The Affects of Conservative Treatment in Reducing Low Back Pain in Pregnancy

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ABSTRACT

Objective: This article provides an overview of literature of the relationship between exercises, chiropractic, and other conservative treatment for low back pain during pregnancy. We will discuss the physiopathology of the musculoskeletal system during pregnancy and prevalence of low back pain in pregnant women. Finally, treatment options will be reviewed with an emphasis on exercises and chiropractic used to treat low back pain in pregnancy.

Data Collection: A computer search using PubMed generated articles relevant to LBP in pregnancy, exercises, and chiropractic care. Referenced sources were identified from the individual searches and from accumulated review of literature. PubMed searches generated over 400 articles on LBP in pregnancy, over 250 articles on treating low back pain in pregnancy, and only 8 articles on chiropractic treatment for LBP in pregnancy. Only one review was found to address all three topics.

Data Synthesis: The majority of women experience an episode of LBP during pregnancy. Although the mechanisms of the LBP are not well understood in pregnancy, the literature has shown that exercise and other conservative care has proven beneficial. LBP is the number one complaint of expecting mothers, but few actually seek treatment.

Conclusions: Research is scarce when it comes to treating LBP in pregnancy, obviously there are challenges when it comes to treating musculoskeletal pains in pregnancy, imaging modalities are limited, medications are harmful, but there have been a limited amount of studies suggesting that conservative care including, chiropractic, exercises, acupuncture, and massage have been beneficial in reducing pain. The consensus of the literature reviewed agrees that conservative treatment has been beneficial in reducing LBP in pregnancy, although more studies are needed to confirm these outcomes

Key Indexing Terms: pregnancy complications/epidemiology, pregnancy complication/physiopathology, pregnancy and low back pain, back pain/ prevention and control, pregnancy, treatment of low back pain in pregnancy, chiropractic treatment of low back pain in pregnancy.

INTRODUCTION

Back pain can affect women of child bearing age whether pregnant or not. Approximately 70% of women will report back pain at some point in their lives.[1] Up to 50-80% of women report LBP when pregnant.[2,3]And of those women up to one-third claim that there LBP is a significant problem.[4] In a study done by Stapleton et al 61.8% of women who reported LBP when pregnant claimed that the pain was at least moderately severe, and 95 claimed they were completely disabled by the pain.[5]

This discomfort most commonly starts between the fifth and seventh month of pregnancy.[2] Morgen et al. reported a mean gestation age at start of pain of 22.1 weeks. However, in this study up to 20% of women claimed that pain started as early as 16 weeks with some claiming pain within the first month.[3]

Most women consider their pain during pregnancy as inevitable and do not seek care from a professional. Of the women with LBP only about 50% seek care from a physician, and of those women only 70% were treated. The majority of treatments focused on prevention because treatment too far into pregnancy is difficult to implement.[6] Of the different treatments rendered exercise before and during pregnancy was found to strengthen core muscles, which improved posture, and allowed increased weight bearing ability, which in turn decreased pain. Although the research is poor chiropractic is also proven beneficial to the treatment of LBP in pregnancy.

DISCUSSION

Back pain is the most common complaint of pregnant women. It is often characterized as axial or para-sagittal ache in the lower lumbar region and is thought to be musculoskeletal in nature. This can be due to a combination of mechanical, hormonal, circulatory, and psychosocial factors.

This pregnancy-related condition negatively influences self-estimated health and interferes with sexual activity during pregnancy.[7] The risk of experiencing LBP in a subsequent pregnancy is extremely high.[3,8] Around four out of ten women report persistent LBP half a year after delivery.[9-12] Remission of the condition primarily occurs during the first six months after delivery.[13] At three years post partum, 20% of all women

with back pain during pregnancy report persistent symptoms.[14] Post partum back pain has been associated with considerable perceived disability in movement-related activities.[15]

Back pain during pregnancy can be significant in terms of intensity and resulting disability. Stapleton et al [16] found that 35.5% of 1120 South Australian women had at least moderately severe back pain during 1 or more of their pregnancies. Gutke et al [17] found that, of 189 subjects with pregnancy-related LBP, 29% had clinically important Oswestry or Visual Analog Scale (VAS) scores, whereas 56% had clinically important Oswestry and VAS scores. As part of their study, Sihvonen et al [18] had 32 pregnant women with preexisting LBP and 21 pregnant women with no previous history of back pain complete VAS and Oswestry Low Back Disability questionnaires at 20 and 36 weeks of gestation. The VAS scores went from 5.86 to 9.21 mm in the previous back pain group and from 0 to 14.67 mm in the group with no previous back pain. The Oswestry scores went from 5.14 to 7.79 in the previous back pain group and from 0 to 5.67 in the previously pain free group.

