven weeks).
The intervention group comprised 54 women, compared with 81 women in the control group. Thirty-three women were on sick leave for an average of 30 days in the intervention group versus 45 women for an average of 54 days in the control group ($P < 0.001$). The reduction in sick leave reduced insurance costs by approximately $53,000 U.S. Sick leave for lumbar back and posterior pelvic pain in the intervention group was significantly reduced with the program, and the program was cost effective.

DUMAS ET AL. (1995) evaluated the effect of **fitness classes for pregnant women on posture and back pain**. One of the expected benefits of exercise programmes for pregnant women is to reduce or prevent back pain by improving posture. In this article, postural aspects are reported.
Sixty five pregnant volunteers were included in the study, of whom 27 were enrolled in exercise classes designed according to Canadian guidelines and 38 acted as sedentary controls. Posture was assessed every four weeks during pregnancy and four months postpartum by measuring curvatures of the lumbar and thoracic spines in a standard relaxed standing position from lateral photographs. Laxity of knee ligaments was also monitored using a clinical arthrometer. Weight gain could explain part of lordosis increase during pregnancy but the effect was not very strong. No effect of exercise on posture was detected.

This study shows that fitness classes for pregnant women designed according to Canadian guidelines had no detectable effect on posture during pregnancy.

GARSHASBI AND FAGHIH ZADEH (2005) investigated the **effect of exercise during pregnancy on the intensity of low back pain and kinematics of spine** in a prospective randomised study.
107 women participated in an exercise program three times a week during the second half of pregnancy for 12 weeks and 105 as control group. All filled in a questionnaire between 17-22 weeks of gestation and 12 weeks later for assessment of their back pain intensity. Lordosis and flexibility of spine were measured by Flexible ruler and Side bending test, respectively, at the same times. Weight gain during pregnancy, time till delivery and neonatal weight were recorded.
Low back pain intensity was increased in the control group. The exercise group showed significant reduction in the intensity of low back pain after exercise ($p<0.0001$). Flexibility of spine decreased more in the exercise group ($p<0.0001$). Weight gain during pregnancy, duration of pregnancy and neonatal weight did not differ between the two groups.
Exercise during second half of pregnancy significantly reduced the intensity of low back pain, had no detectable effect on lordosis and had significant effect on flexibility of spine.

LISI (2006) described the results of a group of pregnant women with **low back pain** who underwent **chiropractic treatment including spinal manipulation** (n=17). The overall group average Numerical Rating Scale pain score decreased from 5.9 (range 2-10) at initial presentation to 1.5 (range 0-5) at termination of care. Sixteen of 17 (94.1%) cases demonstrated clinically important improvement. The average time to initial clinically important pain relief was 4.5 (range 0-13) days after initial presentation, and the average number of visits undergone up to that point was 1.8 (range 1-5). No adverse effects were reported in any of the 17 cases. The results suggest that chiropractic treatment was safe in these cases and support the hypothesis that it may be effective for reducing pain intensity.

FIELD ET AL. (1999) investigated the **effect of massage therapy and relaxation therapy on back pain** during pregnancy.
Twenty-six pregnant women were assigned to a massage therapy or a relaxation therapy group for five weeks. The therapies consisted of 20-min sessions twice a week. Both groups reported feeling less anxious after the first session and less leg pain after the first and last session. Only the massage therapy group, however, reported reduced

anxiety, improved mood, better sleep and less back pain by the last day of the study. In addition, urinary stress hormone levels (norepinephrine) decreased for the massage therapy group, the women had fewer complications during labour and their infants had fewer postnatal complications (e.g., less prematurity).

GUERREIRO DA SILVA ET AL. (2004) investigated the effect of **acupuncture in low back and pelvic pain during pregnancy** under real life conditions, as compared with patients undergoing conventional treatment alone. A total of 61 conventionally treated pregnant women were allocated randomly into two groups to be treated or not by acupuncture. Twenty-seven patients formed the study group and 34 the control group. They reported the severity of pain using a Numerical Rating Scale from 0 to 10, and their capacity to perform general activities, to work, and to walk. They also assessed the use of analgesic drugs. Women were followed up for eight weeks and interviewed five times, at two-week intervals. All women completed the study. In the study group the average pain during the study period shows more reduction (4.8 points) than the control group (-0.3 points) ($P < 0.0001$). Average pain scores decreased by at least 50% over time in 21 (78%) patients in the acupuncture group and in five (15%) patients in the control group ($P < 0.0001$). Maximum pain and pain at the moment of interview were also less in the acupuncture group compared with the control group. The capacity to perform general activities, to work and to walk was improved significantly more in the study group than in the control group ($P < 0.05$). The use of paracetamol was less in the acupuncture group, too ($P < 0.01$).

Also KVORNING ET AL. (2004) evaluated the **analgesic effect and possible adverse effects of acupuncture for pelvic and low-back pain** during the last trimester of pregnancy. Following individual informed consent, 72 pregnant women reporting pelvic or low-back pain were randomised during pregnancy weeks 24-37 to an acupuncture group ($n = 37$) or to a control group ($n = 35$) at three maternity wards in southern Sweden. Traditional acupuncture points and local tender points (TP) were chosen according to individual pain patterns and stimulated once or twice a week until delivery or complete recovery in acupuncture patients. Control patients were given no sham stimulation. Throughout the study period each patient made weekly visual analogue scale (VAS) evaluations of maximal and minimal pain intensity as well as three-point assessments of pain intensity during various activities.
During the study period, VAS scorings of pain intensity decreased over time in 60% of patients in the acupuncture group and in 14% of those in the control group ($p < 0.01$). At the end of the study period, 43% of the acupuncture patients were less bothered than

initially by pain during activity compared with 9% of control patients ($p < 0.01$). No serious adverse effects of acupuncture were found in the patients, and there were no adverse effects at all in the infants.

Another study deals with the efficacy of **acupuncture on low-back and/or pelvic pain in late pregnancy**. Aim of the study by LUND ET AL. (2006) was to evaluate the effects of two different acupuncture stimulation modes on pelvic pain intensity and some emotional symptoms due to the pain condition.
In a prospective randomised controlled single-blind study, pregnant women with pelvic pain, median gestational age 26 weeks (range 18-35), were given ten acupuncture treatments. Needles were inserted subcutaneously over acupuncture points without further stimulation (superficial, n=22), or intramuscular and stimulated repeatedly until a perceived sensation of numbness, de qi, (deep, n=25). Self-reported pain intensity at rest and during daily activities was assessed on a visual analogue scale. The variables pain, emotional reactions, and loss of energy were assessed according to the Nottingham Health Profile questionnaire. Changes in assessed variables were analysed with a nonparametric statistical method allowing for analysis of systematic group changes separated from additional individual changes.
After acupuncture stimulation, significant systematic group changes towards lower levels of pain intensity at rest and in daily activities as well as in rated emotional reaction and loss of energy were seen. The results also show additional individual changes in most variables. In this study, no differences between the effects induced by the superficial and deep acupuncture stimulation modes were observed.

NILSSON-WIKMAR ET AL. (2005) performed a randomised assessor-blinded clinical trial in order to compare **three different physical therapy treatments** with respect to pain and activity in women with **pelvic girdle pain** during pregnancy and 3, 6, and 12 months postpartum.
Based on a clinical examination, 118 women with pelvic girdle pain diagnosed during pregnancy were randomised into three different treatment groups: Information Group, use of a nonelastic sacroiliac belt and oral/written information about pelvic girdle pain (n = 40); Home Exercise Group, same as in the Information Group, with the addition of a home exercise program (n = 41); and the In Clinic Exercise Group, same as in the Information Group, plus participation in a training program (n = 37). Pain intensity was rated on a visual analogue scale (0-100 mm) and marked on a pain drawing concerning localization. The activity of daily life was scored using the Disability Rating Index,

covering 12 daily activity items. Outcome measures were obtained at inclusion, on average in gestation week 38, and 3, 6, and 12 months postpartum.
There was no significant difference among the three groups during pregnancy or at the follow-ups postpartum regarding pain and activity. In all groups, pain decreased and the ADL increased between gestation week 38 and at 12 months postpartum.
Women with pelvic girdle pain seemed to improve with time in all three treatment groups. Neither home nor in clinic exercises had any additional value above giving a nonelastic sacroiliac belt and information.

KIHLSTRAND ET AL. (1999) investigated if **water-gymnastics** during pregnancy may reduce the intensity of back/low back pain and the number of days on sick-leave. In a prospective, randomised study. One hundred and twenty-nine women were randomised to participate in water-gymnastics once a week during the second half of pregnancy and 129 were randomised to a control group. The women in both groups filled in questionnaires in gestational weeks 18, 34 and within the first postpartum week. Every day from week 18 to labour they assessed the intensity of back/low back pain.
Back pain intensity increased during pregnancy. The women participating in water-gymnastics recorded a lower intensity of back/low back pain. The total number of days on sick-leave because of back/low back pain was 982 in the water-gymnastics group (124 women) compared with 1484 in the control group (120 women). After weeks 32 -33, seven women in the water-gymnastics group compared with 17 in the control group were on sick-leave because of back/ low back pain ($p=0.031$).
There was no excess risk for urinary or vaginal infections associated with water-gymnastics. Water-gymnastics during the second half of pregnancy significantly reduced the intensity of back/ low back pain and decreased the number of women on sick-leave because of back/low back pain.

SHIM ET AL. (2007) investigated the effect of a **back-pain-reducing program (BPRP)** during pregnancy for Korean women:
Pregnant women who attended an antenatal clinic and experienced back pain during their pregnancy were included in an intervention group (n=29), and their intensity of back pain, functional limitation and anxiety were compared with women in a control group from another antenatal clinic (n=27). The data was collected at three time points: prior to intervention, and 6 and 12 weeks after intervention.
At 12 weeks after intervention, the intensity of back pain experienced by the intervention group was significantly lower than the control group. However, there were no statistically

significant differences between the groups with respect to functional limitations and anxiety.
The findings show that the pain-reducing program developed for this study was effective in reducing the intensity of back pain experienced by pregnant women.

Summing up, several methods to reduce pregnancy related pain are used, but there is only little knowledge about their real efficacy due to small sample sizes.
The following items are essential:

- Nearly all pregnant women want to talk about pregnancy related problems in prenatal visits with medical doctors and midwives. 15 to 58 percent had been given advice by doctors or midwives, depending on the symptom. Most of all they wanted to talk to a midwife about their problems (LINDENSKOV ET AL., 1994).

- Complementary and alternative medicine (CAM) therapy as treatment for low back pain during pregnancy would be accepted by a majority of pregnant women (61.7%) and of providers of prenatal health care (61%) in Connecticut, USA. Massage (61.4%), acupuncture (44.6%), relaxation (42.6%), yoga (40.6%), and chiropractic treatment (36.6%) are the most common CAM therapies recommended for low back pain in pregnancy by the providers of prenatal health care in this sample (WANG ET AL., 2005).

- There was no significant difference among three **physiotherapy** groups during pregnancy or at the follow-ups postpartum regarding pelvic girdle pain and activity. In all groups, pain decreased and the activity of daily life increased between gestation week 38 and 12 months postpartum. Women seemed to improve with time in all three treatment groups. Neither home nor in clinic exercises had any additional value above giving a nonelastic sacroiliac belt and information (NILSSON-WIKMAR ET AL., 2005).

- Different **group intervention programs**, among them fitness classes for pregnant women with back or pelvic pain have no significant effect on pain, posture and daily function postpartum (DUMAS ET AL., 1995). **Individually designed interventions are more successful**. Differentiation between low back and posterior pelvic pain seems to be essential. The individual-based treatment programs reduced sick leave for lumbar back and posterior pelvic pain significantly in number and duration compared to controls and are cost effective (OSTGAARD ET AL., 1994).

- **Massage therapy** results in reduced anxiety, improved mood, better sleep and less back pain. In addition, urinary stress hormone levels (norepinephrine) decrease. These data can not be taken as universally valid due to the small sample size (FIELD ET AL., 1999).

- No adverse effects were reported after **chiropractic treatment** including spinal manipulation. The results suggest that chiropractic treatment is safe in these cases and support the hypothesis that it may be effective for reducing pain intensity (LISI, 2006). Data is not firm due to the small sample size.

- Average pain scores decreased significantly to a higher extent and more frequently after **acupuncture** compared to controls. The capacity to perform general activities, to work and to walk was improved significantly, the use of paracetamol was less after acupuncture. After acupuncture stimulation, significant systematic group changes towards lower levels of pain intensity at rest and in daily activities, in rated emotional reaction and loss of energy were seen. No differences between the effects induced by the superficial and deep acupuncture stimulation modes were observed. (GUERREIRO DA SILVA ET AL., 2004; LUND ET AL., 2006 and KVORNING ET AL., 2004))

- **Water-gymnastics** during the second half of pregnancy significantly reduced the intensity of back/ low back pain and decreased the number of women on sick-leave because of back/low back pain. There was no excess risk for urinary or vaginal infections associated with water-gymnastics (KIHLSTRAND ET AL., 1999).

2.5. Osteopathic Treatment and Pregnancy Related Back Pain

Only few studies about the efficacy of osteopathic treatment with small samples and a lack of investigations of the sustainability of the therapy have been performed in this connection.

THIEME AND DEGENHARDT (1998) performed a study in order to determine if **osteopathic manipulative treatment (OMT) could decrease the severity of back pain** in the obstetrical(OB) patient, optimise performance of activities of daily living (ADL's), and enhance satisfaction with obstetrical care. This was a prospective pain, age and parity matched outcome study. All participants provided an initial medical history and completed a pain drawing, visual analogue scales(VAS) of pain intensity and patient satisfaction with OB and Oswestry ADL scale at each evaluation. Both groups received standard obstetrical care while the treatment group also received multimodality osteopathic manipulative treatment based on structural diagnosis. There were 36 participants in the study. In the control group (n=15), 93% experienced back pain during the pregnancy. In the treatment group (n=21), 90% experienced back pain during the pregnancy. The patients in the treatment group experienced a statistically significant decrease in their pain ($p<0.04$), a statistically significant increase in their ability to perform their activities of daily living during the third trimester ($p<0.03$), and an increase in their satisfaction with obstetrical care. There were no complications from osteopathic manipulative treatment to the participant or the fetus. According to THIEME AND DEGENHARDT, osteopathic manipulative treatment is a safe effective modality to minimize back pain in the obstetrical patient, increase the patient's ability to perform activities of daily living, and enhance patient satisfaction with total obstetrical care.

PETERS AND VAN DER LINDE (2006) assessed the **effectiveness whether osteopathic treatment influences the pain-symptomatology of women with pregnancy related pain in the pelvic and/or lumbar area**. The study was accomplished by two osteopaths in Germany with a slightly higher sample.

Sixty pregnant women with pain-symptoms in the pelvic and/or lumbar area (on average 30 years old, in the 25th week of pregnancy) participated in the trial. The symptoms had to occur during pregnancy and had to be present for at least one week (VAS>3). 30 women were allocated to an intervention group and 30 to a control group by randomization. During the trial three patients of the control group dropped out.

The intervention group received four osteopathic treatments in weekly intervals. The patients of the control group did not receive any treatment during that time. They received osteopathic treatment after five weeks, which was not relevant for the trial. The osteopathic dysfunctions

in the cranial, visceral and parietal system, found on the day of treatment, were diagnosed and treated individually. The primary parameter was the greatest pain intensity within the last three days, measured with a visual analogue scale (VAS). The secondary parameter was the interference of every day activities through back pain, measured by the Quebec Back Pain Disability Scale.

In the intervention group the pain intensity, measured by VAS, was on average reduced from 6.5 to 2.1 for pain in the pelvic and/or lumbar area, which corresponds to an improvement of 68% ($p<0.0005$, 95% CI=3.5 to 5.2). No improvement occurred in the control group during that time ($p=0.404$, 95% CI=-1.0 to 0.4). Statistic significance was calculated ($p<0.0005$). The Quebec Back Pain Disability Scale was improved by 11 points in the intervention group and thus by 28% ($p=0.001$, 95% CI=4.9 to 17.3), whereas the symptoms in the control group worsened by 20% ($p<0.0005$, 95% CI=- 12.9 to -4.6).

Four osteopathic treatments, over a period of five weeks could cause a clinically relevant influence on pain-symptoms in the pelvic and/or lumbar area and on interference of daily life of pregnant women.

These two studies show a positive effect of ostepathic treatment, but results are not firm due to small sample sizes.

Another interesting aspect was investigated by FILSHIE:

Points of view of 120 practising obstetricians and 120 practising midwives, selected randomly throughout Great Britain were canvassed, by means of a postal self administered questionnaire, as to their awareness of the prevalence of **back pain** of any severity in pregnant women, their current treatment practices and their **opinions as to the acceptability of osteopathic treatment for these patients.** There was an equal response rate for both obstetricians and midwives with an overall response rate of 80.4%. The perception of the obstetric professionals particularly obstetricians, as to the prevalence of back pain of any severity in pregnancy was found to be lower than the numbers reported in relevant literature. Three main areas of musculoskeletal pain were identified as being equally problematical by both groups; the lumbar spine, the sacroiliac joints and the symphysis pubis. The three treatment options favoured equally by the professionals were physiotherapy, mild analgesics and reassurance. Fifty-two per cent considered osteopathic intervention to be an acceptable treatment option, although many commented that more information as to the role and safety of osteopathic treatment is required before they would make referrals (FILSHIE, 2000).

- By OMT a statistically significant decrease in pain in the pelvic and/or lumbar area, a statistically significant increase in their ability to perform their activities of daily living during the third trimester, and an increase in their satisfaction with obstetrical care is achieved. No complications from OMT to the participant or the fetus are reported. These data can not be taken as universally valid due to the small sample size (PETERS AND VAN DER LINDE, 2006 and THIEME AND DEGENHARDT, 1998).

- Approximately 50% of 120 practising obstetricians and 120 practising midwives in Great Britain consider osteopathic intervention to be an acceptable treatment option, although many commented that more information as to the role and safety of osteopathic treatment is required before they would make referrals (FILSHIE, 2000).

3. Methodology

3.1. Recruiting of Test Persons

I intended to distribute questionnaires to pregnant women in an obstetric primary care unit in suburban Salzburg, the public hospital of Hallein as well as in a private clinic in Vienna, specialized in obstetrics.
Contrary to my expectations high resistance was put up by the chief of department of gynecology and obstetrics in the private hospital. Therefore I had to change my plans and performed my questionings in the obstetric primary care unit of the public hospital Rudolfstiftung and in private offices of obstetricians practicing in the private hospital Wiener Privatklinik, both in Vienna.
By this, as side effect, a larger spectrum of social strata was gained.
While in Hallein women from rural catchment areas give birth, in hospital Rudolfstiftung predominantly an urban population (among them many immigrants) is represented.
The clients of the Wiener Privatklinik comprise women with higher education and better social conditions.

3.2. The Questionnaire

A patient survey to find out the prevalence of pregnancy related pain in the musculoskeletal structure in pregnant women. I used a self administered questionnaire, which is added in appendix 2.
In this chapter I like to introduce the questions and my underlying intentions.

3.2.1. Personal Data about the Participating Women

The **actual week of gestation**, the **number of previous pregnancies** and the **age of the pregnant women** were asked in order to classify the results with regard to the following aspects:

- actual trimenon
- primiparous women
- multiparous women
- women younger than 25 years
- women between 25 and 34 years
- women older than 34 years

In order to gain a sufficient sample size for each group, I had to change the initially chosen age limits.

3.2.1. Data about Pain Characteristics

The questions are composed of three divisions with increasing fineness.
They comprise the **general question, if pain in the musculoskeletal system is present**, the question in **which area** pain occurs and a 10-point Likert scale, on which the **intensity of pain** from almost unnoticeable to extremely painful should be marked.
The women were also asked about the **frequency of pain**.

3.2.2. Data Concerning Previous Treatment and its efficacy

These questions aim at the evaluation of reported previous treatment, and which treatment is experienced as effective.
Further, women are asked, if they consider other treatment and which kind of treatment they would like to have.
On the one hand, each of these questions has to be answered with "yes" or "no", on the other hand, a catalogue of common methods is offered to the women, comprising the following items:

- pain killers/drugs
- thermal treatment/heat
- cold packs
- massage
- remedial gymnastics
- acupuncture
- osteopathy

Additional methods can be added by the women in each of the three question blocks.

3.2.3. Questions Concerning the Personal Attitude towards Treatment of Pregnancy Related Pain in the Musculoskeletal System

Pregnant women and obstetricians have different attitudes towards the treatment of pain in the musculoskeletal system during pregnancy, because the symptoms are supposed to be temporal.
Therefore, a question, whether the women theoretically would take therapeutic strategies against pain, was also added.

3.2.4. Data Concerning the Information Status about Osteopathic Treatment

The question, whether pregnant women have heard about osteopathic treatment is completed by a catalogue of answers due to the source of information about osteopathic treatment.

- relatives/friends
- midwife/hospital nurse
- attending medical doctor
- physiotherapist
- internet
- brochure
- elsewhere

In a further question women are asked, whether they have the opportunity to have osteopathic treatment. In Vienna as well as in the environs of Hallein several osteopaths are established in or close to the hospitals. This question is meant to evaluate, if women are aware of this fact.
Finally, the costs pregnant women are willing to spend for an osteopathic treatment are evaluated with four possible answers within the limits of 20 -100 Euro.

3.3. Evaluation of the Data

Data of the questionnaires was collected in a data bank (MS Access 2000), verified and subsequently the consistency was checked by means of data bank queries.
Missing values in the general question of pain ("Do you have pain in the musculoskeletal structure?") were changed into positive answers, if in the following questions concerning the area of the body pain intensity was quoted higher "1".
Errors occurred in six cases (two in hospital Hallein, four in hospital Rudolfstiftung).
Correction of raw data was performed in an analogous way, in reference to previous therapies, improvements by previous therapies and considered therapies. Provided that therapies were mentioned and the general question was not answered or answered negatively, these replies were changed into positive ones.