Stapleton et al's 1120 subjects (68%) continued to have recurrent LBP after their pregnancies, further highlighting the importance of this problem as it raises concern about the pain becoming chronic and inherently more difficult to resolve.[16] Skaggs et al [19] reported that, of the 15% of pregnant women in their study who received some form of care for their pregnancy-related LBP, only 10% were satisfied with the symptom relief they obtained. This highlights the importance of finding efficacious treatments for pregnancy-related LBP.

Studies from Scandinavia suggest that morbidity associated with pregnancy is a major expense for society.[20] For example, 1 in 5 pregnant women in Scandinavia is on sick leave for back pain during or after pregnancy. The average sick leave for these women is 7 weeks, duration added to thenormal pregnancy leave. Surprisingly, sick leave for LBP/PP surrounding pregnancy is the single largest social health care expense in Scandinavia.[20] Certainly, complicating factors during pregnancy and child rearing could have extensive and vital effects on women at important time points in their life.

Women with previous lumbar problems or chronic back pain conditions are more likely to develop back pain during pregnancy, with pain occurring twice as often as in those with no prior complaints. They are also more likely to have severe and long lasting

pain.[6] Along those same lines, women who experience back pain during one pregnancy have an 85% chance of experiencing back pain during a subsequent pregnancy.[7]

Etiology: Low back pain in pregnancy is generally ascribed to the many changes in load and body mechanics that occur during the carrying of a child. It is normal to gain between 20 and 40 pounds during pregnancy. This clearly shifts the body's center of gravity anteriorly and increase the moment arm of forces applied to the lumbar spine. Studies suggest that an anterior shift is associated with pubic symphysis problems. Furthermore, postural changes may be implemented to balance the anterior shift, leading to lordosis, and increase in the natural inward curvature of the spine, further increasing stress on the lower back.[21] Structural adaptation in the gravid patient is a contributory source of low back pain throughout gestation. Spinal dysfunction related to changing load distributions within the motion segments of the lumbar spine and sacroiliac joints are also a factor in back pain.[9] Traction, pressure or stretch of the adnexa, parietal peritoneum, bladder, urethra, rectum, and pelvic structures can also cause referred pain and secondary muscle spasm. Although the female sacrum has enough depth to enable fetal carriage, the displaced weight gain of 25 to 35 lb greatly increases the stress to the sacroiliac joints. As the fetus develops during gestation, this weight is projected forward and the lumbar lordosis is increased, placing extra stress on the intervertebral disks and facet joints. Through compensation, the sagittal curvature of the remainder of the spinal column increases as well. The lumbar lordosis, designed to absorb some of the axial forces, loses integrity as a static support and may be a source of discogenic injury. In addition, the increase in circulating progesterone, estrogen, and relaxin throughout gestation, especially in the third trimester, brings about pelvic hypermobility and creates a decrease in spinal stabilization. Direct pressure of the fetus on the lumbosacral nerve roots may also be a cause of pain.[4] Physically strenuous work and previous low back pain are factors that may also be associated with an increased risk of developing low back pain and sacroiliac dysfunction during pregnancy.[3] All of these factors contribute to back pain experienced by the pregnant patient, leading some gravid patients to seek chiropractic care.

Discomfort in this region may also be contributed to changes in the posterior pelvic region, particularly the sacroiliac joints which undergo changes during pregnancy and/or stretch direct stretch of intrapelvic structures. This can manifest itself in the lumbar region and/or radiate to the buttocks and posterior thighs. Unlike radiculopathy, posterior pelvic pain usually does not extend beyond the knees. The classic description of pain felt by most women is usually a result of symptoms of both types of low back pain, lumbar and pelvic.