A few answers to the question about the source of information about osteopathic treatment ("daughter", "my baby was treated", "Yoga group", "colleague"), were integrated within the answer "relatives/friends".

Some inconsistencies (four in hospital Rudolfstiftung and seven in hospital Hallein) in the answers to the questions "Have you heard about the possibility of osteopathic treatment" (negative answers) and "Do you have the possibility to have osteopathic treatment?" (positive answers), could not be corrected, because it is not clear which of the two answers is right.

After these corrections some new variables were introduced.
First, the **trimenon** was calculated from the week of gestation. Second: by the variable **parity** it was distinguished between primiparous and multiparous women. Third: the **mean estimated age (age*)** was calculated by the substitution of the age groups by the following numerical values in order to check whether the three samples correspond in age:

younger than 20 years	18 years
20-24 years	22.5 years
25-29 years	27.5 years
30-34 years	32.5 years
35-39 years	37.5 years
40 years or older	42 years

The same method was used for the answers about the price women are willing to pay for an osteopathic treatment.
Predominantly, data was evaluated by means of descriptive statistics, 95% confidence intervals, box and whisker plots and if necessary (and possible), by means of χ^2-tests (Winstat 3.1.).

4. Results

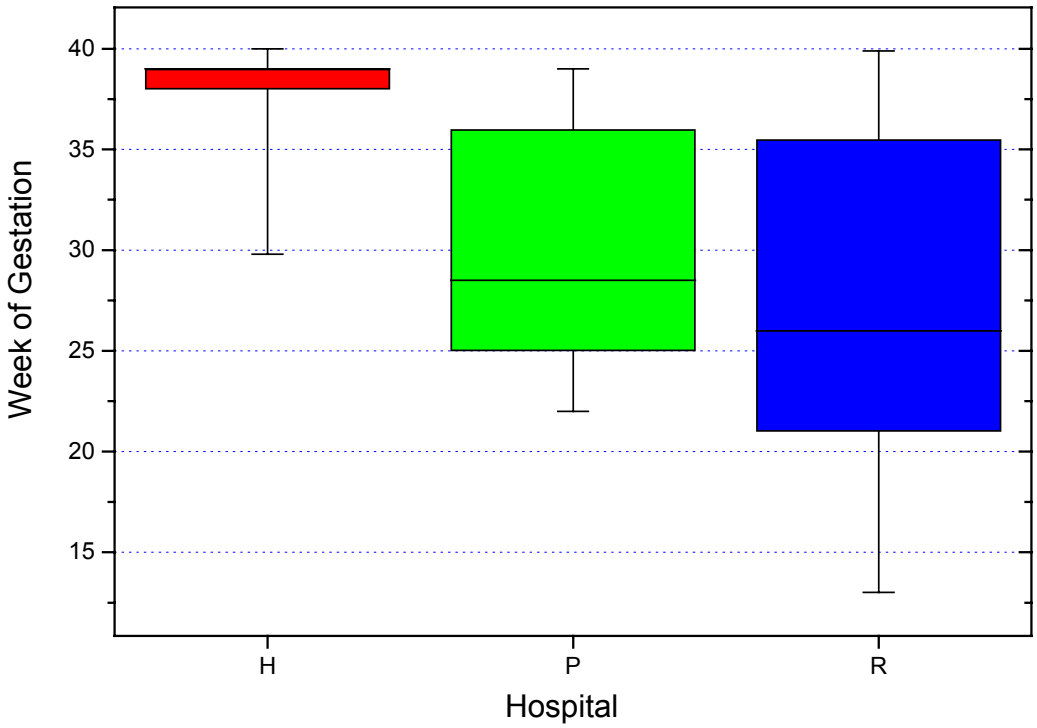
4.1. The Participants

As discussed in chapter 3.1., questionnaires were handed out to pregnant women in the obstetric primary care units of three different hospitals. In total, 131 were answered by pregnant women resulting in the sample sizes summarised in Table 1.

Hospital	**n**	**%**
Hallein (H)	51	38.9
Wiener Privatklinik (P)	13	9.9
Rudolfstiftung (R)	67	51.1
Total	**131**	

Table 1: Sample sizes in the three hospitals.

In order to check the comparability of the samples, the **weeks of gestation**, when the women filled the questionnaires are compared in Ill. 1 in a box-and-whisker plot.



Ill. 1: Box-and-whisker plot of weeks of gestation in the different samples.

The range of these data is lowest in hospital Hallein (H), where most of the pregnant women are in the last trimenon, whereas in both Viennese hospitals (P... Wiener Privatklinik, R...hospital Rudolfstiftung) many women were interviewed in an earlier stage of pregnancy.
Therefore, it has to be considered, that different areas of pain may arise, dependent on the source of data and that influences of the social structure might be overlapped by trimenon specific impacts.

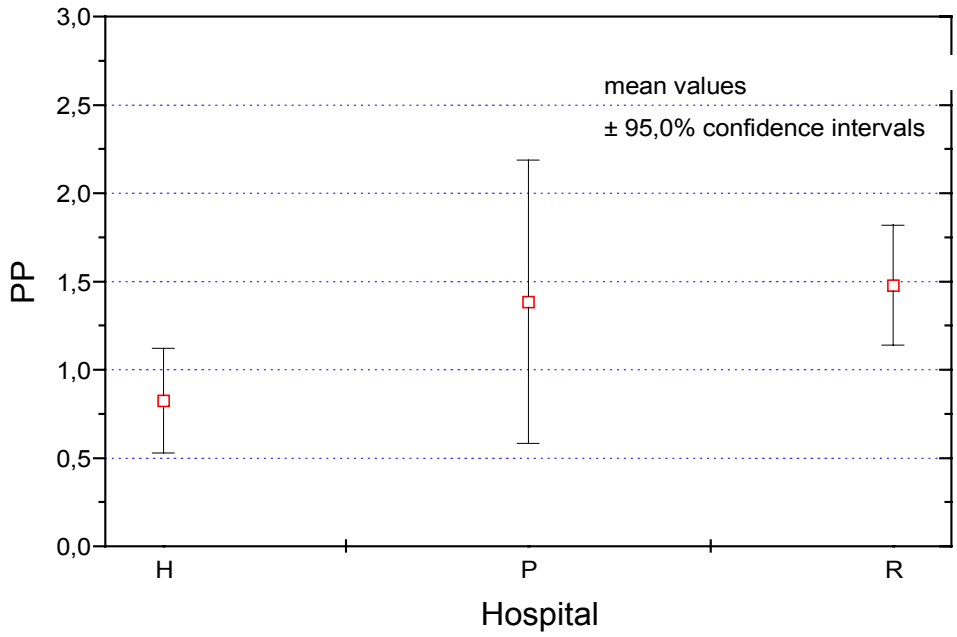
In Table 2 the **number of previous pregnancies** of women, cared for in the three obstetric primary care units are compared. The mode values (i.e. the most frequent values) are marked light green.

Var: PP	Hallein (H)		Wr. Privatklinik (P)		Rudolfstiftung (R)		total	
	n	%	n	%	n	%	n	%
0	**23**	**45.1**	3	23.1	16	23.9	42	32.1
1	20	39.2	**5**	**38.5**	**27**	**40.3**	**52**	**39.7**
2	5	9.8	4	30.8	11	16.4	20	15.3
3	1	2.0	0	0.0	7	10.4	8	6.1
4	1	2.0	0	0.0	1	1.5	2	1.5
>5	1	2.0	1	7.7	5	7.5	7	5.3

Table 2: Previous pregnancies in the different samples and in total. The mode values are marked light green.

According to data in Table 2, more primiparous women were interviewed in hospital Hallein (H) than in the Viennese hospitals (P and R).

Also the mean number of previous pregnancies is lower in Hallein than in the Viennese hospitals (hospital Hallein: 0.82, Wiener Privatklinik: 1.38, hospital Rudolfstiftung 1.48, cf. Ill. 2) .



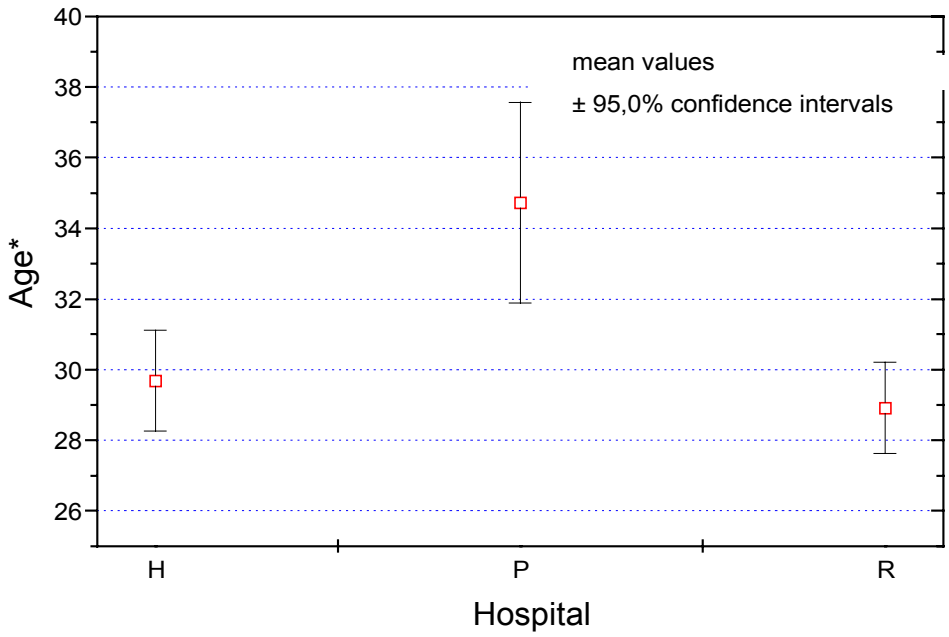
Ill. 2: According to the mean values (+/- 95% confidence intervals), the number of previous pregnancies (PP) is lowest in Hallein (H).

The **mean estimated age** (age*, cf. chapter 3.3) of all women is 29.8 years (+/-0.9 years).

Women interviewed in hospital Rudolfstiftung in average are the youngest (28.9 years), whereas in the Wiener Privatklinik predominantly older women are cared for (mean age: 34.7 years). The mean value in Hallein is 29.7 years.

The median of the estimated age (age*) is 32.5 years in the Wiener Privatiklinik, in the other hospitals, and in total 27.5 years.

In Ill. 3 these differences can be observed, the original data taken from the questionnaire is summarised in Table 3.



Ill. 3: The mean value (+/- 95% confidence interval) of the estimated ages in the Wiener Privatklinik (P) is significantly higher than in the other hospitals.

Due to these significant differences, the presence of pain has to be evaluated under consideration of age, too.

Var: Age	H			P			R			total		
	n	%	%°	n	%	%°	n	%	%°	n	%	%°
<20	-	-	-	-	-	-	2	3.0	3.1	2	1.5	1.6
20-24	9	17.6	18.0	-	-	-	11	16.4	17.2	20	15.3	15.7
25-29	18	35.3	36.0	2	15.4	15.4	28	41.8	43.8	48	36.6	37.8
30-34	17	33.3	34.0	5	38.5	38.5	14	20.9	21.9	36	27.5	28.3
35-39	4	7.8	8.0	4	30.8	30.8	8	11.9	12.5	16	12.2	12.6
>40	2	3.9	4.0	2	15.4	15.4	1	1.5	1.6	5	3.8	3.9
Missing	1	2.0		-	-		3	4.5		4	3.1	

Table 3: Age of women in the different hospitals.

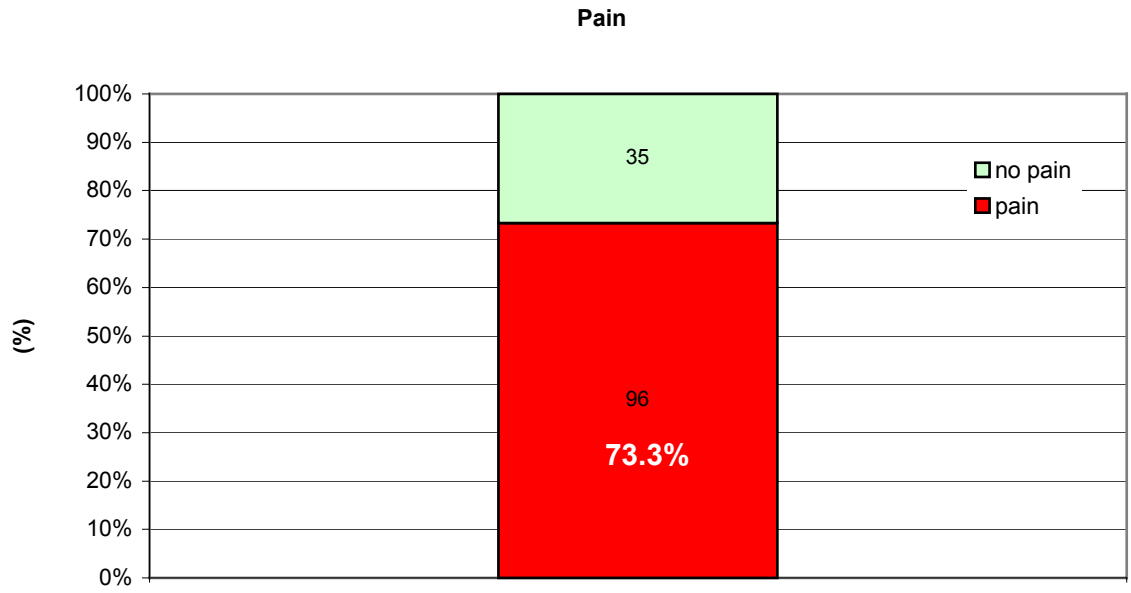
Most women interviewed in the public hospitals Hallein and Rudolfstiftung are between 25 and 29 years old, the age of most pregnant women in Wiener Privatklinik is between 30 and 34 years (cf. Table 3). The mode values are marked light green.

Summing up, it may be said, that the samples from the three different hospitals differ not only in social strata but also in age structure, the number of previous pregnancies and the stage of pregnancy (week of gestation). These aspects might influence the results in different respects and thus they have to be considered additionally. Nevertheless, the classification by hospitals will be sustained.

4.2. Pregnancy Related Pain

4.2.1. Pain Perception

In general, almost 75% (95%-confidence interval: 65.1%-80.1%) of the pregnant women have pain in the musculoskeletal system (cf. Ill. 4).



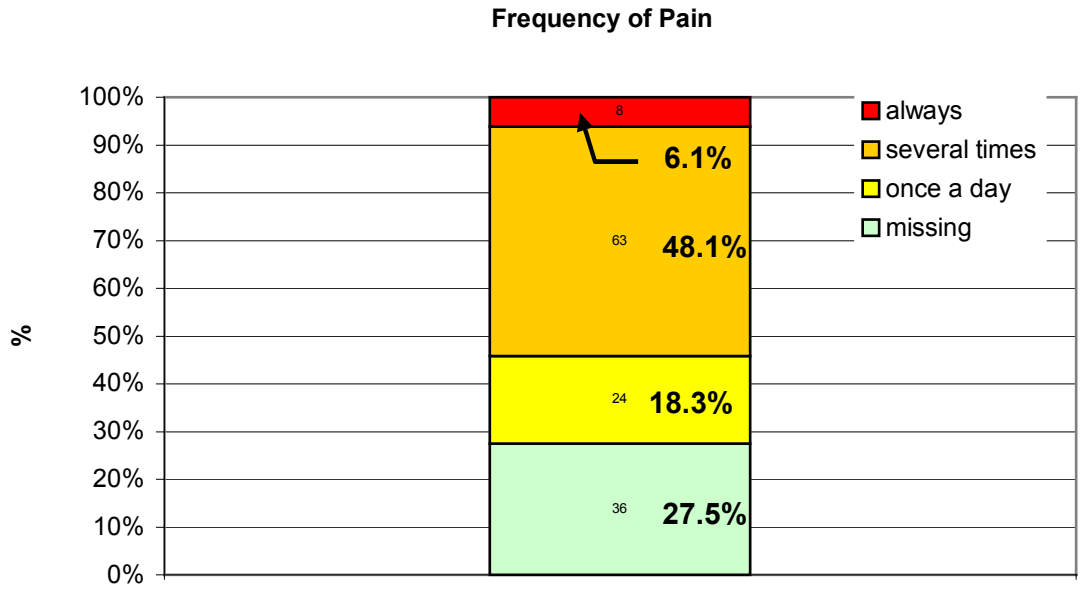
Ill. 4: In total, 73.3% of pregnant women suffer pain (95%CI: 65.1%-80.1%).

This data is largely independent from the hospital and thus from living conditions.(cf. Table 4).

Var: Pain	H		P		R		total	
	n	%	n	%	n	%	n	%
pain	36	70.6	9	69.2	51	76.1	96	73.3
no pain	15	29.4	4	30.8	16	23.9	35	26.7

Table 4: Arising pain during pregnancy classified by hospitals and in total.

Approximately two thirds of these women have pain several times a day and 6,1% permanently (cf. Table 5 and Ill. 5).



Ill. 5: Most women suffer pain during pregnancy several times a day. The missing data comprise the 35 women without pain and one missing value of the pain frequency.

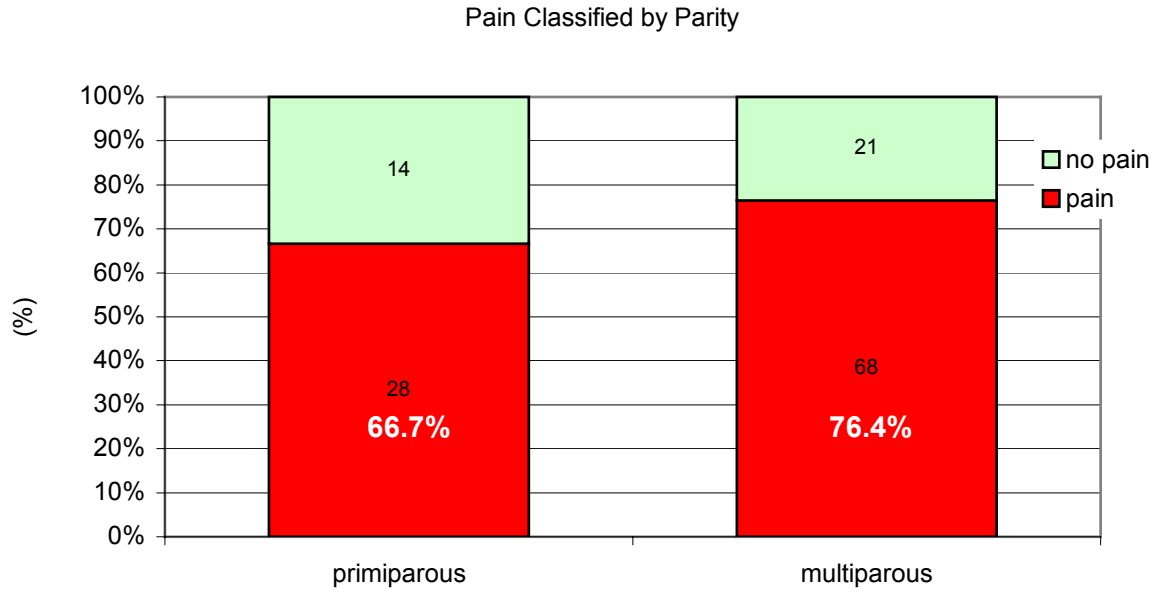
Var: Frequ	H			P			R			total		
	n	%	%°	n	%	%°	n	%	%°	n	%	%°
once a day	7	13.7	20.6	2	15.4	22.2	15	22.4	28.8	24	18.3	25.3
several times	24	47.1	70.6	5	38.5	55.6	34	50.7	65.4	63	48.1	66.3
always	3	5.9	8.8	2	15.4	22.2	3	4.5	5.8	8	6.1	8.4
missing/ no pain	17	33.3		4	30.8		15	22.4		36	27.5	

Table 5: Frequency of pain classified by hospital. Most women have pain several times a day.

Under consideration of the 95%-confidence intervals approximately 40 - 57% of all women have pain several times a day, 13- 26% once a day and 3 - 12 % permanently. 21-36% of the pregnant women do not suffer pain at all.

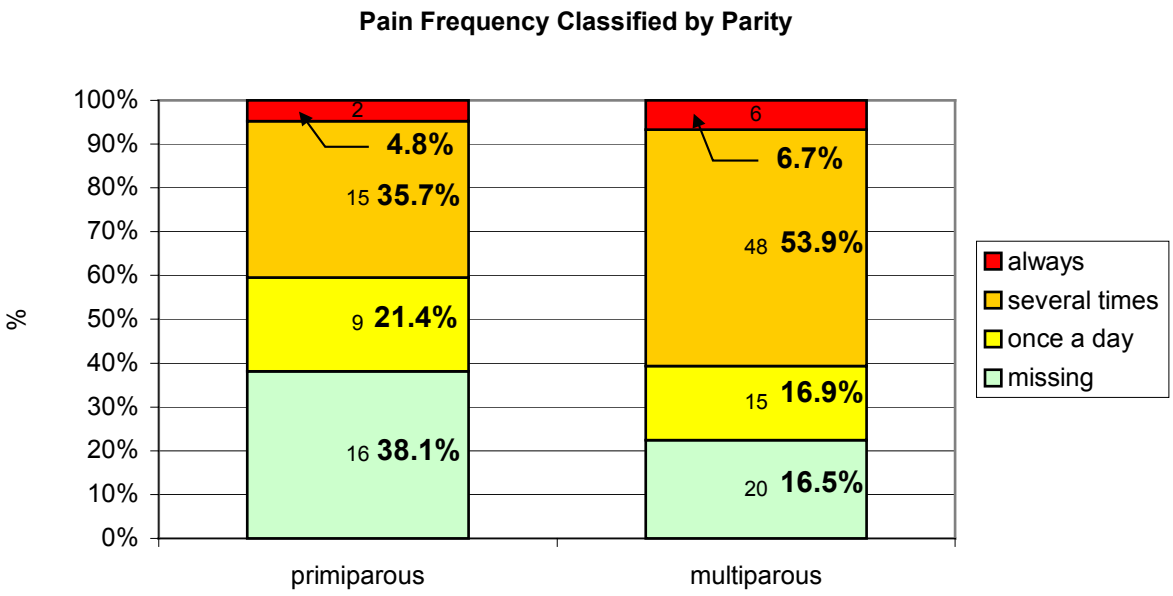
In the following sequences, the data are classified by parity, trimenon and age in order to preclude influences by the different patient structure in the diverse hospitals.

Since 10% more multiparous women state to have pain than primiparous (cf. Ill. 6), the pain prevalence in these groups is compared by means of a χ^2-test (level of significance α= 0.05). According to the result (χ^2=1.382, p= 0.24), these differences in pain prevalence are not significant.



Ill. 6: Approx. 10% more multiparous women (76.4%, CI: 66.6% - 84.0%) state to have pain than primiparous do. (66.7%, CI: 51.6% - 79.0%).

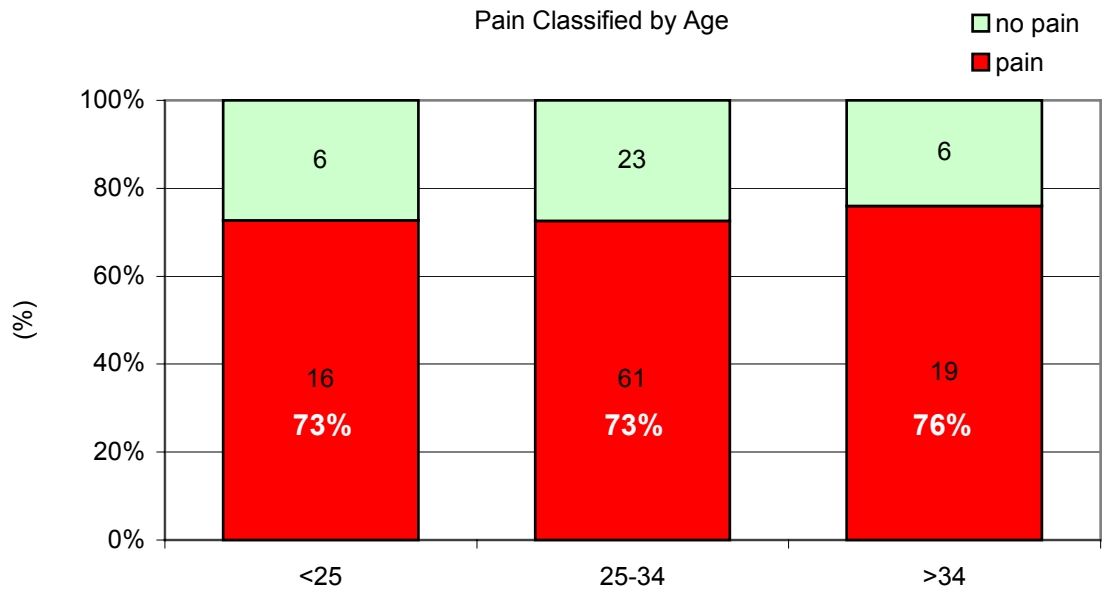
Not only higher pain prevalence among multiparous women, but also a higher frequency than among primipara could be observed (cf. Ill. 7).



Ill. 7: Multiparous women suffer pain more frequently per day than primipara.

Approximately 60% of the women with previous pregnancies have pain at least several times a day, whereas only 40% of the primipara.
After stratification of women suffering pain several times a day or always and women suffering no pain or less than several times a day, these differences turn out to be statistically significant in a χ^2-test (level of significance α= 0.05, χ^2=4.689, p= 0.03).

The classification by age (cf. Ill. 8) shows no obvious difference in pain perception between women younger than 25 years and those between 25 and 34 years (72.7% and 72.6%, respectively).



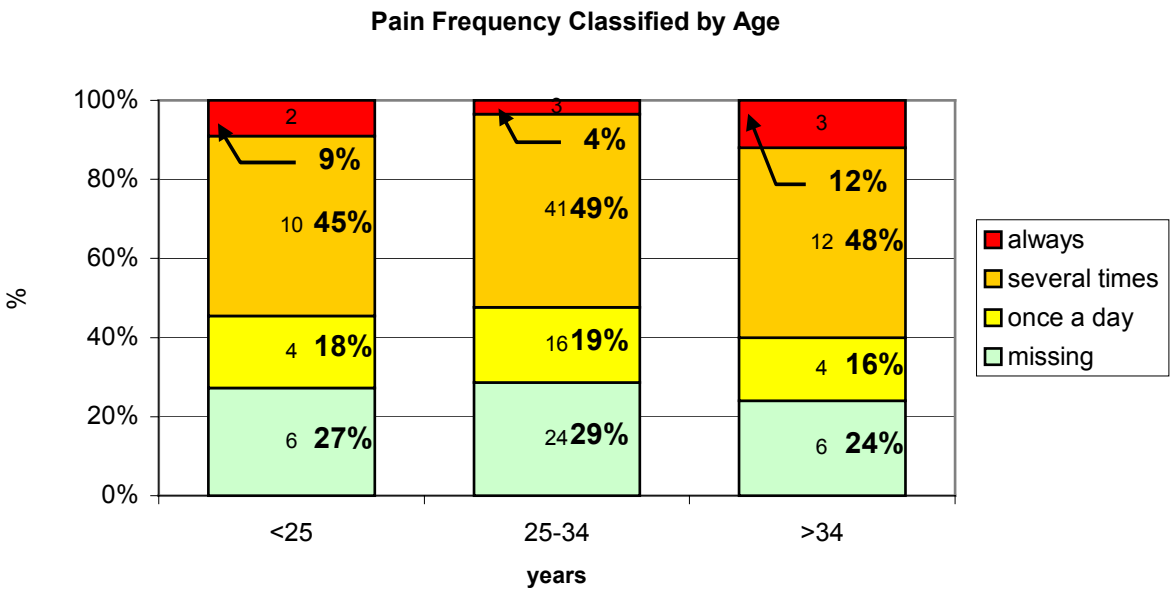
Ill. 8: Pain prevalence during pregnancy turns out to be independent of age.

More women having pain can be observed in the group with an age higher than 34 years (76.0%). Nevertheless, these differences are little, as can be observed in the 95%-confidence intervals listed in Table 6.

Age	n	Percent	95% confidence intervals
<25 years	22	72.7%	51.8% - 86.8%
25-34 years	84	72.6%	62.3% - 81.0%
>34 years	25	76.0%	56.6% - 88.5%

Table 6: Number of pregnant women in the different age groups, percentage of pain perception and 95%-confidence intervals.

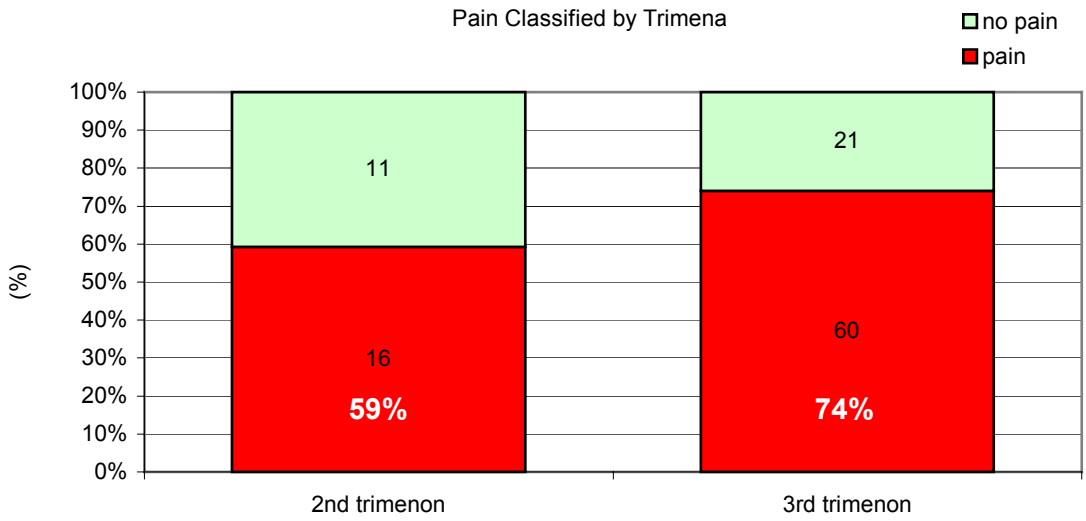
A χ^2-test of the data with the highest differences (dependent variable: pain (yes/no), independent variable: age (25-34years/>34years)) shows no significant difference between pain perception in the age groups 25-34 years and >34 years (χ^2=0.113, p=0.74).



Ill. 9: Pain frequency turns out to be similar regardless different ages.

Pain frequencies per day classified by age groups can be observed in Ill. 9. The difference between groups turn out to be little. The most distinct difference between high daily pain frequencies (always and several times a day) and low daily pain frequencies (once a day, no pain) can be observed in the age group 25-34 years and >34 years. From these data χ^2= 0.45, p=0.50 is calculated, indicating that there are no significant differences.

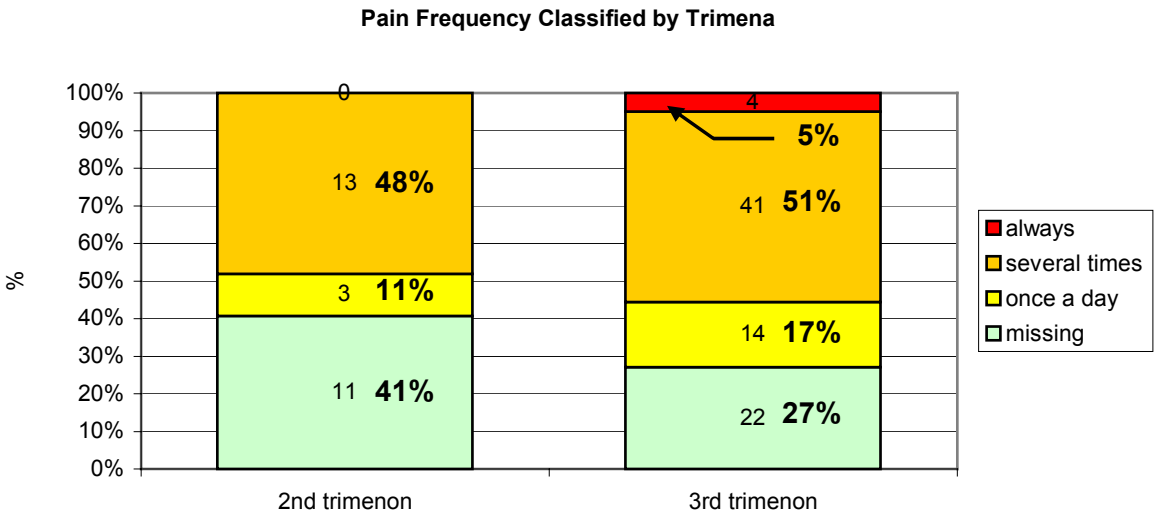
Significant differences in the week of gestation could be observed in the different hospitals at the time the questionnaires were filled in (cf. Ill. 1).
Pain proneness rather might be influenced by the stage of pregnancy than by living conditions. Therefore, data also was tested with regard to the stage of pregnancy (cf. Ill. 10, data classified by trimenon).



Ill. 10: More women suffer pain in the third trimenon.

59.3% of women in the second trimenon (95%CI: 40.7% - 75.5%) and 74.1% of women in the third trimenon (95%CI: 63.6% -82.4%) state to have pain.
Because of these differences, a χ^2-test (dependent variable: pain (yes/no), independent variable: trimenon (second/third)) was performed, but did not result in significant differences (χ^2=2.132, p=0.14 at α=0.05). There might be only a trend.

As can be read from Ill. 11, pain frequency is higher in the third trimenon.



Ill. 11: Pain frequency is higher in the third trimenon compared to the second trimenon. The differences are not statistically significant.

A χ^2-test (level of significance α= 0.05) after stratification of women suffering pain several times a day or always and women suffering no pain or less than several times a day results in no statistical significant differences (χ^2=0.447, p= 0.50).

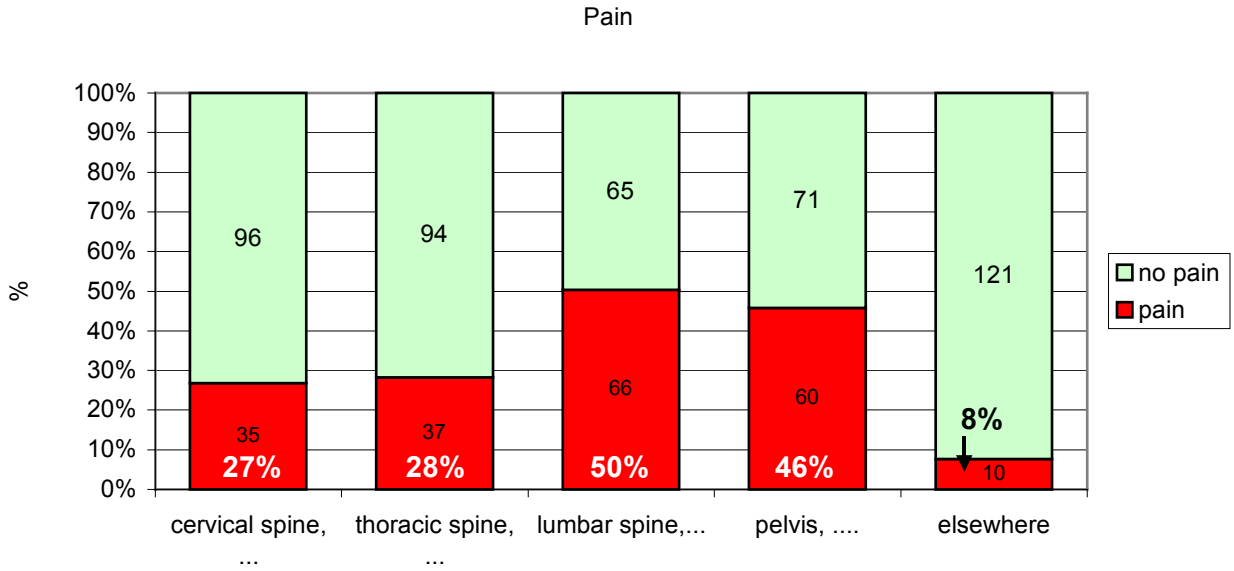
Summing up, almost 75% of all pregnant women have pain in the musculoskeletal system (95%CI: 65-80%). Approximately two thirds of these women have pain several times a day and approximately 8% suffer permanently.
These results are largely independent from the hospital and thus from living conditions.

No significant influences of age and parity on pain prevalence could be found, either.
59% of the women in the second trimenon and 74% of the women in the third trimenon state to have pain. This difference might be seen as a trend, but is not significant (χ^2=2.132, p=0.14).

No significant influences of age and trimenon on daily pain frequency could be found, but approximately 60% of the women with previous pregnancies have pain at least several times a day, only 40% of primipara. These differences are significant in a χ^2-test (χ^2=4.689, p= 0.03).

4.2.2. Pain Prevalence and Pain Areas

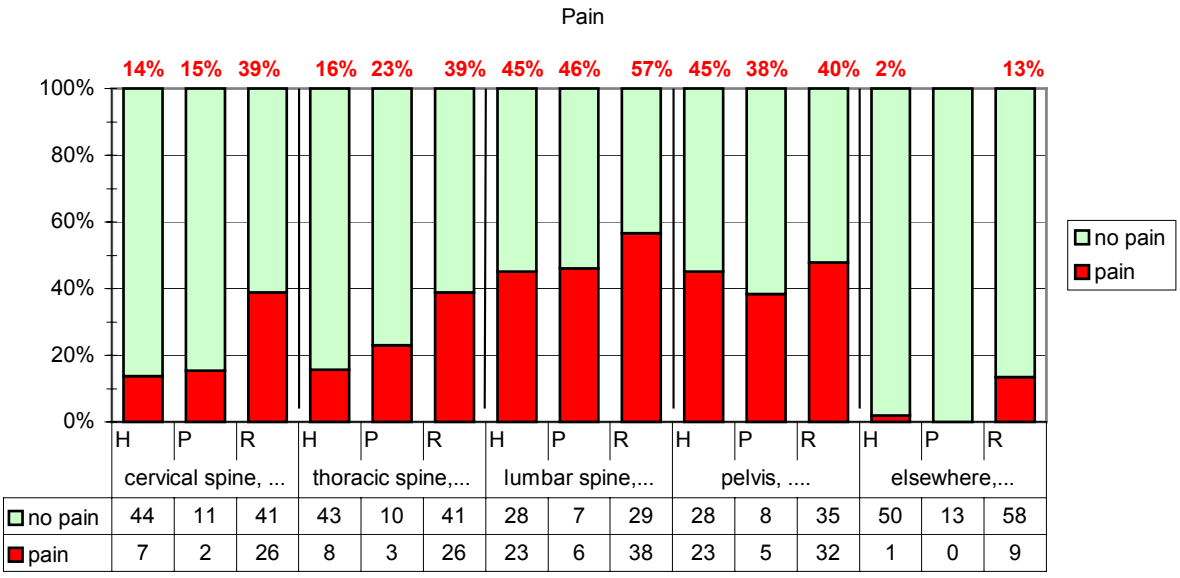
According to answers of pregnant women and corresponding with literature data, where the expression "pregnancy related low back and pelvis pain" is commonly used, it can be observed, that pain is felt most frequently in the lumbar spine and the pelvis (cf. Ill. 12).



Ill. 12: Approximately 50% of women have pain in the lumbar spine. Pelvis problems are the next frequent reasons for pain.

68% of pregnant women have either pain in the lumbar spine, in the pelvis or in both (95%CI: 60 - 75%), 50% only in the lumbar spine (95%CI: 42 - 59%) and 46% only in the pelvis (95%CI: 38 - 54%) (cf. pain prevalence in the total musculoskeletal system of 73.3%).

From Ill. 13 can be read - independently from the pain area – that frequency of pain is highest in hospital Rudolfstiftung (R). Pain in the lumbar spine is most frequent in all hospitals. In hospital Rudolfstiftung many women state to have pain in other areas of the spine too.

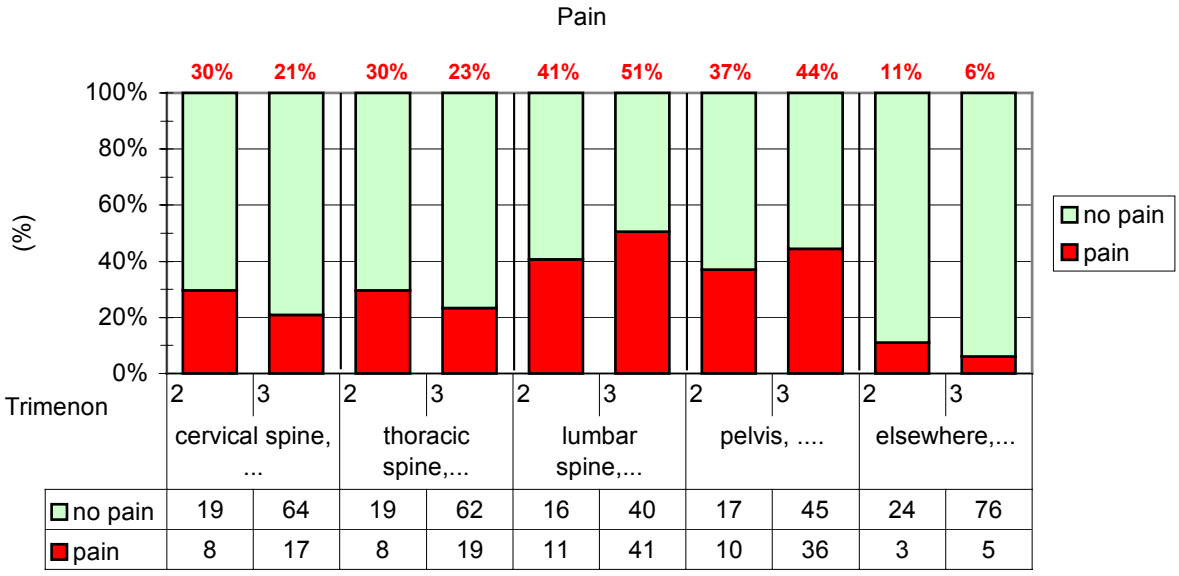


	cervical spine, ...			thoracic spine,...			lumbar spine,...			pelvis, ...			elsewhere,...		
	H	P	R	H	P	R	H	P	R	H	P	R	H	P	R
no pain	44	11	41	43	10	41	28	7	29	28	8	35	50	13	58
pain	7	2	26	8	3	26	23	6	38	23	5	32	1	0	9

Ill. 13: Pain areas grouped by hospitals.

No significant influence of different social strata or other influence of the different obstetric primary care units on the number of women having pain in the lumbar or pelvic region can be observed (lumbar spine: max. χ^2=1.565, p=0.21, pelvis: max. χ^2=0.379, p=0.54), but there are significant differences in pain prevalence in the cervical and thoracic spine between women in hospitals Rudolfstiftung and Hallein.
In hospital Rudolfstiftung 39% of women have pain in the cervical spine as well as in the thoracic spine (95%CI for both: 28-51%), only 14 % in Hallein (95%CI: 7-26%) have pain in the cervical spine and 16% in the thoracic spine (95%CI: 8-28%).
χ^2-tests result in χ^2=9.04, p=0.002 (cervical spine) and χ^2=7.546 p=0.006 (thoracic spine).

While occurrence of pain in the lumbar spine and the pelvis is more frequent in later pregnancy stages (third trimenon), pain in other regions of the spine is rare (cf. Ill. 14).