The intervertebral discs respond to axial loading by expelling fluid, resulting in decreased height and an overall compression of the spine.[22] Rodacki et al. showed that the spines of pregnant women with low back pain compress more after activity than pregnant women without back pain and those who are not pregnant, 4.57, 4.23, and 3.99 mm, respectively. Pregnant women with low back pain also take longer to recover from activity related compression.[23]

The abdominal muscles also stretch to accommodate the expanding uterus. As they stretch, they lose their ability to perform the function of maintaining body posture, causing the lower back to support the majority of the increased weight of the torso. Studies comparing pregnant women enrolled in an exercise program designed to address core strength, flexibility, and muscular endurance, particularly abdominal strength, with those involved in no exercise program, demonstrated a decrease in postural changes and severity of pain in the exercise group.[24]

A significant portion of women first experience pain during the first trimester, when mechanical changes do not yet play a significant role in the etiology of pain.[3] This suggests that some pain may be secondary to hormonal changes rather than physical stresses. Hormonal changes during pregnancy also cause inflammation and pain in the back. For example, some studies have found back pain to correlate with increased levels of relaxin which are produced during pregnancy, [25] even though others have not.[26,27] It has been suggested that the hormone relaxin increases 10-fold in concentration during pregnancy. As the structures of the pelvis and lower spine soften and become more pliant, discomfort may result particularly not only in the sacroiliac joint but also generalized over the entire lower back.

Another theory has been put forward that low back pain during pregnancy, especially pain that worsens at night and is severe enough to wake the patient up, is the result of venous engorgement in the pelvis. The expanding uterus presses on the vena cava, particularly at night when the patient is lying down. This combined with the increased fluid volume from fluid retention during pregnancy leads to venous congestion and hypoxia in the pelvic and lumbar spine. Fast et al. correlated this condition to the low back pain experienced at night in patients with congestive heart failure.[28]

Sciatica, caused by herniation or bulging of an intervertebral disc resulting in nerve compression is often thought to be the cause of low back pain. Associated symptoms of pregnancy, like leg pain and faulty bladder control, can point to this diagnosis. However, during pregnancy this is very unlikely and only presents in about 1% of pregnant women.

Back pain can also be caused by all of the normal factors associated with back pain in the non-pregnant population. Factors such as degenerative disc disease, malignancy, and infection are all potential causes. Pregnancy related problems may also develop such as preterm labor and pregnancy induced osteoporosis. These causes present a more serious problem that can significantly endanger the health of the mother and fetus if not dealt with quickly.

Such discomfort can have a substantial impact on life during pregnancy and may be of variable intensity and duration. Fortunately, in most cases, low back pain resolves itself quickly after partum and does not cause any lasting issues. However, if discomfort is persistent or not of classic presentation, less common causes such as infection and preterm labor must be considered expeditiously to avoid serious consequences.

Activity is also related to the onset of back pain during pregnancy.[3,6] A sedentary lifestyle increases risk of back pain compared to patients who engage in a more active lifestyle. Nonetheless, patients who have occupations described as ‘mostly active’ and ‘physically demanding’ also have a higher risk of developing pain during pregnancy suggesting that extremes of activity are probably not ideal.

Increased body mass index (BMI) may be a risk factor but study results are conflicting. Orvieto et al. found that BMI was significantly higher in those who experience pain compared to those who did not.[29] These results agree with those found by

Mogren et al. who found a mean pre and end BMI of 24.57 and 30.10, respectively, in those who had low back pain compared to BMIs of 23.30 and 28.56 in those who did not. [3]However, Mens et al. found no significant difference between BMI before pregnancy in those with back pain and the general population.[8] Younger age and multiple parity also increase the incidence of back pain.[3,30]

Associated symptoms include stiffness and limited motion in the back or legs. Pain and associated symptoms may be constant or may only occur in certain positions or after extended activity. Approximately one-third of patients report that pain increases as the day goes on while another one-third report that the pain worsens during the night and often disturbed sleep.[2] Approximately 10%of women claim that it prevented them from working[31] and more than 80% report that it affects their daily routine including housework, childrearing, and job performance.[8] Nore´n et al. report back pain as the leading cause of sick leave during pregnancy in Scandinavian countries, with an estimated cost of $2.5 billion in 1990.[32]

Diagnosis: Diagnosis of low back pain is usually based on symptoms because there are few tests available to aid in diagnosis because of fear of harming the fetus. Evaluation of low back pain during pregnancy is difficult because the pain is subjective and usually the result of a combination of problems. Pain is most often measured on a horizontal visual analogue scale from 1 to 100 with anchors at ‘no pain’ and worst pain imaginable.