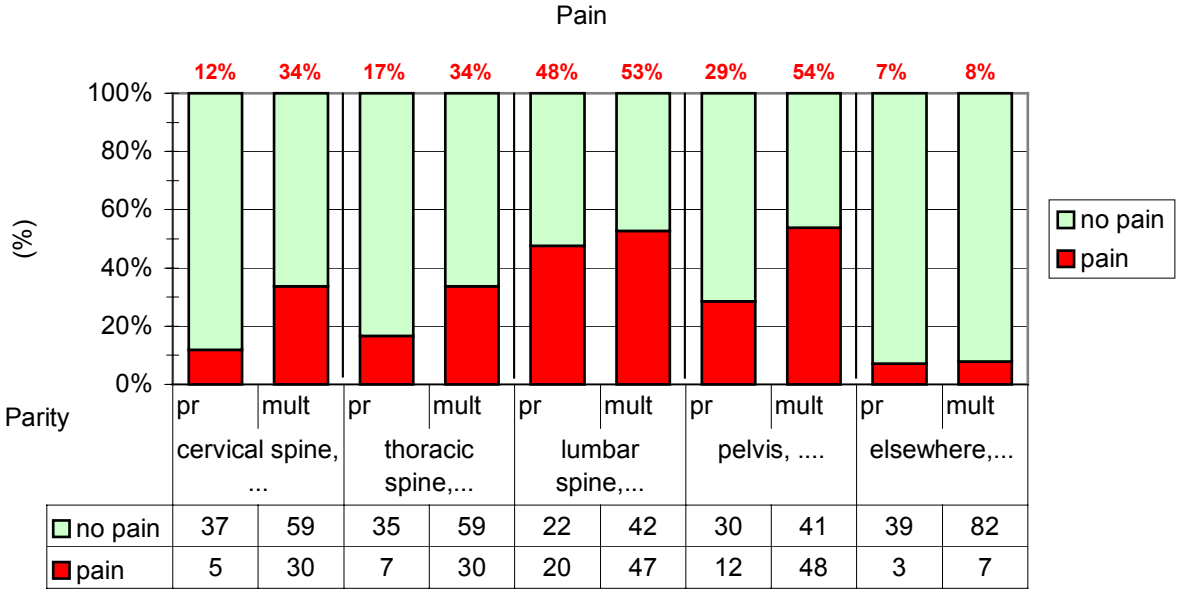


no pain	19	64	19	62	16	40	17	45	24	76
pain	8	17	8	19	11	41	10	36	3	5

Ill. 14: Pain areas grouped by trimenon.

In χ^2-tests, from these data no significant differences between pain prevalence in the second and third trimenon can be deduced.

As can be observed in Ill. 15 primiparous women state to have less pain than multiparous.

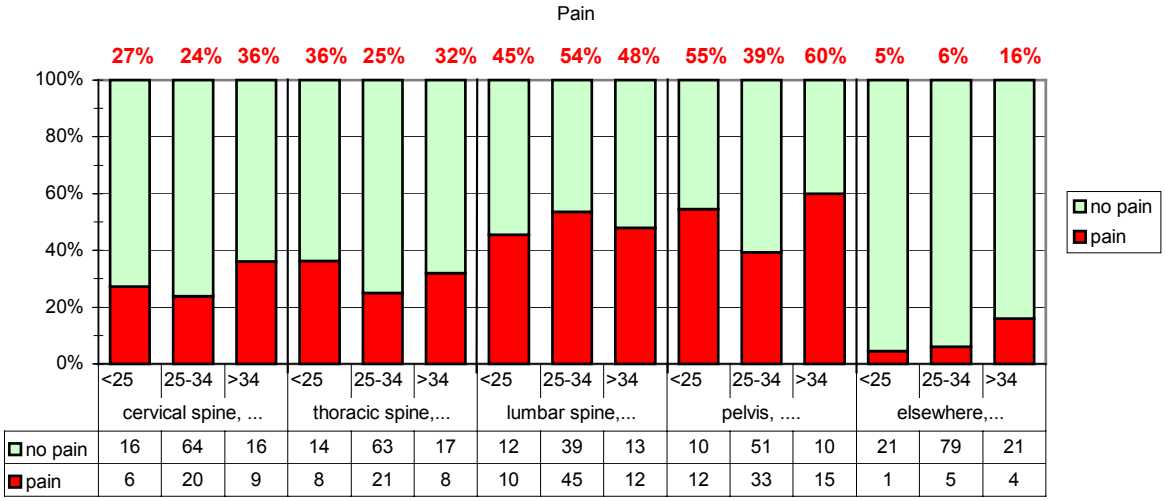


no pain	37	59	35	59	22	42	30	41	39	82
pain	5	30	7	30	20	47	12	48	3	7

Ill. 15: Pain areas grouped by parity.

χ^2-tests result in significant higher pain prevalence among multipara in the pelvis (χ^2= 7.39, p= 0.007), thoracic spine (χ^2= 4.09, p= 0.04) and the cervical spine (χ^2= 6.93, p= 0.008), but not in the lumbar spine (χ^2= 0.308, p= 0.58). Pain prevalence in the pelvis for primipara is 29% (95%CI: 17-44%), for multipara 54% (95%CI:44-64%).
In the thoracic spine pain prevalence for primipara is 17% (95%CI: 8-31%) and for multipara 34% (95%CI: 25-44%), the correlating data for the cervical spine is 12% (95%CI: 5-25%) and 34% (95%CI: 25-44%), respectively.

In contrast to the classifications above, no homogeneous trend can be read from the grouping by age (cf. Ill. 16).



Ill. 16: Pain areas grouped by age.

Most difference in relative frequency can be observed in the pelvic region between the age groups 25-34 years and >34 years with pain prevalences of 39% (95%CI: 30-50%) and 60% (41-77%). The corresponding chi-square value is χ^2=3.35 with a p= 0.07. On a level of significance of α=0.05, this value is not significant, but may be interpreted as a possible trend, so as increasing age is correlated with higher pain prevalence. Between the age groups <25 years and 25-34 years the corresponding values are χ^2= 1.66 and p= 0.20.

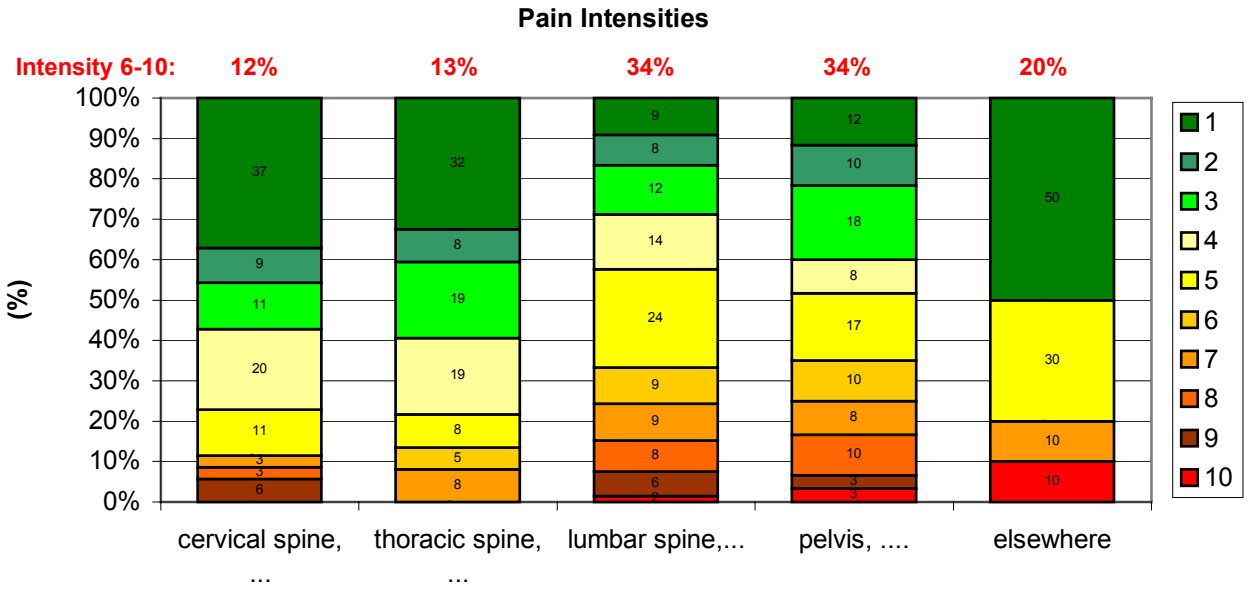
Summing up, pain prevalence is highest in the lumbar spine and pelvis. 68% of pregnant women have pain in the lumbar spine, in the pelvis or both, 50% only in the lumbar spine and 46% only in the pelvis.

There is a significant higher pain prevalence among **multipara** in the pelvis, thoracic spine and the cervical spine, but not in the lumbar spine. This might be a reason for the significantly higher pain prevalence in the cervical and thoracic spine in the hospital Rudolfstiftung compared to Hallein. Other reasons could be different social strata of the different obstetric primary care units. In this connection no significant difference in pain prevalence in the lumbar or pelvic region could be observed.

There is a tendency, that **increasing age** is correlated with higher pain prevalence in the pelvis. No significant difference in pain prevalence in any body structure between the second and third trimenon can be found.

4.2.3. Pain Intensity in Different Body Areas

Analogous to the frequency of pain, pain intensity is highest in the lumbar spine and the pelvis (cf. Ill. 17).



Ill. 17: Above average intense pain (6-10) is most frequent in the pelvis, lumbar spine, and not explicitly specified body structures.

Highest pain intensity (10 on a 10-point Likert scale) can only be observed in the lumbar spine, the pelvis and not explicitly specified body structures, lowest intensity (1) is most frequent in the cervical spine, thoracic spine and again in not explicitly specified body structures. Approximately 34% of the pregnant women have pain intensity between 6 and 10 on the 10-point Likert scale in lumbar spine and pelvis.

4.2.3.1 Pain Intensity in the Cervical Spine, Neck, Shoulder Girdle or Arms

27% (95%CI: 20- 35%) of all women have pain in this area. Among them, the total prevalence of above-average pain (values >5) is 11.4% (95%CI: 5- 26%).

Pain intensity and prevalence of above-average pain intensity grouped by hospitals

Due to the small sample data of pregnant women in the Wiener Privatklinik can not be considered and data from Hallein only with restrictions. Therefore it is not possible to work out a difference between the different social strata. The distribution of pain intensity (5%-, 25%-, 50%-, 75%- and 95%-percentiles) can be compared - under restriction of low sample size- in the upper left chart of Ill. 18. Descriptive data is summarised in Table 7.

Hospital	N	Mean	Std. dev.	intensity <6		intensity >5		95%CI	
				n	%	n	%	l	u
H	7	2.7	2.21	6	86	1	*14*	2.6%	51.3%
P	2	8.5	0.71	0	0	2	***100***	34%	100%
R	26	2.9	2.00	25	96	1	4	1%	19%

Table 7: Descriptive data of pain intensity grouped by hospitals.

Average pain intensity of 2.7 could be found in Hallein and of 2.9 in Rudolfstiftung. The corresponding median values are 2 and 3, respectively. 75% of pregnant women have pain intensity equal or less 4.

Pain intensity and prevalence of above-average pain intensity grouped by trimenon

Again, the number of women in the second trimenon having cervical pain is little and therefore distribution data is imprecise, it is not possible to work out a difference between the two trimena. The distribution of pain intensity (median, 5%-, 25%-, 75%- and 95%-percentiles) can be compared in the upper right chart of Ill. 18. Descriptive data is summarised in Table 8.

Trimenon	N	Mean	Std. dev.	intensity <6		intensity >5		95%CI	
				n	%	n	%	l	u
second	8	3.6	2.88	7	87.5	1	*12.5*	2%	47%
third	17	2.6	1.80	16	94	1	6	1%	27%

Table 8: Descriptive data of pain intensity grouped by trimena.

In the actual study prevalence of above-average pain intensity (values >5) in the cervical spine is higher during the second than the third trimenon. The average pain intensity is 3.6 among women in the second trimenon and 2.6 among women in the third. The corresponding median values are 3.5 and 2. In the second trimenon, 75% of the women have pain intensity equal or less 5 and in the third trimenon equal or less 4.

Pain intensity and prevalence of above-average pain intensity grouped by parity

Again, distribution data are imprecise. Median, 5%-, 25%-, 75%- and 95%-percentiles of data can be compared in the lower left chart of Ill. 18. Descriptive data is summarised in Table 9.

Parity	N	Mean	Std. dev.	intensity <6		intensity >5		95%CI	
				n	%	n	%	l	u
primiparous	5	4.6	2.70	4	80	1	*20*	4%	62%
multiparous	30	3.0	2.27	27	90	3	*10*	3%	26%

Table 9: Descriptive data of pain intensity grouped by parity.

Average pain intensitiy among primipara is 4.6 and among multipara 3. The corresponding median values are 4 and 2.5, respectively. Extreme values are lower among multipara. The prevalence of above-average pain among primiparous women is higher than the average total prevalence (11.4%). **These aspects might be a hint, that pain intensity in the cervical spine is lower in multipara.**

Pain intensity and prevalence of above-average pain intensity grouped by age

Again the restrictions of small sample sizes apply and the difference between age groups can not be worked out precisely. The distribution of pain intensity (median, 5%-, 25%-, 75%- and 95%-percentiles) can be compared in the lower right chart of Ill. 18. Descriptive data is summarised in Table 10.

Age	N	Mean	Std. dev.	intensity <6		intensity >5		95%CI	
				n	%	n	%	l	u
<25	6	3.0	3.10	5	83	1	*17*	3%	56%
25-34	20	3.1	2.01	19	95	1	5	1%	24%
>34	9	3.7	2.78	7	78	2	*22*	6%	55%

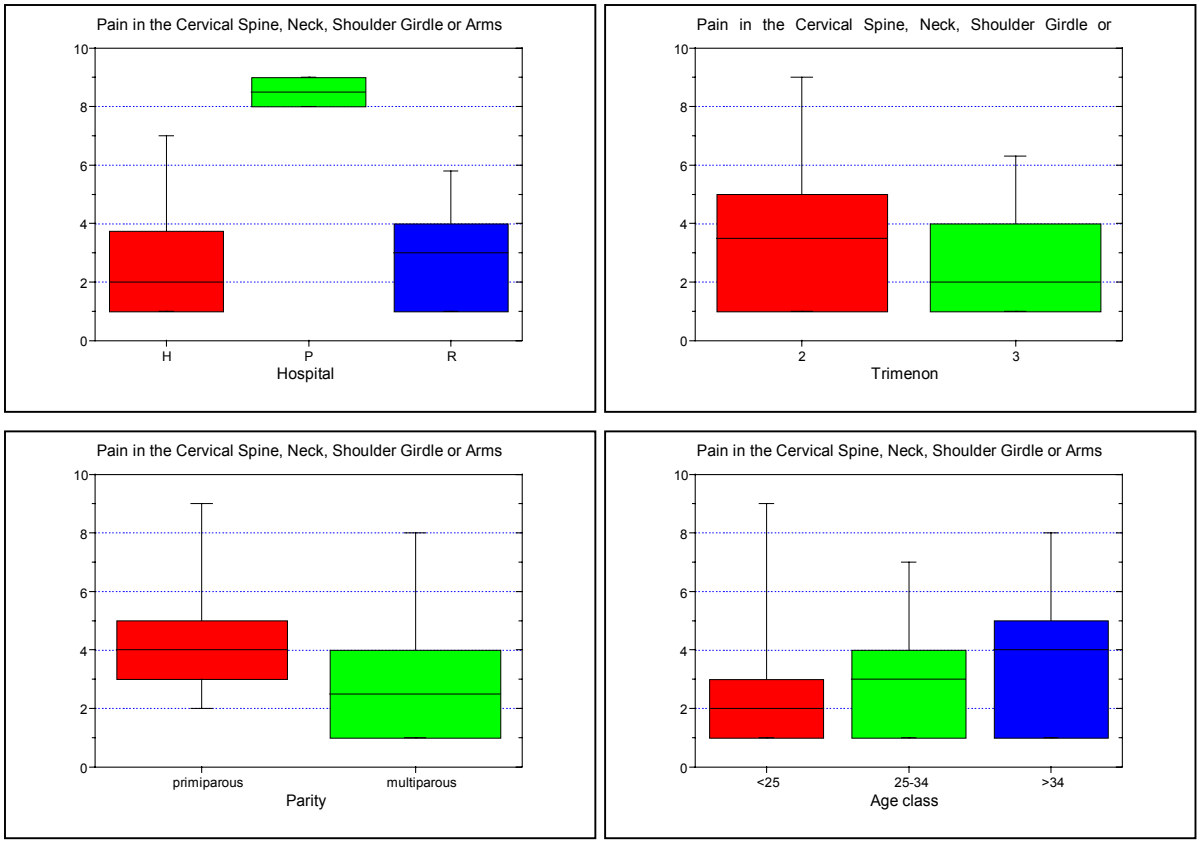
Table 10: Descriptive data of pain intensity grouped by age.

Prevalence of above-average pain intensity (values >5) in the cervical spine is lowest in the group 25- 34 years. The average pain intensity among women older than 34 years is 3.7, both other mean values are approximately. 3. The median values for the three age groups are 2, 3 and 4, 75%-percentiles 3, 4 and 5. **There might be a tendency for women older than 34 years to have a more risk of higher intensity of cervical pain.**

In Ill. 18 and also the next subchapters, box-and-whisker plots containing the information about the relative frequency and intensity of pain will be shown. Women without pain are not considered.

I**nfluences of living conditions,** visualised by the grouping by **hospitals**, can be read from the upper left chart. **Temporal influences** (grouped by **trimena**) are visualised in the upper right chart and in the lower left chart it is distinguished between **primiparous and multiparous** women. Finally, in the lower right chart influences on the pain perception by **age** are considered. The median of pain intensity is specified by the horizontal line in the box. Lower and upper margins of the boxes are the 25%- and 75%-percentiles respectively, lower and upper ends of the whiskers are the 5%- and 95%-percentiles.

Due to the low sample sizes, the latter two represent the minimum and maximum values in most cases.



Ill. 18: Pain intensity in the cervical spine, neck, shoulder girdle or arms grouped by hospital, trimenon, parity and age.

4.2.3.2 Pain in the Thoracic Spine, Thorax or Ribs

28% (95%CI: 21- 36%) of all women have pain in this area. Among them the total prevalence of above-average pain is 13.5% (95%CI: 6- 28%).

Pain intensity and prevalence of above-average pain intensity grouped by hospital

Due to the low sample size, data of the pregnant women in the Wiener Privatklinik can not be considered and data from Hallein only with restrictions. Differences can not be worked out precisely. The distribution of pain intensity can be compared - under restriction of low sample size - in the upper left chart of Ill. 19. Descriptive data is summarised in Table 11.

Hospital	N	Mean	Std. dev.	intensity <6		intensity >5		95%CI	
				n	%	n	%	l	u
H	8	3.0	1.41	8	100	0	0	0%	32%
P	3	3.7	2.52	2	67	1	**33**	6%	79%
R	26	3.1	2.08	22	85	4	*15*	6%	34%

Table 11: Descriptive data of pain intensity grouped by hospitals.

Average pain intensity of 3.1 could be found in Hallein and of 3.0 in Rudolfstiftung, the median value for both is 3 and the 75-percentile is 4.

Pain intensity and prevalence of above-average pain intensity grouped by trimena

Descriptive data is summarised in Table 12. Again, the number of women in the second trimenon having cervical pain is low and therefore distribution data is imprecise, it is not possible to work out a firm difference between the two trimena. The distribution of pain intensity can be compared in the upper right chart of Ill. 19.

Trimenon	N	Mean	Std. dev.	intensity <6		intensity >5		95%CI	
				n	%	n	%	l	u
second	8	3.9	2.64	5	62.5	3	**37.5**	14%	69%
third	19	2.8	1.30	19	100	0	0	0%	17%

Table 12: Descriptive data of pain intensity grouped by trimena.

In the actual study above-average pain intensity (values >5) in the thoracic spine can only be observed in the second trimenon. The average pain intensity is 3.9 among women in the second trimenon and 2.8 among women in the third, the corresponding median values are 4 and 3, and the 75%-percentiles 6.5 and 4. **Pain intensity in the thoracic spine, thorax or ribs might be higher in the first trimenon.**

Pain intensity and prevalence of above-average pain intensity grouped by parity

Again, distribution data is imprecise. Median, 5%-, 25%-, 75%- and 95%-percentiles of data can be compared in the lower left chart of Ill. 19. Descriptive data is summarised in Table 13.

Parity	N	Mean	Std. dev.	intensity <6		intensity >5		95%CI	
				n	%	n	%	l	u
primiparous	7	3.3	1.38	6	86	1	*14*	3%	51%
multiparous	30	3.1	2.07	26	87	4	*13*	5%	30%

Table 13: Descriptive data of pain intensity grouped by parity.

The average pain intensity among primipara is 3.3 and among multipara 3.1. The median values are 3 for both groups. There is almost no difference in prevalence of above-average pain intensity and average pain intensity.

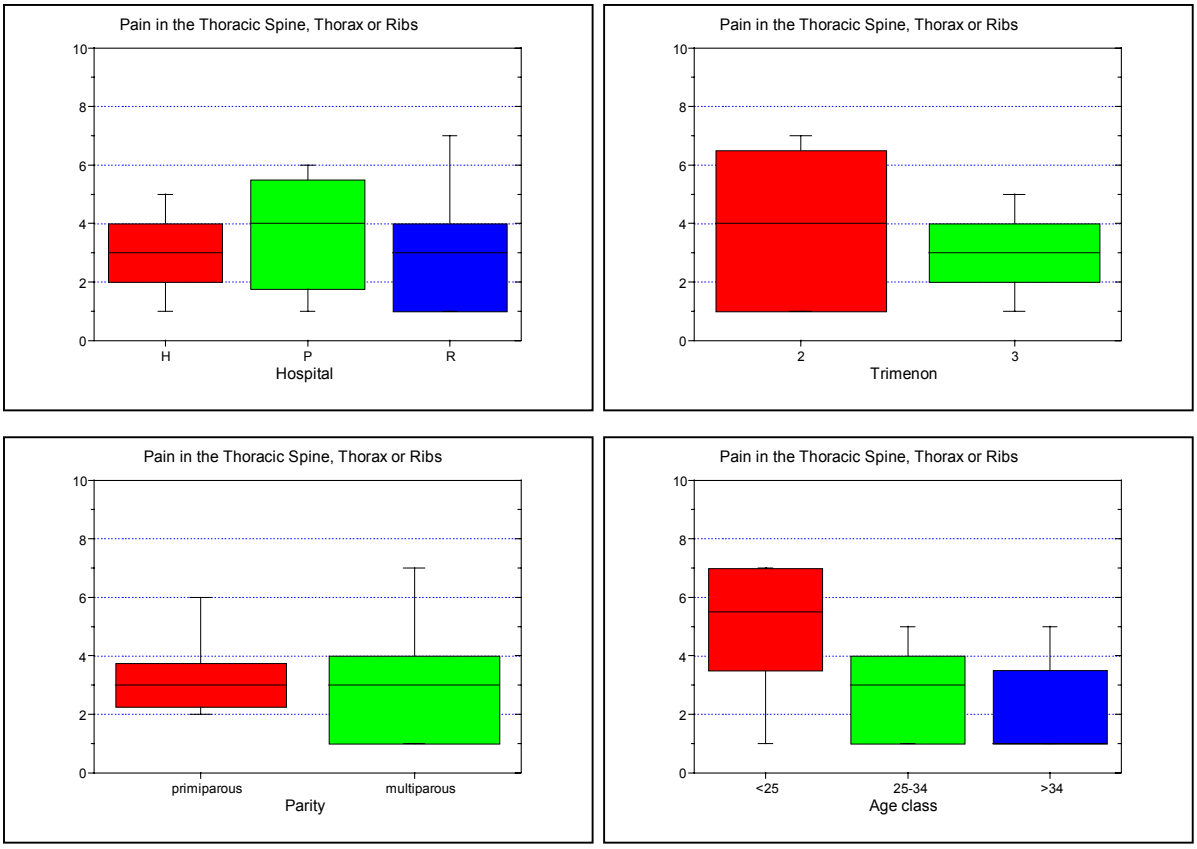
Pain intensity and prevalence of above-average pain intensity grouped by age

Again the restrictions of small sample sizes apply and a difference between age groups can not be worked out firmly. The distribution of pain intensity (median, 5%-, 25%-, 75%- and 95%-percentiles) can be compared in the lower right chart of Ill. 19. Descriptive data is summarised in Table 14.

Age class	N	Mean	Std. dev.	intensity <6		intensity >5		95%CI	
				n	%	n	%	l	u
<25	8	5.0	2.20	4	50	4	***50***	22%	78%
25-34	21	2.8	1.48	20	95	1	5	1%	23%
>34	8	2.1	1.64	8	100	0	0	0%	32%

Table 14: Descriptive data of pain intensity grouped by age.

Prevalence of above-average pain intensity (values >5) in the cervical spine is highest in age younger than 25 years. The mean value (5.0), median and 75%-percentile are highest in this age group (median 5.5, 75%-percentile: 9).Average pain intensity among women between 25-34 years is 2.8 (median 3) and among women older than 34 years is 2.1 (median: 1). **Pregnancy in young age might be a risk for intense pain in the thoracic spine, thorax or ribs.**



Ill. 19: Pain in the thoracic spine, thorax or ribs grouped by hospital, trimenon, parity and age.

4.2.3.3 Pain in the Lumbar Spine, Os Sacrum or Os Coccyx

50% (95%CI: 42- 59%) of all women have pain in this area. Among them the total prevalence of above-average pain is 33.3% (95%CI: 23- 45%).

Pain intensity and prevalence of above-average pain intensity grouped by hospital

Due to the low sample number data of the pregnant women in the Wiener Privatklinik and thus the maximum values of mean pain intensity and prevalence of above-average pain intensity (values >5) can not be considered. Descriptive data is summarised in Table 15, distribution of pain intensity can be compared in the upper left chart of Ill. 20.

Hospital	N	Mean	Std. dev.	intensity <6		intensity >5		95%CI	
				n	%	n	%	l	u
H	23	4.8	1.72	16	70	7	**30**	16%	51%
P	5	6.4	2.07	2	40	3	***60***	23%	88%
R	38	4.7	2.59	26	68	12	**32**	19%	47%

Table 15: Descriptive data of pain intensity grouped by hospitals.

Average pain intensity of 4.8 could be found in Hallein and of 4.7 in Rudolfstiftung, both median values are 5 and also the prevalence of above-average pain intensity (values >5) is comparable.

Pain intensity and prevalence of above-average pain intensity grouped by parity

The distribution of pain intensity can be compared in the lower left chart of Ill. 20, descriptive data is summarised in Table 16.

Parity	N	Mean	Std. dev.	intensity <6		intensity >5		95%CI	
				n	%	n	%	l	u
primiparous	20	4.7	2.18	16	80	4	*20*	8%	42%
multiparous	46	4.9	2.37	28	61	18	**39**	26%	54%

Table 16: Descriptive data of pain intensity grouped by parity.

In the actual study above-average pain intensity (values >5) in the lumbar spine can be observed more frequently among multipara. The average pain intensity is 4.7 among

primiparous women and 4.9 among multipara. The median values for both groups are 5, the 75%-percentiles are 5 and 7, respectively. **Under consideration of the total prevalence of above-average pain of 33.3% there might be a tendency towards higher pain intensity in the lumbar spine among multiparous women.**

Pain intensity and prevalence of above-average pain intensity grouped by trimena

Median, 5%-, 25%-, 75%- and 95%-percentiles of the data can be compared in the upper right chart of Ill. 20, descriptive data is summarised in Table 17.

Trimenon	N	Mean	Std. dev.	intensity <6		intensity >5		95%CI	
				n	%	n	%	l	u
second	11	5.4	2.58	5	45	6	***55***	28%	79%
third	41	4.8	2.25	29	71	12	**29**	18%	44%

Table 17: Descriptive data of pain intensity grouped by trimena.

The average pain intensity among woman in the second trimenon is 5.4 and among women in the third trimenon 4.8. The corresponding median values are 6 and 5. In the second trimenon 55% (95%CI: 28-79%) of the women have pain with above-average intensity (values >5), in the third only 29% (95%CI: 18-44%). **Higher pain intensity in the lumbar spine in the second trimenon is not statistically firm, but there might be a tendency.**

Pain intensity and prevalence of above-average pain intensity grouped by age

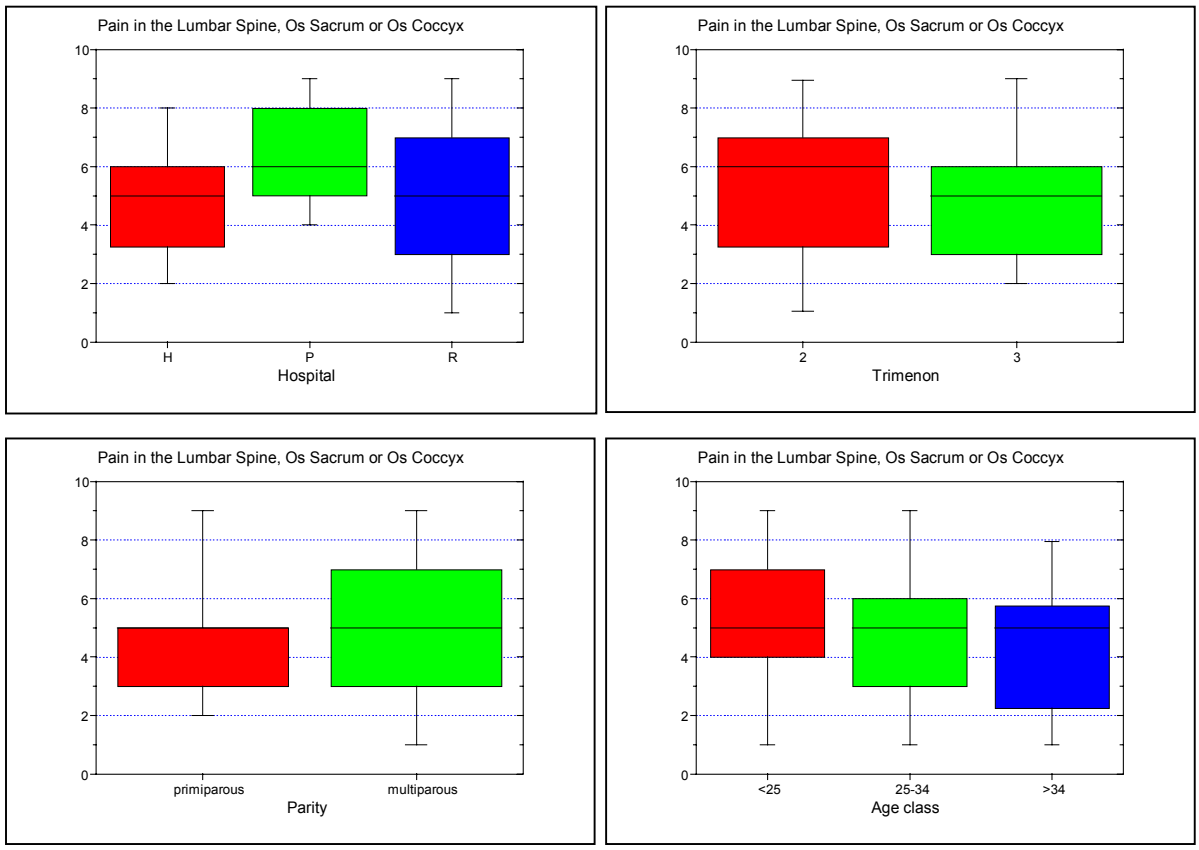
The distribution of pain intensity (median, 5%-, 25%-, 75%- and 95%-percentiles) can be compared in the lower right chart of Ill. 20. Descriptive data is summarised in Table 18.

Age class	N	Mean	Std. dev.	intensity <6		intensity >5		95%CI	
				n	%	n	%	l	u
<25	10	5.1	2.28	6	60	4	**40**	17%	69%
25-34	45	4.9	2.33	30	67	15	**33**	21%	48%
>34	11	4.3	2.33	8	73	3	**27**	10%	57%

Table 18: Descriptive data of pain intensity grouped by age.

Prevalence of above-average pain intensity (values >5) in the cervical spine is highest in age group younger than 25 years (40%), the mean value (5.1) is highest in this age group. The average pain intensity among women between 25-34 years is 4.9 and among

women older than 34 years it is 4.3. All median values are 5 and the 75%-percentiles are 7 for the women younger than 25 years and 6 for the other groups.



Ill. 20: Pain in the lumbar spine, os sacrum or os coccyx grouped by hospital, trimenon, parity and age.

4.2.3.4 Pain in the Pelvis, Hips or Legs

46% (95%CI: 38- 54%) of all women have pain in this area. Among them the total prevalence of above-average pain is 35% (95%CI: 24- 48%).

Pain intensity and prevalence of above-average pain intensity grouped by hospital

Due to the low sample number data of the pregnant women in the Wiener Privatklinik can not be considered. The distribution of pain intensity can be compared in the upper left chart of Ill. 21. Descriptive data is summarised in Table 19.

Hospital	N	Mean	Std. dev.	intensity <6		intensity >5		95%CI	
				n	%	n	%	l	u
H	23	4.2	2.31	18	78	5	*22*	10%	42%
P	5	5.4	2.70	3	60	2	**40**	12%	77%
R	32	4.9	2.62	18	56	14	**44**	28%	61%

Table 19: Descriptive data of pain intensity grouped by hospital.

Average pain intensity of 4.2 could be found in Hallein and of 4.9 in Rudolfstiftung, also the prevalence of above-average pain intensity (values >5) is higher in Rudolfstiftung, medians for all hospitals are 5. There is a difference in the 75%-percentiles: The value for Hallein is 5, whereas in the Viennese hospitals the 75%-percentiles are both 7. **Since no according influence of the gestational age can be observed, there might be a difference due to different social strata or other patient characteristics.**

Pain intensity and prevalence of above-average pain intensity grouped by parity

The distribution of pain intensity can be compared in the lower left chart of Ill. 21 and descriptive data is summarised in Table 20.

Parity	N	Mean	Std. dev.	intensity <6		intensity >5		95%CI	
				n	%	n	%	l	u
primiparous	12	5.0	2.52	9	75	3	**25**	9%	53%
multiparous	48	4.6	2.52	23	48	18	**38**	25%	52%

Table 20: Descriptive data of pain intensity grouped by parity.

In the actual study above-average pain intensity (values >5) in the pelvis can be observed more frequently among multipara. The average pain intensity is 5.0 among

primiparous women and 4.6 among multipara. Also median value and extreme values of the primiparous are higher.

Pain intensity and prevalence of above-average pain intensity grouped by trimena

Descriptive data is summarised in Table 21. Additionally, median, 5%-, 25%-, 75%- and 95%-percentiles of the data can be compared in the upper right chart of Ill. 21.

Trimenon	N	Mean	Std. dev.	intensity <6		intensity >5		95%CI	
				n	%	n	%	l	u
second	10	4.4	3.17	6	60	4	**40**	17%	69%
third	36	4.6	2.41	25	69	11	**31**	18%	47%

Table 21: Descriptive data of pain intensity grouped by trimenon.

The average pain intensity among woman in the second trimenon is 4.4 and among women in the third trimenon 4.6. In the second trimenon 40% of the women have pain with above-average intensity (values >5), in the third 31%.

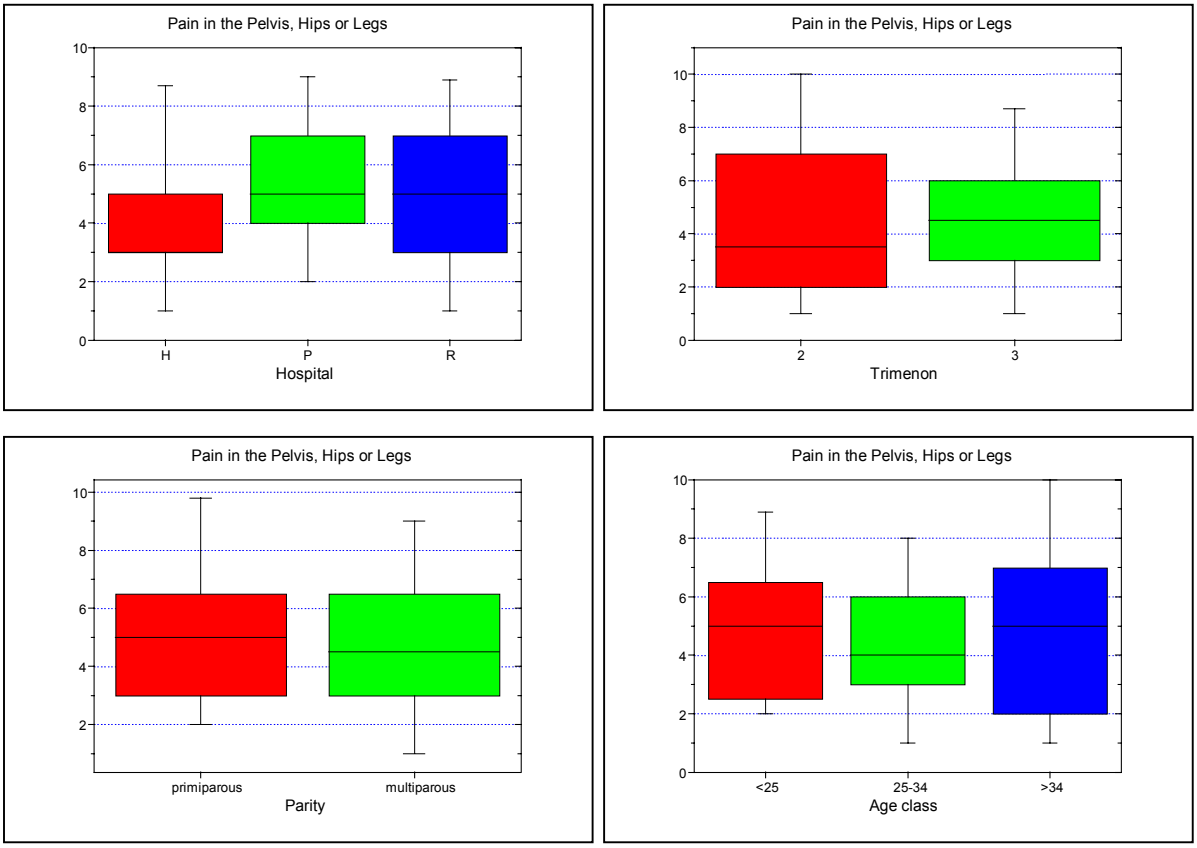
Pain intensity and prevalence of above-average pain intensity grouped by age

The distribution of pain intensity (median, 5%-, 25%-, 75%- and 95%-percentiles) can be compared in the lower right chart of Ill. 21 and descriptive data is summarised in Table 22.

Age class	N	Mean	Std. dev.	intensity <6		intensity >5		95%CI	
				n	%	n	%	l	u
<25	12	5.0	2.37	7	58	5	**42**	19%	68%
25-34	33	4.4	2.19	23	70	10	**30**	17%	47%
>34	15	4.9	3.26	9	60	6	**40**	20%	64%

Table 22: Descriptive data of pain intensity grouped by age.

Prevalence of above-average pain intensity (values >5) in the cervical spine is highest in age group younger 25 years (42%), the mean value (5.0) is highest in this age group. The average pain intensity among women between 25-34 years is 4.4 and among women older than 34 years is 4.9. The median values and 75%-percentiles show the same characteristics, but in the age group >34 years, extreme values are higher.



Ill. 21: Pain intensity in the pelvis, hips or legs grouped by hospital, trimenon, parity and age.

4.2.3.5 Other Areas of Pain

Only few women answered the question about other pain locations and its intensity. In Table 23 this additional information is listed.

Var:PainE		Description of the location of pain	total	
			n	%
10-point Likert intensity scale	0		121	92.4
	1	(no descriptions)	5	3.8
	2		-	-
	3		-	-
	4		-	-
	5	**twinge in the lower abdomen, pain in the knee pain of the sciatic nerve**	3	2.3
	6		-	-
	7	**pain of the sciatic nerve**	1	0.8
	8		-	-
	9		-	-
	10	**pain of the kidneys**	1	0.8

Table 23: Other sources of pain and corresponding pain intensity.

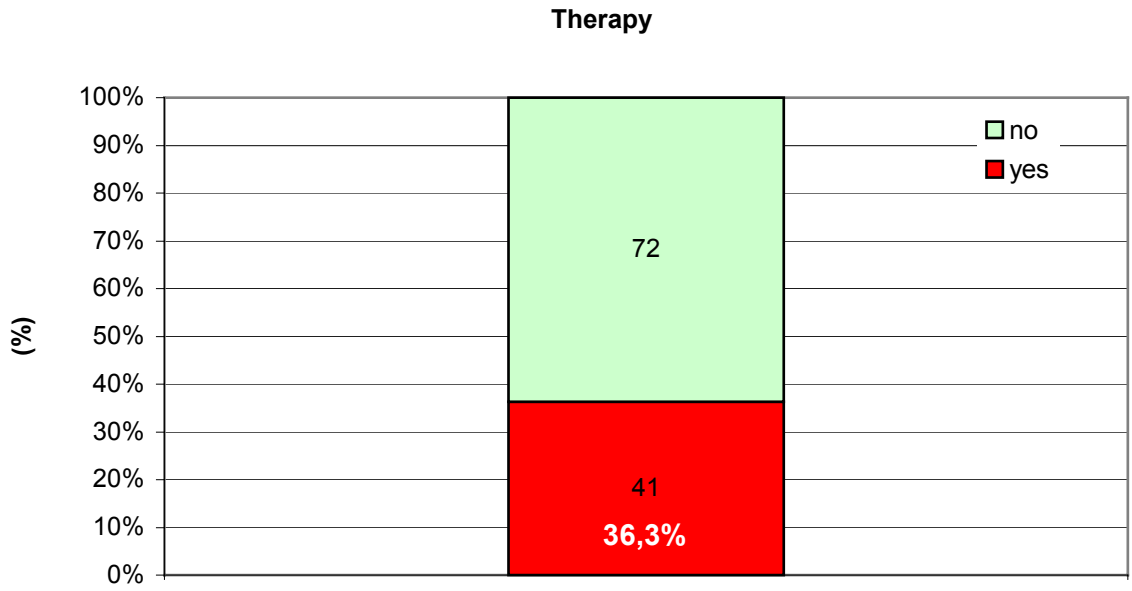
Analogous to pain prevalence also pain intensity is highest in the lumbar spine and the pelvis.

Some additional possible tendency could be observed from pain intensity data, but due to insufficient data, they are not statistically firm:

- Concerninf the cervical spine there might be a tendency, that women older than 34 have a more risk of higher intensity of cervical pain than younger women, and intensity of pain in the cervical spine might be higher in primipara.
- Pregnancy in young age might be a risk for intense pain in the thoracic spine, thorax or ribs. Pain intensity in the thoracic spine, thorax or ribs might be higher in the first trimenon.
- In the lumbar spine, there is a tendency towards higher intensity of pain in the second trimenon and among multiparous women.
- Finally there are hints, that different social strata or other patient characteristics are responsible for a difference in pain intensity in the pelvis between the hospital in Hallein and the Viennese hospitals.

4.3. Alternate Treatments to Reduce Pregnancy Related Pain in the Musculoskeletal System

Surprisingly, approximately only one third of the women took action against pain. This value is higher in the Wiener Privatklinik, where 50% of the women had accompanying therapies (cf. Ill. 22 and Table 24).



Ill. 22: Number of women who chose therapeutic strategies against pregnancy related pain in the musculoskeletal system.

Var: Treatm	H			P			R			total		
	n	%	%°	n	%	%°	n	%	%°	n	%	%°
yes	12	23.5	30.0	5	38.5	50.0	24	35.8	38.1	41	31.3	36.3
no	28	54.9	70.0	5	38.5	50.0	39	58.2	61.9	72	55.0	63.7
missing	11	21.6		3	23.1		4	6.0		18	13.7	

Table 24: Number of women who chose therapeutic strategies against pregnancy related pain in the musculoskeletal system in the different hospitals.