Classic mobility models cannot be applied to pregnant women because their mobility pattern and expectations are different from the general population. Disability as the result of pain is often measured using the Quebec back pain disability scale. While this scale is used primarily to measure disability from nondescript low back pain not related to pregnancy, it can be adapted to use for pregnancy related pain.[33-35] Several studies have attempted to develop a system to evaluate the extent and effect of pain specifically during and after pregnancy. Van De Pol et al. developed the Pregnancy Mobility Index (PMI) to assess the ability to do normal household activities on a scale from ‘no problems performing this task’ to ‘performing this task is impossible or only possible with the aid of others.’ The PMI was found to be a valid assessment of mobility during and after pregnancy.[36]

Physical exam can distinguish posterior pelvic pain from lumbar pain by several maneuvers. The posterior pelvic pain provoking test, standing on one leg, and Patrick Fabere test elicit pelvic pain. Each test manipulates the patients' legs to put pressure on the pelvic joints. Palpation over soft tissue of the sacroiliac, pubic symphysis, and gluteal regions distinguish pelvic pain from tenderness over the back above the waist. Studies show that both methods are effective in diagnosing posterior pelvic pain and distinguishing among the various causative syndromes; although pain provocation tests are more reliable than topography/palpation tests.[37]

When the source of the problem is difficult to determine by history and physical alone, imaging techniques are available for consideration. The amount of radiation or Grays depends on the type of imaging technique used and the area of the mother exposed. The effect of absorbed radiation depends on gestational age of the fetus. At 2– 8 weeks, a dose of less than 10 cGy poses no increased risk of abnormalities, while the risk of anomalies increases 1% per 10 cGy increase.[38] From 9 to 15 weeks, risks are similar and increase with dose. After 15 weeks there is a measurable increase in the risk of cancer with an exposure as low as 1 cGy.[39]

The fetus is exposed to virtually no radiation when radiographs of the extremities, head, or chest are done with proper shielding. However, the fetus does absorb a moderate to high amount of radiation when imaging the lumbar spine. The mean fetal exposure for a conventional lumbar spine radiograph is 1.7 mGy with a maximum dose of 10 mGy while the mean and maximum dose for computed tomography is 2.4 and 8.6, respectively.[26] Magnetic resonance imaging is the preferred technique for severe low back pain that is not relieved with more conservative therapy during pregnancy. Uroradiologic procedure occasionally preformed for hydronephrosis in pregnant women result in a mean uterine dose of .4 mGy.[40]

Since 1962 [41], diagnosis, prognosis and treatment of pregnancy-related pelvic girdle and/or low back pain have inflicted debate and have led to considerable differences of opinions. Many articles appeared mainly in International journals and some etiological mechanisms were hypothesized. However, the subject remains controversial, mainly because insight in etiology and prognosis is lacking. Moreover, diagnostic investigation

into the exact definition and classification of pregnancy-related pelvic girdle and/or low back pain shows various opinions between leading experts on this topic. The controversy relates to factors eliciting pain [33] and prognostic factors such as the interpretation of pain at the symphysis [42,43], the question whether pelvic girdle pain is a syndrome separate from low back pain [44,45] and the importance of questions about limitations in activities.[45] Also recent research about treatment strategies reflects those various opinions [20], in fact suggesting there is professional uncertainty about the optimal approach. Investigators draw particular attention to biomedical factors but there is growing evidence that important prognostic issues such as biopsychosocial factors appear to be even more important as basis in a treatment program[46,47]. Although the group of musculoskeletal disorders holds many different biomedical labels, the process of developing chronic disability has shown surprising similarities with regard to biopsychosocial factors.[48] For the moment, pregnancyrelated pelvic girdle and/or low back pain is a subjective experience comprising pain and limitations in activities for which classification criteria are insufficient in guiding to a treatment approach (Bastiaenen et al. personal communication). Results of various therapeutic interventions have been published but excepting one recent study, [49] their effectiveness remain unproven. Furthermore, the majority of the studies are methodologically flawed.[20]

Treatment: Treatment options are often poor, as the cause of back pain is not always fully understood. Furthermore, treatments that are available usually have a low success rate and consist mainly of life style adjustments and bed rest.