The different therapies are summarized in Table 25. As additional information, the relative improvements are added.

Therapy	Therapeutic strategy made use of by...		Improvement by...		Relative improvement
	n	%	n	%	%
Pain killers/drugs	12	9.2	9	6.9	0.75
Thermal/heat	15	11.5	11	8.4	0.73
Cold packs	0	-	0	-	-
Massage	24	18.3	19	14.5	0.79
Remedial gymnastics	11	8.4	7	5.3	0.64
Acupuncture	2	1.5	1	0.8	0.50
Osteopathy	6	4.6	6	4.6	**1.00**
Other therapies than mentioned above					
Yoga	1	0.01	1	0.01	**1.00**
Household remedies	1	0.01	1	0.01	**1.00**
Mud-bath	1	0.01	1	0.01	**1.00**
Gymnastics	1	0.01	1	0.01	**1.00**
Homeopathy	1	0.01		0.01	-
Not specified	1	0.01	1	0.01	**1.00**

Table 25: Alternate treatment to reduce pregnancy related pain in the musculoskeletal system and its efficacy. (multiple answers were possible)

Massage is the most commonly used alternate treatment to reduce pregnancy related pain in the musculoskeletal system (18.3% of the women), followed by thermal treatment (8.4%). Pain killers (6.9%) and remedial gymnastics (5.3%) are used more often than osteopathic treatment, which is had by only 4.6% of the women (especially in the Wiener Privatklinik) Osteopathic treatment turns out to be the most effective method, even though the small number of subjects has to be taken into consideration.

70% of the women, who answered the question would have alternate treatment to reduce pregnancy related pain in the musculoskeletal system (cf. Table 26).

Var:alternate	total		
	n	**%**	**%°**
yes	56	42.7	70.0
no	24	18.3	30.0
Missing	51	38.9	

Table 26: Number of women considering alternate treatment to reduce pregnancy related pain in the musculoskeletal system.

Massage is most common (37.2%), followed by acupuncture (20.9%) and remedial gymnastics (18.6%). 7% of the women would consider to have osteopathic treatment, whereas only 2.3% would use pain killers (cf. Table 27).

	Additional treatment	
	n	**%**
Pain killers/drugs	1	2.3
Thermal/heat	5	11.6
Cold packs	-	
Massage	16	37.2
Remedial gymnastics	8	18.6
Acupuncture	9	20.9
Osteopathy	3	7.0
Not specified	1	2.3

Table 27: Additional treatment women would consider to reduce pregnancy related problems.

If necessary, almost 3/4 of the women would consider treatment to reduce pregnancy related problems (cf. Table 28).

Var: Would	**total**		
	n	**%**	**%°**
yes	85	64.9	74.6
no	29	22.1	25.4
Missing	17	13.0	

Table 28: Number of women who would consider treatment.

In Table 29 therapy methods are summarized.

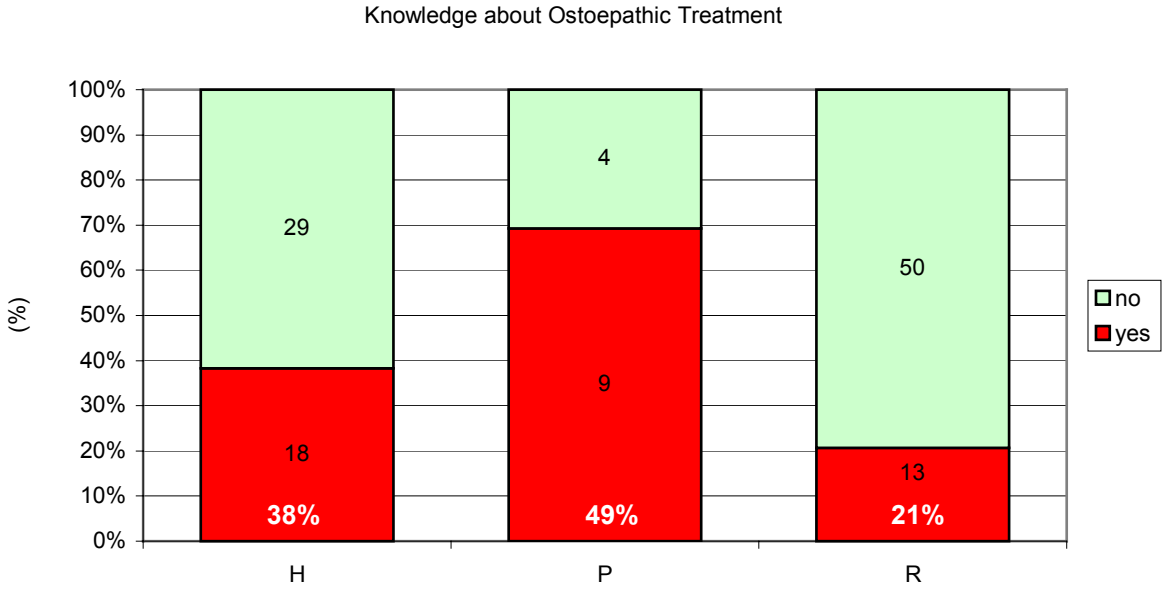
	Would	
	n	**%**
Pain killers/drugs	9	6.9
Thermal/heat	25	19.1
Cold packs	4	3.1
Massage	56	42.7
Gymnastics	38	29.0
Acupuncture	32	24.4
Osteopathy	26	19.8
Not specified	2	1.5

Table 29: Treatment women would consider to reduce pregnancy problems, if necessary.

The popularity of massage, remedial gymnastics and acupuncture is highest. 19.8% of the women would have osteopathic treatment.

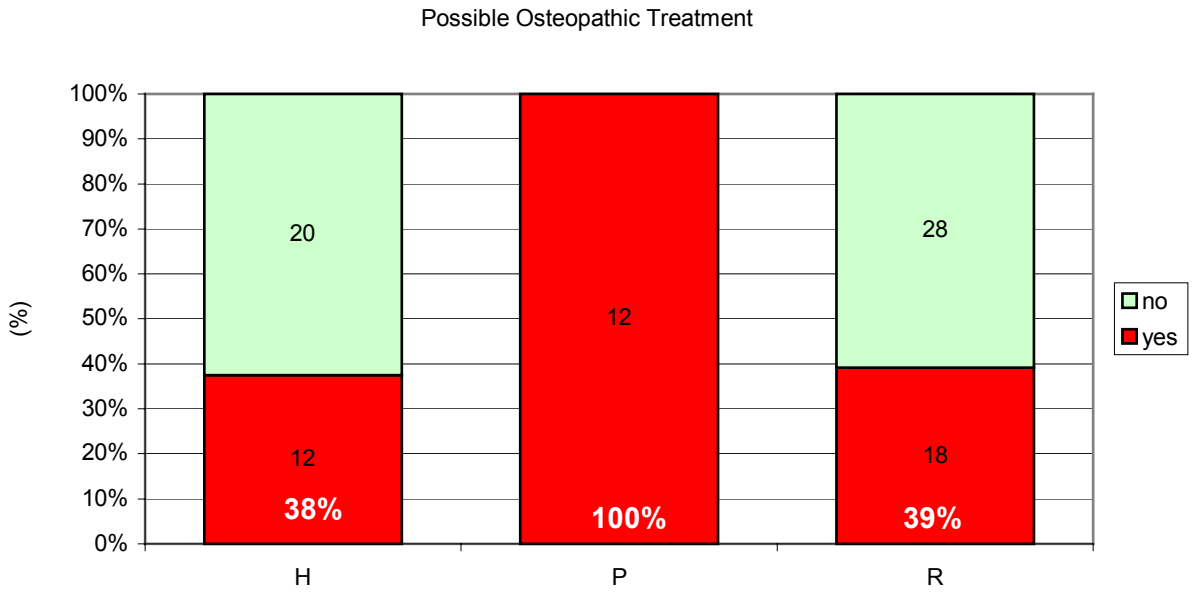
4.4. Familiarity of Pregnant Women with Osteopathic Treatment

In total 32.5% of the women state to know about osteopathic treatment, but there are differences in the hospitals. The knowledge is highest in the Wiener Privatklinik (69.2%), in hospital Hallein 38.3% of the women know about osteopathic treatment and in hospital Rudolfstiftung only 20.6% of the women have heard about osteopathy as an alternate treatment to reduce pregnancy related problems in the musculoskeletal system (cf.Ill. 23).



Ill. 23: Knowledge about osteopathic treatment in the different hospitals.

In total 46.7% of the woman have the opportunity to have osteopathic treatment. The knowledge about possible osteopathic treatment is similar for women in the public hospitals Hallein and Rudolfstiftung (37.5% and 39.1%, respectively, cf. Ill. 24), where osteopathic treatment is not sufficiently propagated. In the Wiener Privatklinik osteopathic treatment is offered and obviously all of the pregnant women consulting their obstetricians there know about this fact.



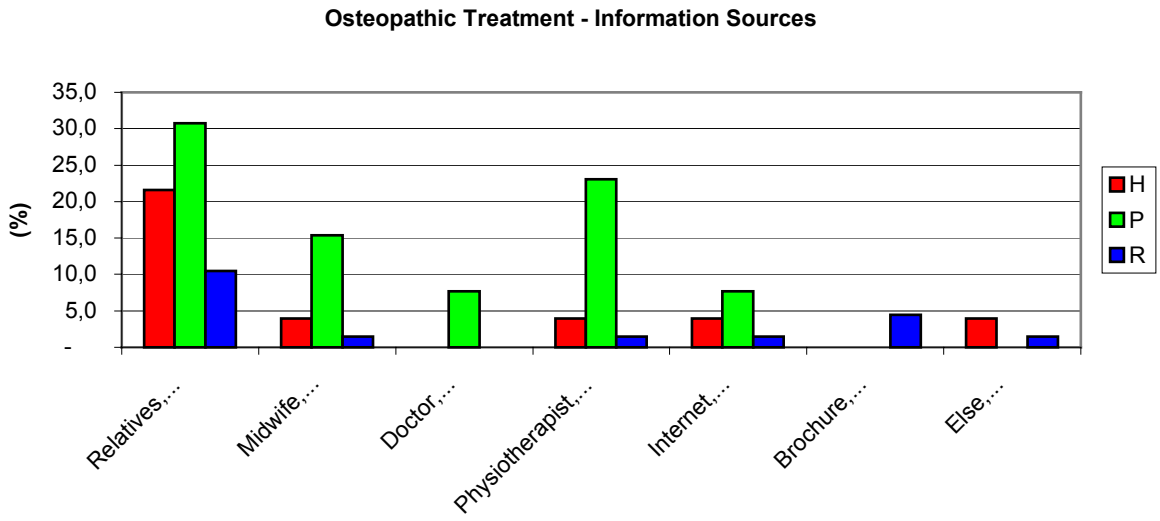
Ill. 24: Women who could have osteopathic treatment grouped by hospitals.

The women's idea about the costs is depending on the hospitals. In total, most women would be willing to pay 40 to 60€ per session. After substitution of the groups by the mean values (e.g. 30€ for the group 20-40€) the mean value of all answers would be 46.9 € (cf. Table 30).

Var: cost_mean	**H**	**P**	**R**	**total**
n	30	13	40	83
mean value	48.00	57.69	42.50	46.9
stdev	17.69	17.39	15.48	17.2
median	50	50	40	50

Table 30: Amount women are willing to pay for osteopathic treatments.

16.8% of the women got their information about osteopathic treatment from relatives and friends, 4-5 % from physiotherapists and midwives. Medical doctors are only of importance in the Wiener Privatklinik and compared to the other information sources negligible (cf. Ill. 25).



Ill. 25: Information sources for osteopathic treatment.

In total, 17% of the women gained information from relatives and friends. Physiotherapists and midwives contribute to the knowledge about osteopathy not as much and were an information source for 5% and 4%, respectively. Internet (3%) and brochures (2%) contribute more to the knowledge about osteopathic treatment than medical doctors (<1%).

5. Discussion

5.1. The Questionnaire

Due to a change of the question "Number of present pregnancy" to "Number of previous pregnancies" and maintaining the scale an answer for primiparous women ("0") was missing.
Many women answered to the question correctly, but errors can not be precluded.
Comparing the mean number of pregnancies (1.2 (previous pregnancies) + 1 (actual one) = 2.2 children/woman) with the data of Statistik Austria (2005) (1.42 children/woman), wrong answers can be assumed.

The declaration of pain in the musculoskeletal system differed in some cases with the answers concerning pain intensity. A possible reason is, that some women do not count the pelvis or spine to be part of the musculoskeletal system (german: "Bewegungsapparat" , translated as "locomotive system"). It seems they did not draw a connection between these questions. These answers could be corrected.

This also applies to the question about painful body areas. Some women did not answer the questions in which area they had pain, but quoted the pain intensity (higher "1"). Maybe this is caused by a sensitizing process during filling the questionnaire. These answers could be corrected.

In a few cases pain intensity in all body structures is quoted with "1", but the general question whether women had pain is answered negatively. Obviously, for these women the scale was not intelligible enough.
According to my experience on other scales, beginning with "no pain at all" would have been accepted even less, resulting in many missing values.
The problem was solved in the way, that answers were only corrected, if at least one of the answers concerning pain intensity was quoted with values exceeding "1".
Vice versa in case all pain intensities were quoted with "1" they were dismissed.

Questions concerning previous treatment and improvement by previous treatment were answered - almost incredibly - consistently.

With my acquired experience, I would define the intention of the questions more explicitly in the questionnaire.

For example, a differenciation in the question "Do you consider other treatment ?" / "Would you use treatment to reduce your pain?" is not easy to recognize.
The same applies to the question "Have you heard about the possibility of osteopathic treatments" and "Do you have the possibility of osteopathic treatment?".

5.2. The Participants

The samples from the three hospitals differ in age structure, the number of previous pregnancies and the trimenon. Therefore, these aspects can influence the results.
In the hospital Hallein most women were questioned in the last trimenon, whereas in both Viennese hospitals (Wiener Privatklinik, Rudolfstiftung) more women in an earlier stage of pregnancy filled in the questionnaire.
Depending on the origin of data, thus, different pain areas may arise.
Therefore results are also evaluated in consideration of the stage of pregnancy.
In Hallein more primiparous women were asked than in the other hospitals.
The mean estimated age of all women is 29.8 years (+/-0.9 years). In hospital Rudolfstiftung the women are on average 28.9 years, in the Wiener Privatklinik 34.7 years. In Hallein a mean value of 29.7 years was calculated.
Due to the difference in age, parity and trimenon the results might also be dependent on these factors and not only on life circumstances.

5.3. Discussion of the Data

5.3.1. Pain Prevalence

In the entire study group, pain in the musculoskeletal system is mentioned by 73.3% (95%-confidence interval: 65%-80%) of the pregnant women. This data is largely independent from the hospital and thus from living conditions.
Two thirds of these women have pain several times a day and approximately 8% permanently.

This is in accordance with later literature data about the frequency of back pain. For example, MARTINS AND SILVA, 2005 describe a prevalence of pregnancy related back pain of 79.8%. WANG ET AL. (2004) come to a total of 68.5% (95%CI: 65-72%) of pregnant women with low back pain and MOGREN AND POHJANEN in 2005 to 72%. These values decrease if mild complaints are excluded.

5.3.1.1 Age Influences on Pain Prevalence

Age does not influence the probability of pregnancy related pain to a high extent.

A classification by age shows no difference in pain perception between the women younger than 25 years and the pregnant women between 25 and 34 years (72.7% and 72.6%, respectively). More pregnant women having pain can be observed in the group with an age higher than 34 years (76.0%). Nevertheless, this difference is only little. A χ^2-test of the data with the highest difference (dependent variable: pain (y/n), independent variable: age (25-34years/>34years)) shows no significant difference between pain perception in the age groups 25-34 years and >34 years (χ^2=0.113, p=0.74).
Also the most difference between high daily pain frequencies (always and several times a day) and low daily pain frequencies (once a day, no pain) is observed in the age group 25-34 years and >34 years, result in a χ^2= 0.45, p=0.50 and thus there is no significant difference.

In literature data dealing with this topic is inconsistent. Some authors find no dependency of back pain on age (e.g. ORVIETO ET AL. (1994), some describe an increasing prevalence of pain with higher age (MANTLE ET AL. (1977)) and others a decrease with higher age of the mother (e.g. ENDRESEN (1995), OSTGAARD ET AL. (1991).

5.3.1.2 Influences of the Trimenon on Pain Prevalence

A contribution of the factor trimenon on the prevalence of pain is not significant.
59.3% of women in the **second trimenon** (95%CI: 40.7% - 75.5%) and 74.1% of women in the third trimenon (95%CI: 63.6% -82.4%) state to have pain.
A χ^2-test (dependent variable: pain (y/n), independent variable: trimenon (2/3)) shows no significant difference in the two groups (χ^2=2.132, p=0.14 at α=0.05).

This is in accordance with ORVIETO ET AL. (1994).

There is no significant difference in the frequency of daily pain attacks between the second and third trimenon.
Women having pain at least several times a day can be observed a little more often in the third trimenon than in the second one. Nevertheless, a χ^2-test (level of significance α= 0.05) after stratification of women suffering pain several times a day or always and women suffering no pain or less than several times a day results in no statistical significant difference (χ^2=0.447, p= 0.50).

5.3.1.3 Influence of the Life Circumstances on Pain Prevalence

The number of women having pain is largely independent from the hospital and thus from living conditions.

No difference in the frequency of pain attacks can be observed between the three hospitals. Most women have pain several times a day.

5.3.1.4 Influence of Previous Parities on Pain Prevalence

In the actual study multiparous women are approximately 10% more frequently suffering pain than primiparous, but this difference is not significant in this study.

As discussed in chapter 5.1., this point is error prone due to the missing value "0" for primiparous women in the questionnaire. It is very likely that many women considered as multiparous women in fact are primiparous.

Under these restrictions, difference in the occurance of pain are not significant. Since 10% more multiparous women state to be in pain than primiparous, the numbers of the occurrence of pain in these groups is compared by means of a χ^2-test (level of significance α= 0.05, χ^2=1.382, p= 0.24). That means, there is only a tendency that multiparous women suffer pain more frequently, than primipara.

A higher prevalence of longer periods of back pain (least several times a day or permanent pain) can be observed in multiparous women.

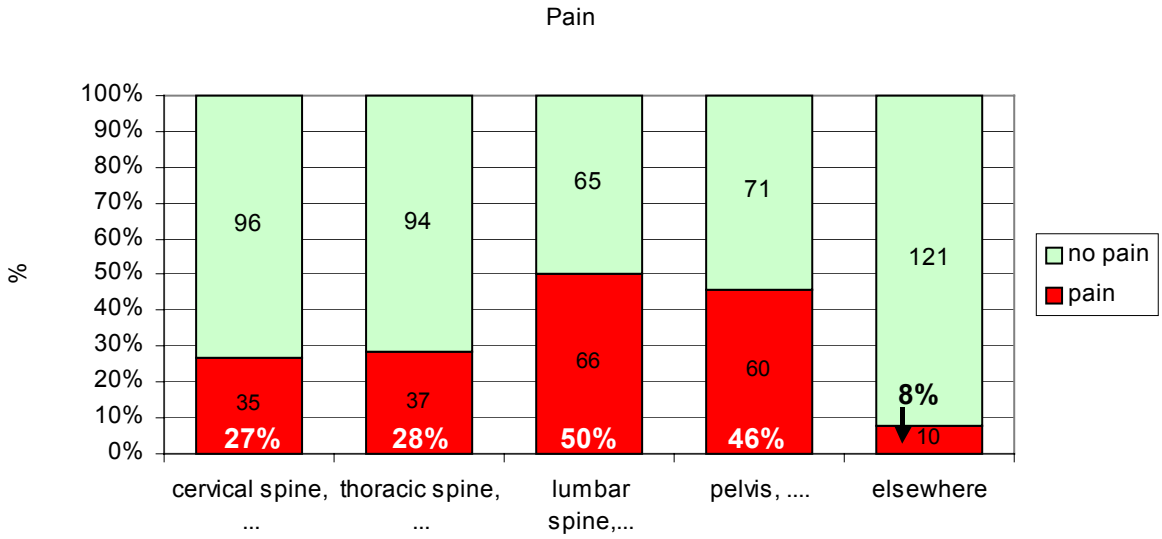
Approximately 60% of women with previous pregnancies have pain at least several times a day, whereas only 40% of the primipara do so. This difference is statistically significant in a χ^2-test after the stratification of women suffering at least several times a day and women suffering less than several times a day (level of significance α= 0.05, χ^2=4.689, p= 0.03)

In literature, only OSTGAARD AND ANDERSSON (1991) also describe an increasing prevalence of longer periods of back pain with parity (statistically significant) and a **tendency** to have an increased risk of back pain. For this no statistical significance is found.

ORVIETO ET AL. (1994) explicitly exclude an influence of the number of prior pregnancies on low back pain.

5.3.2. Pain Areas and Pain Intensity

In accordance with literature data and the commonly used expression "low back pain and pelvis pain", it can be observed, that pain is felt most frequently in the lumbar spine and the pelvis (cf.Ill. 26).



Ill. 26: Approximately 50% of the women have pain in the lumbar spine. Pelvis problems are the next frequent reasons for pain, stated by 46% of the women.

68% of the pregnant women have either pain in the lumbar spine, in the pelvis or in both (95%CI: 60 - 75%), 50% only in the lumbar spine (95%CI: 42 - 59%) and 46% only in the pelvis (95%CI: 38 - 54%), pain prevalence in the total musculoskeletal system is 73.3%.

Considering the variance of literature data in chapter 2.1 and that pain areas were classified only by the pregnant women, these data are reasonable.

5.3.2.1 Pain in the Cervical Spine, Neck, Shoulder Girdle or Arms

Pain Prevalence

There is a significant difference in pain prevalence in the cervical and thoracic spine between women in the hospitals Rudolfstiftung and Hallein.

In hospital Rudolfstiftung 39% of the women have pain in the cervical spine (95%CI for both: 28-51%) and only 14% in Hallein (95%CI: 7-26%). A χ^2-test results in χ^2=9.04, p=0.002. In this connection, the different structures of pregnant women concerning gestational week and number of previous parities have to be considered. There is also a highly significant dependency of pain prevalence with parity (more multiparous women have pain in the cervical spine than primipara), and more primipara are considered in Hallein than in Rudolfstiftung. Thus, it is very likely that this is the reason for the difference between the two hospitals, rather than social strata.

There is a significant higher pain prevalence among multipara in the cervical spine.

χ^2-tests result in significant higher pain prevalence among multipara in the cervical spine (χ^2= 6.93, p= 0.008). Pain prevalence for primipara is 12% (95%CI: 5-25%) and 34% (95%CI: 25-44%) for multipara.

No significant difference in pain prevalence between the second and third trimenon can be found.

Nevertheless, a slight decrease of pain prevalence can be observed.

No significant dependencies on age can be observed.

Pain prevalence is highest among women older than 34 years and lowest among women between 25 and 34 years of age.

Pain Intensity

27% (95%CI: 20- 35%) of all women have pain in this area. Among them, the total prevalence of above-average pain (values >5) is 11.4% (95%CI: 5- 26%).

There might be a tendency, that women older than 34 have more risk of higher intensity of cervical pain than younger women.

Prevalence of above-average pain intensity (values >5) in the cervical spine is lowest between 25- 34 years of age (5%). Below 25 years prevalence is 17%, and more than 34 years 22%. The average pain intensity among women older than 34 years is 3.7, both

other mean values are approximately 3. The median values for the three age groups are 2, 3 and 4, 75%-percentiles 3, 4 and 5.

Since there is a lack of data, this hypothesis can not be proven, but it is consistent with the highest pain prevalence in this age group.

The pain intensity in the cervical spine might be higher in primipara.

The average pain intensity among primipara is 4.6 and among multipara 3. The corresponding median values are 4 and 2.5, respectively and also extreme values are lower among multipara. The prevalence of above-average pain among primiparous women is higher than the average total prevalence (11.4%).

Since a significant higher pain prevalence among multipara in the cervical spine could be observed, it is doubtable if this hypothesis is right.
Psychoemotional factors - uncertainty or a higher sensibility may be other reasons.

5.3.2.2 Pain in the Thoracic Spine, Thorax and Ribs

Pain Prevalence

There is a significant difference in pain prevalence in the thoracic spine between women in the hospitals Rudolfstiftung and Hallein.

In hospital Rudolfstiftung 39% of women have pain in the thoracic spine (95%CI: 28-51%), in Hallein only 16% (95%CI: 8-28%). A χ^2-test results in χ^2= 7.546 and p= 0.006. In this connection, the different characteristics of pregnant women concerning gestational week have to be considered. There is also a highly significant dependency of pain prevalence with parity (more multiparous women have pain in the cervical spine than primipara), and more primipara are counted in Hallein than in Rudolfstiftung. Thus, it is very likely, that this is the reason for the difference between the two hospitals, rather than social strata.

There is a significant higher pain prevalence among multipara in the thoracic spine.

χ^2-tests result in significant higher pain prevalence among multipara in the thoracic spine (χ^2= 4.09, p= 0.04). Pain prevalence for primipara is 17% (95%CI: 8-31%) and for multipara 34% (95%CI: 25-44%).

No significant difference in pain prevalence between the second and third trimenon can be found.

Nevertheless, a slight decrease of pain prevalence can be observed.

No significant dependency on age can be observed.

Pain prevalence is highest among women younger than 25 years and lowest among women in an age between 25 and 34.

Pain Intensity

28% (95%CI: 21- 36%) of all women have pain in this area. Among them, the total prevalence of above-average pain is 13.5% (95%CI: 6- 28%).

Pregnancy in young age might be a risk for intense pain in the thoracic spine, thorax or ribs.

Prevalence of above-average pain intensities (values >5) in the cervical spine is highest in the group younger than 25 years. 50% of women younger than 25 years have above average pain, in the next age group only 5% and older than 35 none have pain in these intensities. Also the mean value (5.0), median and 75%-percentile are highest in this age group (median 5.5, 75%-percentile: 9). The average pain intensities among women between 25-34 years is 2.8 (median 3) and among women older than 34 years is 2.1 (median: 1).

Pain intensity in the thoracic spine, thorax or ribs might be higher in the first trimenon.

In the actual study, above-average pain intensity (values >5) in the thoracic spine can only be observed in the second trimenon (37.5% of the women having pain in the thoracic spine in the second trimenon). The average pain intensities are 3.9 among women in the second trimenon and 2.8 among women in the third, the corresponding median values are 4 and 3, respectively and the 75%-percentiles 6.5 and 4.

5.3.2.3 Pain in the Lumbar Spine, Os Sacrum and Os Coccyx

Pain Prevalence

There is no significant higher pain prevalence among multipara in the lumbar spine.

With χ^2= 0.308, p= 0.58 there are no significant differences.

According to ORVIETO ET AL. (1994) multiparity is no risk faktor for developing pregnancy related **low back pain**.

MANTLE ET AL. (1977) and MOGREN AND POHJANEN (2005) found, that increasing parity is a risk for developing **low back or pelvic pain**. Since there is a significantly higher prevalence of pelvic pain in multipara, these differing results of ORVIETO ET AL. (1994) and the others obviously are dependant on the number of women with pelvic pain.

No significant difference in pain prevalence between the second and third trimenon can be found.

Nevertheless, a slight increase of pain prevalence can be observed.

Also according ORVIETO ET AL. (1994) pain prevalence is not significantly influenced by gestational age.

No significant dependency on age can be observed.

Pain prevalence among women in the age group between 25 and 34 is highest and lowest among women younger than 25 years.

According to ORVIETO ET AL. (1994) age was not found to be a risk factor in low back pain.

In contrary, WANG ET AL. (2004) found, that low back pain was predicted by age and younger women were more likely to develop it.

Pain Intensity

50% (95%CI: 42- 59%) of all women have pain in this area. Among them the total prevalence of above-average pain is 33.3% (95%CI: 23- 45%).

In the lumbar spine there is a tendency towards higher pain intensity in the second trimenon.

The average pain intensity among woman in the second trimenon is 5.4 and among women in the third trimenon 4.8. The corresponding median values are 6 and 5. In the second trimenon 55% (95%CI: 28-79%) of the women have pain with above-average intensity (values >5), in the third only 29% (95%CI: 18-44%). The higher pain intensity in the lumbar spine in the second trimenon is not statistically firm, but there might be a tendency.

There is also a tendency towards higher pain intensity among multiparous women.

In the actual study, above-average pain intensity (values >5) in the lumbar spine can be observed more frequently among multipara. The average pain intensities are 4.7 among primiparous women and 4.9 among multipara. The median values for both groups are 5, the 75%-percentiles are 5 and 7, respectively. Under consideration of the total prevalence of above-average pain of 33.3% there might be a tendency towards higher pain intensities in the lumbar spine among multiparous women.

5.3.2.4 Pain in the Pelvis, Hips and Legs

Pain Prevalence

There is a significant higher pain prevalence in the pelvis among multipara.

The pain prevalence in the pelvis for primipara is 29% (95%CI: 17-44%), for multipara 54% (95%CI: 44-64%). χ^2-tests result in significant higher pain prevalence among multipara (χ^2= 7.39, p= 0.007).

As already mentioned in the previous chapter, MANTLE ET AL. (1977) and MOGREN AND POHJANEN (2005) found, that increasing parity is a risk for developing (**low) back or pelvic pain**. Under consideration of the results of ORVIETO ET AL. (1994), who found no correlation between low back pain and parity, pelvic pain must be influenced to a higher extent by increasing parity.

There is a tendency, that increasing age is correlated with higher pain prevalence in the pelvis.

The highest difference in relative frequency can be observed in the pelvic region between the age groups 25-34 years and >34 years with pain prevalence of 39 (95%CI: 30-50%) and 60% (41-77%). The corresponding chi-square value is χ^2=3.35 with a p= 0.07. On a level of significance of α=0.05, this value is not significant, but may be

interpreted as a possible trend, that increasing age is correlated with higher pain prevalence.

No significant difference in pain prevalence between the second and third trimenon can be found.
A slight increase of pain prevalence in the second and third trimenon can be observed.

Pain Intensity
46% (95%CI: 38- 54%) of all women have pain in this area. Among them the total prevalence of above-average pain is 35% (95%CI: 24- 48%).

There are hints, that different social strata or other patient characteristics might be responsible for a difference in pain prevalence and intensity in the pelvis between the hospital in Hallein and the Viennese hospitals

Average pain intensity of 4.2 could be found in Hallein and of 4.9 in Rudolfstiftung. The prevalence of above-average pain intensity (values >5) is higher in Rudolfstiftung, medians for all hospitals are 5. There is a difference in the 75%-percentiles: The value for Hallein is 5, whereas in the Viennese hospitals the 75%-percentiles are 7, both. Since no according influence of the gestational age can be observed, there might be a difference due to different social strata or other patient characteristics.

5.3.3. Alternate Treatment to Reduce Pregnancy Related Pain in the Musculoskeletal System

In total approximately 36% of the women already had therapeutic strategies against pain, 70% of the women would have additional therapies against pain and additional 5% would accept pain therapy during pregnancy if necessary.

In the Wiener Privatklinik, compared to the 36% of all women, many of the women chose accompanying therapies (50%). This is a hint, that also costs might be a reason for the low number of woman accepting therapeutic aid.
In general, massage is the most commonly used therapy method to reduce pregnancy related pain in the musculoskeletal system (18% of the women), followed by thermal treatment (8%). Also pain killers (7%) and remedial gymnastics (5%) are used more often than osteopathic treatment, which is had by only 5% of the women (especially in

the Wiener Privatklinik where osteopathic treatment is offered). Less than two percent use acupuncture.

70% of the women consider to have other or additional therapies against pain - this value almost reaches the percentage of women with pain in the musculoskeletal system. Massage is most common (37%), followed by acupuncture (21%), remedial gymnastics (19%) and thermal treatment (12%). Seven percent of the women consider to have osteopathic treatment, whereas only two percent want to take pain killers.

If necessary, 3/4 of the women would choose alternate treatment to reduce pregnancy related pain in the musculoskeletal system. Also in this question, the popularity of massage (43%), remedial gymnastics (29%) and acupuncture (24%) is highest. 20% of the women would have osteopathic treatment and 19% thermal treatment. Pain killers (7%) and cold packs (3%) are less popular.

According to WANG ET AL. (2005) the majority of pregnant women (61.7%) as well as 61% of providers of prenatal health care participating in his study in New Haven, Connecticut, USA, reported that they would accept complimentary and alternative medicine (CAM) therapy as treatment for low back pain during pregnancy. Massage (61.4%), acupuncture (44.6%), relaxation (42.6%), yoga (40.6%), and chiropractic treatment (36.6%) were the most common CAM therapies recommended for low back pain in pregnancy by the providers of prenatal health care in this sample.

That means that more women in Austria declare they would accept therapeutic strategies against pain than in WANG's study (75 vs. 62%), but in fact only half of the women had.
Contrary to the New Haven data the sum of relative frequency of principally accepted therapies does not exceed 100% by far in the Austrian data. This indicates, that most women do not plan to use multiple therapies. In New Haven the high sum of percentages shows that multiple therapies are recommended.

5.3.4. Knowledge about the Possibility to have Osteopathic Treatment to Reduce Pregnancy Related Pain

In total 32.5% of the women state to know about osteopathic treatment, but there is a difference between the hospitals.

The knowledge is highest in the Wiener Privatklinik, where 69% of the women know about osteopathic treatment, in hospital Hallein 38% and in hospital Rudolfstiftung only 21% of the women have heard about the possibility to have osteopathic treatment to reduce pregnancy related pain.

In total 46.7% of the woman state to have the possibility of osteopathic treatment.

Osteopathic treatment is offered in the Wiener Privatklinik and, apparently, all of the pregnant women know this fact. The knowledge about the possibility of osteopathic treatment is similar in the public hospitals Hallein and Rudolfstiftung (37.5% and 39.1%, respectively).

In total most women would be willing to pay 40 to 60€ per session.

The women's idea about the cost is depending on the hospitals. The mean value is lowest in hospital Rudolfstiftung and highest in the Wiener Privatklinik. Medians of the data of the hospitals Hallein and Rudolfstiftung are equal (50€).

After substitution of the groups by the mean values (e.g. 30€ for the group 20-40€) the mean value of all answers would be 46.9 €.

The most important information source about osteopathic treatment are relatives and friends.

In total 17% of the women gained information from relatives and friends. Physiotherapists and midwives contribute to the knowledge about osteopathic treatment not as much and were an information source for 5% and 4%. Internet (3%) and brochures (2%) contribute more to the knowledge about osteopathic treatment than medical doctors (<1%). These were only of importance in the Wiener Privatklinik and compared to the other information sources negligible.

According to FILSHIE (2000), approximately 50% of 120 practising obstetricians and 120 practising midwives in Great Britain consider osteopathic intervention to be an acceptable treatment option, although many commented that **more information as to the role and safety of osteopathic treatment was required before they would make referrals.**

6. Synopsis

"Low back pain is a problem that is faced by 50% of pregnant women and causes important social trouble. In spite of this, the problem is considered to be normal and is expected during pregnancy, which has contributed to the lack of prophylactic and relief measures." (FERREIRA AND NAKANO, 2001, 95)

There is (almost) nothing to add...

Prevalence of back pain and especially low back pain and pelvic pain turned out to be high in pregnant women who presented themselves in obstetric primary care units in two hospitals in Vienna, and one in Hallein, Austria.
In the entire study, pain in the musculoskeletal system is mentioned by 73.3% (95%-confidence interval: 65.1%-80.1%) of the pregnant women.
68% of the pregnant women have either pain in the lumbar spine, in the pelvis or in both (95%CI: 60 - 75%), 50% only in the lumbar spine (95%CI: 42 - 59%) and 46% only in the pelvis (95%CI: 38 - 54%) .
These data are largely independent from the hospital and thus from living conditions.
Age does not influence the probability of pregnancy related pain to a high extent, either, and there is no significant contribution of the trimenon on the prevalence of pain. In the actual study, approximately 10% more of the multiparous women are suffering pain than primiparous, but this difference is not significant.

Two thirds of these women have pain several times a day and 8.4% permanently. **A significantly higher prevalence of longer periods of back pain (several times a day or permanent pain) can be observed in multiparous women.** There is no significant difference in the frequency of daily pain attacks between the second and third trimenon and no difference in the frequency of pain attacks can be observed between the three hospitals, either.

In spite of the high prevalence of pain, no more than approximately 36% of the women already have had treatments to reduce pregnancy related pain in the musculoskeletal system, 70% of the women consider other or additional therapies to reduce pain and an additional 5% would accept pain therapy during pregnancy, if necessary.
In case of pain massage would be used by 43%, remedial gymnastics by 29% and acupuncture by 24%. **20% of the women would have osteopathic treatment** and 19% thermal treatment. Pain killers (7%) and cold packs (3%) are less popular.

In total **only a third of the women state to have knowledge about osteopathic treatment and less than half of the woman think, they have the opportunity to have osteopathic treatment**. These data are dependent on the hospitals. In Wiener Privatklinik, where osteopathic treatment is offered, numbers are much higher.

The most important information source about osteopathic treatment are recommendations by relatives and friends. Midwives and physiotherapists contribute to a much smaller extent to knowledge about osteopathy and information contribution of medical doctors is negligible. Data from the Wiener Privatklinik indicate that **recommendations by physiotherapists, midwives and medical doctors are essential for an increase of the knowledge and acceptance of osteopathic treatments by pregnant women.**

Women with pregnancy related back pain do not only have an **individual lower quality of life** concerning sleep, energy, pain, physical functioning, occupation, ability to perform jobs around the house, social life and hobbies compared with women without back pain. Most of the women with previous severe low back pain experience the same symptoms in a subsequent pregnancy. Even if not pregnant 20% of the women with back pain during pregnancy still experience pain three years later. Many women refrain from another pregnancy because of their fear of low back pain. Additionally, there might be a higher risk of an increase in low back pain during menstruation.
4-5 times **longer durations of sickness absences are also an economic factor**.

Since prevalence of pregnancy related back pain, which can be treated efficiently with osteopathic treatments and the risk of persisting back pain post partum are high, **an information campaign should be started** to enhance the information status of the possibilities of osteopathic treatment. Literature data from Great Britain (FILSHIE, 2000) show the need of more information as to the role and safety of osteopathic treatment before obstetricians and midwives would make referrals.

Therefore publications of study results in international scientific magazines should be intensified.

Musculoskeletal pain is very common (73%) among pregnant Austrian women with its highest prevalence and the highest severity of pain levels in the low back and pelvic region.

Osteopathic treatment had the highest success rate (100%) among all therapeutic options but was only administered in 5% of all patients.

32.5% of all patients knew about the possibility of osteopathic treatment mainly from friends and relatives.

Osteopathic treatment as a highly effective therapy for musculoskeletal complaints in pregnancy is currently under-represented in Austria.

Therefore, information campaigns for specific health care providers (obstetricians and midwives etc.) could improve the knowledge and acceptance of this valid treatment form.

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Appendix 1

Conception

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Conception Masterthesis

TITEL	**LOW BACK PAIN IN PREGNANCY - DO AUSTRIAN WOMEN KNOW ABOUT THE OSTEOPATHIC APPROACH?**
Study design	Patient survey
Keywords	Back pain – pregnancy – osteopathic approach
Research Question – Hypothesis	Osteopathic treatment for low back pain in pregnancy is underrepresented in Austria. Only few pregnant women know about the possibility of an osteopathic approach in dealing with symptoms of low back and pelvic pain.
Introduction – Background	There is evidence of the high incidence of low back and pelvic pain in pregnant women in various international publications. The osteopathic approach has a lower impact in suburban regions of Austria.
Osteopathic Relevance	To evaluate the knowledge of osteopathic treatment during pregnancy. If there is data which accounts for a lack of information among pregnant women an advertising campaign should be undertaken.

Methodology

STUDY POPULATION	100 PREGNANT WOMEN ARE RECRUITED FROM AN OBSTETRICAL PRIMARY CARE UNIT IN SUBURBAN SALZBURG AS WELL AS FROM A PRIVATE OBSTETRICAL CLINIC IN VIENNA (50 WOMEN EACH).
Inclusion criteria	Otherwise healthy pregnant women of 20 – 40 weeks of gestation.

Appendix 2

Questionnaires

Questionnaire

Actual **week of gestation**: _____

Number of previous pregnancies:

□ 1 □ 2 □ 3 □ 4 □ 5 □>

Age:

□ younger than 20
□ 20-24 years
□ 25-29 years
□ 30-34 years
□ 35-39 years
□ 40 years or older

Do you have any problems in the musculoskeletal structure ?

□ yes □ no

...if yes, in which area of the body do you have problems?

□ ... cervical spine, neck , shoulder girdle, arms
□ ... thoracic spine, thorax, ribs (upper back)
□ ... lumbar spine, os sacrum, os coccyx (lower back)
□ ... pelvis, hips, legs
□ ... elsewhere: _____

How intense is the pain?
Please use □**1** for **almost unnoticeable (a.u.)** to □**10** for **extremely intense pain**

□ ... cervical spine, neck , shoulder girdle, arms

a.u.: □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7 □ 8 □ 9 □ 10 :extremely intense

□ ... thoracic spine, thorax, ribs (upper back)

a.u.: □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7 □ 8 □ 9 □ 10 :extremely intense

□ ... lumbar spine, os sacrum, os coccyx (lower back)

a.u.: □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7 □ 8 □ 9 □ 10 :extremely intense

□ ... pelvis, hips, legs

a.u.: □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7 □ 8 □ 9 □ 10 :extremely intense

□ ... elsewhere: _____

a.u.: □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7 □ 8 □ 9 □ 10 :extremely intense

How often do you feel pain?

□ once per day □ several times a day □ permanently

Did you have previous treatments?

□ yes □ no

... if yes , what treatment?

□ ... pain killers
□ ... thermal treatment
□ ... cold treatment
□ ... massage
□ ... remediation gymnastics
□ … acupuncture
□ … osteopathy
□ ... else: _____

Did the problems get any better with the treatments?

□ yes □ no

... if yes, what treatment?

□ ... pain killers
□ ... thermal treatment
□ ... cold treatment
□ ... massage
□ ... remediation gymnastics
□ … acupuncture
□ … osteopathy
□ ... else: _____

Would you consider other treatments?

□ yes □ no

What treatment would you choose?

□ ... pain killers
□ ... thermal treatment
□ ... cold treatment
□ ... massage
□ ... remediation gymnastics
□ … acupuncture
□ … osteopathy
□ ... else: _____

Have you heard about the possibility of osteopathic treatments?

- □ No, I have not heard about it.
- □ Yes, I have heard about it...
  - □ ... from relatives/ friends.
  - □ ... from a midwife/nurse
  - □ … from my medical doctor
  - □ … from my physiotherapist
  - □ ... I have read about it in internet.
  - □ ... in a brochure.
  - □ ... else: _____

In case of pain, would you use treatment to reduce your problem?

□ yes □ no

... if yes, what treatment?

- □ ... pain killers
- □ ... thermal treatment
- □ ... cold treatment
- □ ... massage
- □ ... remediation gymnastics
- □ … acupuncture
- □ … osteopathy
- □ ... else: _____

Do you have the possibility to have osteopathic treatment?

□ yes □ no

How much would you be willing to spend for an osteopathic treatment?