Most women consider back discomfort as an inevitable part of pregnancy and do not seek treatment from a health care professional. Only about 50% of women visit a physician for low back or pelvic pain. Women who rate their pain higher on a VAS are more likely to see a physician. Of the women who saw a physician, 70% were treated. The majority of women treated report more than one type of treatment.[6]

The majority of treatment strategies center on prevention because treatment late into the pregnancy is often difficult to implement. When treatment is sought; conservative management of low back pain is preferred during pregnancy for obvious reasons, although such treatments typically do not have a high incidence of success.

Treatment options include physiotherapy, transcutaneous nerve stimulation, pharmacological treatment, acupuncture or chiropractic treatment, and stabilization belts. Proper posture is essential for the relief of low back pain. While instruction may be enough to alleviate the pain, braces are available to insure proper body positioning.

Numerous treatments have been advocated for back pain during pregnancy, including exercise (such as encouraging maintenance of fitness as much as possible), use of proper ergonomics, heat and cold therapy, relaxation exercises, rest as needed, patient education on avoiding aggravating factors and encouraging relieving activities, joint mobilization, stretching, massage, acetaminophen (or other pain relieving medications), acupuncture, and chiropractic. [51,55] One systematic review found randomized controlled trials supporting the use of physiotherapy, acupuncture, and pregnancy specific exercises in particular.[50] Two reviews of chiropractic care for LBP during pregnancy exist.[52,53]

Physical activity is a major determinant of life-long health [54,55], and is well known to be beneficial for physical and psychological well-being before, during, and after pregnancy.[56,57] Unfortunately, the epidemiology of physical activity shows a consistent decline from adoles- cence to young adulthood.[55] Physical activity usually declines during pregnancy [58,59], but increased wellbeing has been found in women who maintain or increase their levels of exercise and sporting activity post partum.[60] In an American study, fitness and strength declined relative to pre-pregnancy levels in the early post partum period, but improved by 27 weeks post partum.[61] We have previously demonstrated that a higher number of years of regular leisure-time physical activity (PA) prior to pregnancy decreases the risk of LBPP during pregnancy.[6]

Regular, non-excessive physical activity during pregnancy has been shown to have positive physiological effects on maternal and fetal outcomes.[62] However, pregnant women generally decrease their level of physical training as pregnancy progresses [59,63], due to both the physical changes resulting from the pregnancy and a combination of social and psychological factors.[58] Enhanced psychological well-being has been shown in women who regularly exercise during pregnancy.[57] Additionally, a study evaluating physical activity at six weeks post partum found indications of physical and psychological benefits in women who were able to exercise vigorously and avoid any decrease in their usual level of activity. [64]The literature on the frequency of PA post

partum is limited, and to our knowledge no previous study has been published on the prevalence of PA among women who have experienced LBPP during pregnancy. The identification of determinants and outcomes of physical activity before, during, and after pregnancy has important implications for the development of strategies aimed at promoting a physically active lifestyle among women, and thus constitutes an important public health issue.[59]

Exercise before and early in pregnancy can strengthen abdominal, back, and pelvic muscles, which improves posture and allows increased weight bearing ability. Low intensity exercise can also alleviate pain once it develops. Exercise during the second half of pregnancy significantly decreases pain following a three time a week 12 week program.[65] Pelvic tilts are particularly effective in relieving lumbar pain. Knee pull, straight leg raising, curl up, lateral straight leg raising, and the Kegel exercises are also successful in relieving low back pain in pregnant women. Water aerobics is another recommended strategy that has shown to reduce pain and, as a result, the need for sick leave in women with lumbar pain during pregnancy.[66]

Back-pain-reducing programs involving exercise and education are often implemented early in pregnancy to combat occurrence or increased intensity of pain. Some studies show that such interventional therapy reduces intensity and anxiety, decreases the amount of sick leave taken, and prevents prolonged postpartum back pain [31,67] and recurrence at 6-year follow-up. [68] However, other studies contradict these findings. Dumas et al. found no significant difference in the prevalence of back pain or resulting functional limitations in pregnant women enrolled in an interventional exercise class and those who remained sedentary.[24]

Studies have shown that complementary and alternative medicine therapies can be an effective means of decreasing back pain during pregnancy. One-third of the population of the United States use such alternative therapies, the majority of whom are women of childbearing age.[69] Consequently, it is no surprise that alternative therapies are a popular option for pain relief. The most popular therapies include massage, acupuncture, relaxation, yoga, and chiropractic procedures. Similarly, over 90% of prenatal health care providers would recommend some kind of nonpharmalogical treatment, including some

alternative therapies. Midwives (93%) are more likely to recommend alternative treatments than physicians (64%) or prenatal nurse educators (57%).[70]