- □ 20-40 Euro
- □ 40-60 Euro
- □ 60- 80 Euro
- □ 80-100 Euro

Appendix 3

Results

Question	Variable
Hospital	Hosp
ID	PID
Actual week of gestation	WoG
Number of previous pregnancies	PP
Age	Age
Do you have any problemsin the musculoskeletal structure?	Pain
Do you have pain in the cervical spine, neck, shoulder girdle, arms?	P_c
How intense is the pain in the cervical spine, neck, shoulder girdle, arms?	P_c_d
Do you have pain in the thoracic spine, thorax, ribs (upper back)?	P_th
How intense is the pain in the thoracic spine, thorax, ribs (upper back)	P_th_d
Do you have pain in the lumbar spine, os sacrum, os coxxyx (lower back)?	P_l
How intense is the pain in the lumbar spine, os sacrum, os coxxyx (lower back)?	P_l_d
Do you have pain in the pelvis, hips, legs ?	P_h
How intense is the pain in the pelvis, hips, legs?	P_h_d
Do you have pain elswhere ?	P_e
How intense is the pain in this structure?	P_e_d
Location of this pain	P_e_l
How often do you feel pain per day?	frequ
Did you have previous treatments?	Treat
pain killers	T_Med
thermal treatment	T_heat
cold treatment	T_cold
massage	T_mass
remediation gymnastics	T_gym
acupuncture	T_acup
osteopathy	T_ost
else	T_else
Did the problems get any better with the treatments? If yes, what treatment did help:	Improv
pain killers	I_Med
thermal treatment	I_heat
cold treatment	I_cold
massage	I_mass
remediation gymnastics	I_gym
acupuncture	I_acup
osteopathy	I_ost
else	I_else
Would you consider other treatments? If yes, what:	Wish
pain killers	W_Med
thermal treatment	W_heat
cold treatment	W_cold
massage	W_mass
remediation gymnastics	W_gym
acupuncture	W_Akup
osteopathy	W_Ost
else	W_else
Have you heard about the possibility of osteopathic treatments? By:	Knowl
relatives/friends	Inf_rel
midwife/nurse	Inf_mw
medical doctor	Inf_dr
physiotherapist	Inf_phys
internet	Inf_Inet
brochure	Inf_broch
else	Inf_else
In case of pain, would you use treatment to reduce your problem? If yes, what tr.?	Would
pain killers	Wo_med
thermal treatment	Wo_heat
cold treatment	Wo_cold
massage	Wo_mass
remediation gymnastics	Wo_gym
acupuncture	Wo_acup
osteopathy	Wo_ost
else	Wo_else
Do you have the possibility to make use of an osteopathic treatment?	O_poss
How much would you be willing to spend for an osteopathic treatment?	cost

ID1	Hosp	PID	WoG	PP	Age	Pain	P_c	P_c_d	P_th	P_th_d	P_l	P_l_d	P_h	P_h_d	P_e	P_e_d	P_e_l	frequ	Treat	T_Med	T_heat	T_cold	T_mass	T_gym	T_acup	T_ost	T_else	Improv	I_Med	I_heat	I_cold
1	H	H 1	40	4	35-39	y	y	1	y	5	y	8	y	1				always	y	x	x		x					y	y	x	
2	H	H 2	40	3	25-29	y					y	4	y	4				several times per day	n												
3	H	H 3	39	2	25-29	y					y	3	y	3				several times per day	y	x	x		x	x				y	y	x	
4	H	H 4	39	0	25-29	n																									
5	H	H 5	39	2	30-34	n													n												
6	H	H 6	40	1	30-34	y					y	5	y	3				several times per day	y								yoga	y	y		
7	H	H 7	36	1	30-34	y	y	1	y	1	y	6	y	3				several times per day	n												
8	H	H 8	40	1	25-29	y					y	3	y	3				several times per day	n												
9	H	H 9	39	1	35-39	y							y	5				several times per day	n												
10	H	H 10	40	1	25-29	n													n												
11	H	H 11	26	0	25-29	y			y	2	y	3	y	3				once a day	n												
12	H	H 12	25	1	20-24	n																									
13	H	H 13	32	1	30-34	y	y	4										once a day	y								home remedy	y	y		
14	H	H 14	38	1	25-29	y					y	6	y	6				several times per day	n												
15	H	H 15	39	0	20-24	n																									
16	H	H 16	37	0	30-34	y					y	5						several times per day	n												
17	H	H 17	39	1	25-29	y					y	2						several times per day	n												
18	H	H 18	39	1	30-34	n																									
19	H	H 19	36	0	30-34	n																									
20	H	H 20	40	0	30-34	y							y	5				several times per day	y				x	x		x	moor	y	y		
21	H	H 21	39	2		y			y	3	y	6						once a day	n									n			
22	H	H 22	39	0	25-29	y					y	4						several times per day	n												
23	H	H 23	40	0	>40	n																									
24	H	H 24	38	0	25-29	n													n												
25	H	H 25	39	1	30-34	y							y	1				several times per day	n												
26	H	H 26	36	1	20-24	y			y	5								several times per day	y								gymnastics	y	y		
27	H	H 27		0	20-24	y							y	2					n												
28	H	H 28		2	30-34	y					y	5						several times per day	y		x		x					y	y	x	
29	H	H 29	39	2	30-34	n																									
30	H	H 30	38	1	20-24	y	y	1	y	3			y	2				once a day	n												
31	H	H 31	38	0	20-24	y					y	5						always	n												
32	H	H 32	37	0	35-39	y					y	2						once a day	n												
33	H	H 33	38	0	20-24	n													n												
34	H	H 34	39	1	35-39	n																									
35	H	H 35	39	1	30-34	n													y	x					x			y	y		
36	H	H 36	38	1	25-29	y							y	3				several times per day	n												
37	H	H 37	39	0	25-29	y					y	5						once a day	n												
38	H	H 38	40	0	25-29	y							y	5				several times per day	y				x					y	y		

ID1	Hosp	PID	WoG	PP	Age	Pain	P_c	P_c_d	P_th	P_th_d	P_l	P_l_d	P_h	P_h_d	P_e	P_e_d	P_e_l	frequ	Treat	T_Med	T_heat	T_cold	T_mass	T_gym	T_acup	T_ost	T_else	Improv	I_Med	I_heat	I_cold
39	H	H 39	38	1	20-24	y					y	7	y	5				several times per day													
40	H	H 40	39	0	25-29	y	y	2			y	4	y	3					n												
41	H	H 41	39	0	30-34	y	y	3			y	3						once a day	y					x				y	y		
42	H	H 42	39	0	25-29	y			y	2	y	7	y	8				several times per day	n												
43	H	H 43	38	1	20-24	y							y	6				several times per day	n												
44	H	H 44	38	1	30-34	y					y	8	y	8				several times per day	n												
45	H	H 45	37	0	25-29	y					y	5						several times per day	n												
46	H	H 46	39	0	30-34	y							y	5	y	7	sciatic nerve	always	y	x	x		x	x			homeopathic medicine	n			
47	H	H 47	39	0	30-34	y			y	3			y	2				several times per day	n												
48	H	H 48	30	1	30-34	n																									
49	H	H 49	38	>5	>40	y	y	7					y	10				several times per day	y		x							y	y	x	
50	H	H 50	39	0	25-29	y					y	5						several times per day	n												
51	H	H 51	38	0	25-29	n																									
52	P	P 1		1	25-29	y			y	1								once a day	n												
53	P	P 2	29	2	35-39	y			y	4	y	4	y	4				several times per day	y							x		y	y		
54	P	P 3	23	0	30-34	y	y	9	y	6	y	9						several times per day	y				x	x	x	x		y	y		
55	P	P 4		2	>40	y					y		y	2				several times per day	n												
56	P	P 5		2	>40	y	y	8			y	5	y	5				always	y				x	x				y	y		
57	P	P 6		2	35-39	y							y	7				always	n												
58	P	P 7	36	5	35-39	y							y	9				several times per day	y		x		x					y	y		
59	P	P 8	36	1	30-34	y					y	8						several times per day	y		x		x	x				y	y	x	
60	P	P 9	39	0	30-34	n																									
61	P	P 10	27	1	30-34	n																									
62	P	P 11		1	25-29	y					y	6						once a day	n												
63	P	P 12	22	0	30-34	n													n												
64	P	P 13	28	1	35-39	n																									
65	R	R 1	36	1	25-29	y					y	3						several times per day	n												
66	R	R 2	13	1	25-29	n													y	x								y	y		
67	R	R 3		1	20-24	y	y	9			y	9	y	9				always	n									n			
68	R	R 4	32	1	25-29	y	y	1	y	1	y	5	y	1				several times per day	n									n			
69	R	R 5		1	25-29	y	y	3	y	5	y	5	y	8				several times per day	y				x	x				n			
70	R	R 6	23	2	25-29	y			y	4	y	8	y	8				several times per day	y		x			x				y	y	x	
71	R	R 7	13	3	20-24	y			y	7	y	6	y	6				several times per day	n									n			
72	R	R 8		1	<20	y	y	3	y	7	y	1	y	7	y	1		several times per day	y	x								y	y		
73	R	R 9	13	3	30-34	y					y	7						several times per day	y				x				n.s.	y	y		
74	R	R 10	39	2	35-39	y	y	1	y	1	y	5	y	7	y	1		several times per day	n									n			
75	R	R 11	26	3	25-29	n							y	1				once a day	n									n			
76	R	R 12	28	4	30-34	y	y	1	y	2	y	9	y	6				several times per day	n									n			

ID1	Hosp	PID	WoG	PP	Age	Pain	P_c	P_c_d	P_th	P_th_d	P_l	P_l_d	P_h	P_h_d	P_e	P_e_d	P_e_l	frequ	Treat	T_Med	T_heat	T_cold	T_mass	T_gym	T_acup	T_ost	T_else	Improv	I_Med	I_heat	I_cold
77	R	R 13	22	1	25-29	n																									
78	R	R 14	22	3	35-39	y	y	1	y	1	y	7	y	1	y	1		several times per day	y							x		y	y		
79	R	R 15		2	30-34	y	y	4	y	1	y	3	y	4				several times per day	n												
80	R	R 16	21	2	25-29	y			y	4	y	4						several times per day	n												
81	R	R 17		1	20-24	y	y	1	y	1	y	5	y	5				once a day	n												
82	R	R 18	41	1	30-34	y	y	1	y	1	y	1	y	3				once a day	n												
83	R	R 19	40	5	35-39	y							y	3				several times per day	y		x		x					y	y	x	
84	R	R 20	24	1	25-29	n													n												
85	R	R 21	30	3	30-34	y							y	4				several times per day	n												
86	R	R 22	23	1	35-39	y	y	1	y	1	y	3	y	2	y	5	twinge lower abdomen	several times per day	n												
87	R	R 23	34	5	35-39	y	y	4	y	1	y	1	y	7	y	1		several times per day	y		x		x					y	y	x	
88	R	R 24	13	2	30-34	y							y	3				several times per day	n												
89	R	R 25	22	2	25-29	n																									
90	R	R 26	13	2	35-39	y	y	5	y	1	y	1	y	1				once a day	y		x		x					y	y	x	
91	R	R 27		>5	30-34	n													y	x								y	y		
92	R	R 28	13	1	20-24	n																									
93	R	R 29		3	25-29	y					y	5						once a day	n												
94	R	R 30	35	1	25-29	y	y	2			y	10							n									n			
95	R	R 31	37	2	>40	y					y	5						several times per day	n												
96	R	R 32		1	25-29	y							y	5				several times per day	n									n			
97	R	R 33	18	0	35-39	y							y	10				once a day	y	x	x							y	y	x	
98	R	R 34	39	0	25-29	y	y	4			y	2						once a day	y				x					y	y		
99	R	R 35	22	2	25-29	n													n									n			
100	R	R 36	21	0	25-29	y					y	5	y	4	y	5	knee	several times per day	y	x								n			
101	R	R 37	21	1	25-29	n													n									n			
102	R	R 38	21	1	30-34	y	y	2										once a day	y		x		x	x		x		y	y	x	
103	R	R 39	15	0	25-29	y	y	5			y	2						several times per day	n												
104	R	R 40	27	0	20-24	y					y	4	y	5				once a day	n												
105	R	R 41	38	0		n													n									n			
106	R	R 42	31	1	30-34	y	y	4					y	8				several times per day	n												
107	R	R 43	29	>5	25-29	y	y	5			y	4			y	10	kidneys	always	y	x								n			
108	R	R 44	14	1	20-24	y	y	1	y	7	y	7	y	2				several times per day	n												
109	R	R 45	13	0	<20	n													n									n			
110	R	R 46	21	2	35-39	y	y	5										several times per day	y		x		x			x		y	y		
111	R	R 47		1	25-29	y	y	4	y	4	y	4	y	6				several times per day	y				x					y	y		
112	R	R 48		1	20-24	y			y	6								several times per day	y	x								y	y		
113	R	R 49	21	1	25-29	y							y	7				several times per day	n												

ID1	Hosp	PID	WoG	PP	Age	Pain	P_c	P_c_d	P_th	P_th_d	P_l	P_l_d	P_h	P_h_d	P_e	P_e_d	P_e_l	frequ	Treat	T_Med	T_heat	T_cold	T_mass	T_gym	T_acup	T_ost	T_else	Improv	I_Med	I_heat	I_cold
114	R	R 50	28	0	25-29	y					y	2						once a day	n												
115	R	R 51	40	0	25-29	y			y	3								several times per day	n												
116	R	R 52	38	0	20-24	y							y	8				several times per day	n												
117	R	R 53		>5	30-34	y	y	1	y	1	y	1	y	1	y	1		once a day	y		x		x	x				n			
118	R	R 54	39	1	25-29	y	y	1	y	3	y	1	y	5				once a day	y				x					y	y		
119	R	R 55	18	0	30-34	n													n												
120	R	R 56	28	0	25-29	y					y	9						several times per day	y				x					y	y		
121	R	R 57				n													n												
122	R	R 58		1	25-29	y	y	4	y	3	y	6	y	6				always	y				x					n	y		
123	R	R 59	38	1	20-24	y					y	3	y	3				several times per day	n												
124	R	R 60	37	0		n																									
125	R	R 61	26	1	30-34	n													n												
126	R	R62	26	2	25-29	y			y	4								once a day	n												
127	R	R63	26	1	20-24	y	y	3	y	4	y	4						several times per day	y	x								n	y		
128	R	R64	36	0	30-34	y			y	3	y	8						once a day	n												
129	R	R65		1	20-24													once a day	n									n			
130	R	R66		3	30-34	y					y	7						several times per day	n												
131	R	R67	26	0	25-29	y			y	4	y	5			y	5	sciatic nerve	several times per day	y				x					y	y		

PID	I_mass	I_gym	I_acup	I_ost	I_else	Wish	W_Med	W_heat	W_cold	W_mass	W_gym	W_Akup	W_Ost	W_else	Knowl	Inf_rel	Inf_mw	Inf_dr	Inf_phys	Inf_Inet	Inf_broch	Inf_else	Would	Wo_med	Wo_heat	Wo_cold	Wo_mas	Wo_gym	Wo_acup	Wo_ost	Wo_else	O_poss	cost
H 1	x					n									y	x				x			y							x		n	40-60
H 2						y				x					y	x				x			y		x		x		x	x		n	
H 3	x	x				n									n								n									n	40-60
H 4															y		x						y				x	x	x	x		y	40-60
H 5															n																		
H 6					yoga	n									n								y									?	20-40
H 7						n									y	x							n									y	40-60
H 8						n									n								n									n	
H 9						n									y				x				n										
H 10						n									y	x							n									n	
H 11															n								n									?	20-40
H 12															n								y		x		x		x				40-60
H 13					home remedy	n									n								n										
H 14															n																		
H 15															y				x			x	y				x	x	x	x		y	40-60
H 16						n									n								n									n	
H 17						y		x							n								y		x							n	20-40
H 18															n								y	x			x		x				
H 19															n								y				x					n	40-60
H 20				x	moor	n									y	x							y							x		y	40-60
H 21						n									n								y		x		x					y	40-60
H 22															y	x							n										
H 23																																	
H 24															y	x							y		x	x	x	x	x	x		n	60-80
H 25						n									n								n										
H 26					gymnastics	n									n								y				x					n	20-40
H 27																																n	20-40
H 28	x					n									y	x							y		x		x			x		y	40-60
H 29																																	
H 30						n									n								n									n	
H 31															n								n									y	20-40
H 32						y				x					n																		
H 33						n									y	x							y		x		x	x	x			n	
H 34																																	
H 35						n									n								y					x	x			y	80-100
H 36															n								y		x	x	x	x		x		n	20-40
H 37						y				x	x	x			n								y				x	x	x				
H 38	x					n									n								y		x		x	x	x	x		n	40-60

PID	I_mass	I_gym	I_acup	I_ost	I_else	Wish	W_Med	W_heat	W_cold	W_mass	W_gym	W_Akup	W_Ost	W_else	Knowl	Inf_rel	Inf_mw	Inf_dr	Inf_phys	Inf_Inet	Inf_broch	Inf_else	Would	Wo_med	Wo_heat	Wo_cold	Wo_mas	Wo_gym	Wo_acup	Wo_ost	Wo_else	O_poss	cost
H 39						n									n								y										40-60
H 40						y				x			x		y								y				x			x		y	40-60
H 41		x				n									n								y										20-40
H 42															y								y		x	x	x	x	x	x		y	80-100
H 43						n									y	x							n									n	
H 44						n									n								y		x		x					n	40-60
H 45						n									y	x							y				x		x				20-40
H 46						y									y		x						y									n	80-100
H 47						n									n								y				x	x				n	40-60
H 48															n								y				x					y	40-60
H 49						y				x	x				n								y				x	x					
H 50															n																		
H 51															y							x	y									y	20-40
P 1						n									y					x												y	40-60
P 2				x		n									y	x							y						x	x		y	60-80
P 3	x					y				x					y				x				y		x		x			x		y	80-100
P 4															y			x					y				x	x	x	x		y	80-100
P 5		x				n									y	x	x						y						x	x		y	20-40
P 6						y					x	x			n													x	x			y	40-60
P 7	x	x		x		y				x	x		x		y				x				y							x		y	60-80
P 8	x	x				n									n								y		x		x	x				y	40-60
P 9															y	x	x		x				y				x	x	x	x		y	40-60
P 10															y	x							y		x	x	x	x	x	x		y	40-60
P 11															n								n										40-60
P 12															n								y									y	40-60
P 13															y												x	x		x		y	40-60
R 1						n									y		x						n									y	40-60
R 2															y	x																n	
R 3						n									n								y									y	20-40
R 4						n									n								y	x								n	
R 5						y						x			n								y						x			y	20-40
R 6		x				y						x	x										y						x	x	x	y	20-40
R 7						n									n								y				x					n	
R 8						n									n								y				x	x				?	20-40
R 9	x				n.s.	y		x		x	x				n								y		x		x	x			x	y	20-40
R 10						n									n								y									n	20-40
R 11						n									n								n									n	40-60
R 12						n									n								n									n	

PID	I_mass	I_gym	I_acup	I_ost	I_else	Wish	W_Med	W_heat	W_cold	W_mass	W_gym	W_Akup	W_Ost	W_else	Knowl	Inf_rel	Inf_mw	Inf_dr	Inf_phys	Inf_Inet	Inf_broch	Inf_else	Would	Wo_med	Wo_heat	Wo_cold	Wo_mas	Wo_gym	Wo_acup	Wo_ost	Wo_else	O_poss	cost
R 13															y					x	x		y	x	x		x	x				?	40-60
R 14				x		n									y	x							y						x		y	40-60
R 15						y				x					n								y				x	x				n	
R 16															y	x							y		x		x					n	
R 17						y				x					n								y									y	20-40
R 18															n								y										
R 19	x					n									y							x	y		x		x					n	20-40
R 20						n									y	x							n										
R 21															n								n										
R 22															n								?										
R 23	x					y						x			n								y						x			n	40-60
R 24						n																											
R 25															n								y	x			x					n	20-40
R 26	x					n									n								y										
R 27															n								y	x									
R 28															y	x							y				x			x		y	40-60
R 29						n									n								n									n	
R 30						n									n								n									n	
R 31															y	x							y				x	x	x			y	40-60
R 32						n									n								y	x			x					n	80-100
R 33						n									n								n									n	
R 34	x					n									n								y					x	x	x		n	20-40
R 35															n																		
R 36						y				x		x			n								y				x	x	x			?	40-60
R 37						n									n								y		x		x	x	x			n	
R 38	x	x		x		n									y				x				y		x		x	x		x		n	20-40
R 39						y				x	x				n								y		x		x	x				y	40-60
R 40															n								n									y	80-100
R 41						n									n								n									n	
R 42						y				x					n								y				x		x			y	
R 43						y	x	x		x				induce labour	n								y	x	x		x	x				?	40-60
R 44															n								y				x	x				n	40-60
R 45						n									n								y				x	x	x			?	20-40
R 46	x			x		y					x	x			n								y					x	x			y	20-40
R 47	x					y		x		x		x			n								y		x		x		x			n	20-40
R 48						n									n								y	x									20-40
R 49															n								y				x	x	x			y	40-60

PID	I_mass	I_gym	I_acup	I_ost	I_else	Wish	W_Med	W_heat	W_cold	W_mass	W_gym	W_Akup	W_Ost	W_else	Knowl	Inf_rel	Inf_mw	Inf_dr	Inf_phys	Inf_Inet	Inf_broch	Inf_else	Would	Wo_med	Wo_heat	Wo_cold	Wo_mas	Wo_gym	Wo_acup	Wo_ost	Wo_else	O_poss	cost
R 50						y				x	x				y						x		y					x				y	20-40
R 51															n								y		x		x	x				?	20-40
R 52															n								n										
R 53						n									y								n				x	x					40-60
R 54	x														n								y				x						
R 55															n								y	x			x	x				n	
R 56	x					y		x				x			n								y		x		x	x	x	x		y	20-40
R 57						n																											
R 58	x					n									n								y									y	40-60
R 59															n								y				x					n	20-40
R 60																																	
R 61															y	x					x		y						x	x		y	40-60
R62															n								y				x	x				n	40-60
R63						n									n								n									n	40-60
R64															n								y				x					n	60-80
R65						n									n								y									n	
R66															n								n									n	20-40
R67	x														n								n										