Diakow et al[72] conducted a retrospective cross-sectional survey of women attending 1 of 5 chiropractic clinics regarding back pain during pregnancy and labor. Twenty-five of the 179 subjects had seen a chiropractor for LBP during their pregnancy, and 21 (84%) reported relief of their LBP.[72] Fallon conducted a case series, reported as an abstract only, of 103 patients who received chiropractic care during their pregnancy.[75] All of the women reported greater than 50% decrease in back pain on a questionnaire.[75] Guadagnino[74] conducted a case series on 12 patients where they all received 2 particular treatment modalities (trigger point therapy and manual traction) and 1 of 3 manipulative techniques according to their presentation. The subjects had average baseline pain ratings of 7.58 of 10, and these decreased to 4.25 of 10 while they were under care.[74] Mantero and Crispini[72] conducted a case series where 120 pregnant women with LBP underwent an average of 15 chiropractic treatments, 25% had complete remission of their back pain,50% reported feeling very well, 15% were feeling better, and 10% noted no change in condition.

Lisi [73] conducted a retrospective case series on 17 pregnant patients with LBP using a multimodal chiropractic treatment plan. He found that the average pain levels of all but one of the patients displayed clinically important improvements on an 11 point numerical pain rating scale.[73] Clinically important improvement was observed within 1.8 treatments on average occurring over an average of 4.5 days.[73] The average pain level of patients at the end of their treatment regimens were 1.5 of 10 on average, down from 5.9 of 10 on average at baseline.[73]

Skaggs et al conducted a quasi-experimental single group pretest-posttest study, reported as an abstract only, on 58pregnant patients with LBP who saw a chiropractor at a musculoskeletal pain pregnancy clinic.[71] These patients were all treated with a multimodal treatment regimen in 1 visit.[71] The average scores on the Bournemouth Questionnaire went from 45 at the initial visit to 34 at the second visit.[71] Since a change score of 4.5 is considered clinically significant, this study demonstrates both clinically and statistically significant improvements in pregnancy-related LBP after chiropractic care.

None of the studies indicated any adverse effects or evidence of harm to either the pregnant woman or unborn child from the treatments rendered. However, only the study by Lisi [73] formally reported that there were no adverse events; the remaining studies did not comment one way or the other.

Results from the 6 included studies showed that chiropractic care is associated with improved outcome in pregnancy-related LBP. Although the results from these studies were consistently positive, the studies rated moderate to poor in methodological quality according to the Downs and Black [72] checklist. The methodological quality of the reviewed studies and the lack of randomized trials and control groups preclude any definitive statement as to the efficacy of chiropractic care for pregnancy-related LBP. Given the relatively common use of this type of care during pregnancy, there is urgent need for higher quality observational studies and controlled trials to determine efficacy.

Shaw reports the results of a chiropractic and medical collaborative study indicating that 75% of pregnant patients who received chiropractic care during their pregnancies stated that they found relief from pain. In addition, a retrospective chart review of 400 pregnancies and deliveries investigated the relationship between pregnancy and low back pain. The results of this survey support the hypothesis that back pain, pregnancy, and labor are associated, and emphasize the need for further studies. Findings indicated relief from back pain during the pregnancy in 84% of the cases. The authors also noted that chiropractic manipulation may significantly decrease the incidence of "back labor." The relative risk of experiencing back labor was almost 3 times greater if back pain was experienced during the pregnance.[72]

It has also been reported that there may be a relationship between back pain throughout pregnancy and a longer duration of the labor and delivery process. A retrospective review of statistics reported that primigravida women who seek chiropractic care throughout gestation have, on average, a 25% shorter labor time whereas multiparous women who seek chiropractic care throughout their pregnancy have, on average, 31% shorter labor times.[77]

Literature within the osteopathic profession also includes evidence of improved outcomes in labor and delivery for women who receive prenatal osteopathic manipulative treatment. Although the literature in the chiropractic profession dates back several

decades, evidence of osteopathic manipulative treatment being used in pregnancy and labor is documented in the osteopathic profession back to the early 1900s.[78] A more recent retrospective case-control study using outcomes of meconium-stained amniotic fluid, preterm delivery, use of forceps, and cesarean delivery found a strong relationship between women receiving prenatal osteopathic manipulative treatment and a reduction of the occurrence of these outcomes of pregnancy, labor, and delivery, especially for meconium-stained amniotic fluid and preterm delivery. An increasing number of practitioners and obstetricians are realizing the benefits of manual therapy for their pregnant patients, and inclusion of chiropractic or osteopathic care during patient's pregnancies and labors is becoming more widely accepted.[78]

Mechanisms of relief of low back pain during pregnancy. Low back pain is often described as an inevitable complication of pregnancy. Fascial constraint and spinal pelvic subluxation may be the cause of low back pain in pregnancy. As the growing uterus expands, it pulls the sacral base anterior, causing an anterior tilt of the pelvis and flexion of the hips. This orientation of the pelvis causes an increase in the lumbar lordosis, which increases the activity of the iliopsoas muscles. The piriformis muscle remains in a contracted state to maintain the external rotation of the legs, which compensates for a lack of balance as the center of gravity shifts as the pregnancy progresses.20 However, gentle myofascial relaxation of the piriformis and iliopsoas can greatly aide in the reduction of pain and tension. Also, improving the strength of the transversis abdominus muscle is thought to prevent some of the typical postural alterations that are seen in the third trimester that come with anterior pelvic tilt. Anterior translation of the cervical spine and extension of the occiput on the atlas can occur and be related to muscle spasms and suboccipital headaches to compensate for the laxity experienced as gestation progresses. Release of these spasms can be quite beneficial in alleviating continuous cephalgia. Also, exaggerated thoracic kyphosis, anterior translation of the head, and he increased weight of the breast tissue may cause cervicothoracic pain, thoracic outlet syndrome symptoms, or myofascial pain syndromes. The hormone relaxin is found circulating in greater quantities in a woman in her third trimester.[72]

Safety of chiropractic care during pregnancyA retrospective case series was performed to describe the results of chiropractic treatment offered to a sample of pregnant women. Of 17 patients,16 demonstrated clinically important improvement. The average time until relief was found to be a mean of 4.5 days after the initial treatment. The average number of treatments when substantial relief was achieved was 1.8 treatments. No adverse effects of treatment were reported. This observed evidence supports the hypothesis that chiropractic treatment may be effective in reducing the intensity of low back pain during pregnancy. Although, typically, it is quite safe to perform adjustment to a pregnant patient, caution should be exercised. Circumstances may arise indicating that chiropractic care is not appropriate and warrant a referral. Contraindications to adjusting may include vaginal bleeding, ruptured amniotic membranes, cramping, sudden onset of pelvic pain, premature labor, placenta previa, placenta abruption, ectopic pregnancy, and moderate to severe toxemia. Also, the use of electrical modalities, including stimulation and ultrasound, and radiodiagnostic imaging are contraindicated during pregnancy and should be avoided. [72]

The adjustive procedures of the pregnant patient. The ligamentous laxity brought on by pregnancy often makes adjusting comparatively easy using the gentlest of movements. A patient who is comfortable will relax more completely and require a less forceful adjustment to be applied. As it becomes uncomfortable for the pregnant patient to lay prone after about the fifth month of pregnancy, the use of tables with abdominal pieces that can be lowered may be beneficial for prone adjusting, especially for targeting troublesome pelvic portions with the drop component of the table. In addition, as pregnancy typically causes the breast tissue to enlarge throughout the course of gestation, the use of commercially made pillows may allow proper positioning and comfort to the patient. Side posture techniques can still be used, but the flexed leg will likely not be positioned as far cephalad toward the chest as usual. One author has suggested that left lateral decubitus adjustments should be used. When the patient is supine, the head and shoulders should be elevated enough to avoid cardiovascular stress and the knees should be supported in a flexed position.[72] The chiropractic adjustment can be beneficial and, with proper patient positioning for comfort and relaxation, only the slightest force need

be applied to safely and successfully correct misalignment and fixation in the spine and pelvis of the pregnant chiropractic patient.

Support belts and corsets are another means to support the back. Pelvic girdle belts are used to press together the articular surfaces of the sacroiliac joints to provide stability and decrease laxity in the pelvis. Application of a pelvic belt in a high position was found to significantly decrease pelvic laxity using Doppler imaging of vibration in the prone position. [72]Studies have shown that the use of pelvic belts have been effective in relieving pain.[8,72] A pelvic belt is often the most prevalent therapy, although women do not rate it as the most effective therapy available.[6]

Opoid medications can be prescribed for severe pain. Care must be taken to limit the dose to avoid opoid withdrawal in the newborn. In one case, physicians used an epidural administration instead of an oral route to minimize daily dosage in a woman with severe back pain due to multiple herniated discs.[72]

Simple home remedies such as heating pads and over the counter pain medication can also ease pain. Acetaminophen is an acceptable over the counter medication to relieve pain during pregnancy while aspirin and ibuprofen are not. Muscle relaxants can also be prescribed. Comfortable shoes without heels reduce symptoms and allow for more motility.

CONCLUSION

The literature reviewed highlights the prevalence and complexity of back pain in pregnancy, and, notably, in a population in the United States and throughout the world. Importantly, it has identified that pregnancy- related pain is related to sleep disturbance and this may influence the patient's quality of life. Taken together with the current understanding of chronic musculoskeletal pain and that no other population has more chronic LBP than women who have been pregnant, back pain in pregnancy can no longer be considered normal.

Although chiropractic care typically includes the care of pregnant patients, the research literature is sparse. Biomechanical changes and stress to the neuromusculoskeletal system are present during and immediately after pregnancy. Chiropractic evaluation and treatment during this period may be warranted and

considered a safe and effective means of treating common musculoskeletal symptoms that many pregnant patients encounter. There is evidence that chiropractic with exercise may greatly improve low back pain in pregnancy, but more studies are needed to support this claim.

References

1. Svensson HO, Andersson GB, Hagstad A, Jansson PO. The relationship of low-back pain to pregnancy and gynecologic factors. Spine 1990;15:371–5.

2. Fast A, Shapiro D, Ducommun EJ, Friedmann LW, Bouklas T, Floman Y. Low back pain in pregnancy. Spine 1987;12:368–71.

3. Mogren IM, Pohjanen AI. Low back pain and pelvic pain during pregnancy: prevalence and risk factors. Spine 2005;30(8):983–91.

4. O¨ stgaard HC, Andersson GB, Karlsson K. Prevalence of back pain in pregnancy. Spine 1991;16:549–52.

5. Stapleton DB, MacLennan AH, Kristiansson P. The prevalence of recalled low back pain during and after pregnancy: a south Australian population study. Aust N Z J Obstet Gynaecol 2002;42(5):482–5.

6. Mogren IM. Previous physical activity decreases the risk of low back pain and pelvic pain during pregnancy. Scand J Public Health 2005;33(4):300–6.

7. Mogren I: Perceived health, sick leave, psychosocial situation, and sexual life in women with low back pain and pelvic pain during pregnancy. *Acta Obstet Gynecol Scand* 2006, 85(6):647-56.

8. Mens JM, Vleeming A, Stoeckart R, Stam HJ, Snijders CJ: Understanding peripartum pelvic pain. Implications of a patient survey. *Spine* 1996, 21(11):1363-9. discussion 1369–70

9. Larsen EC, Wilken-Jensen C, Hansen A, Jensen DV, Johansen S, Minck H, *et al.*: Symptom-giving pelvic girdle relaxation in pregnancy. I: Prevalence and risk factors. *Acta Obstet Gynecol Scand* 1999, 78(2):105-10.

10. Ostgaard HC, Roos-Hansson E, Zetherstrom G: Regression of back and posterior pelvic pain after pregnancy. *Spine* 1996, 21(23):2777-80.

11. Turgut F, Turgut M, Cetinsahin M: A prospective study of persistent back pain after pregnancy. *Eur J Obstet Gynecol Reprod Biol* 1998, 80(1):45-8.

12. Mogren IM: BMI, pain and hyper-mobility are determinants of long-term outcome for women with low back pain and pelvic pain during pregnancy. *Eur Spine J* 2006, 15(7):1093-102.

13. Ostgaard HC, Zetherstrom G, Roos-Hansson E: Back pain in relation to pregnancy: a 6-year follow-up. *Spine* 1997, 22(24):2945-50.

14. Noren L, Ostgaard S, Johansson G, Ostgaard HC: Lumbar back and posterior pelvic pain during pregnancy: a 3-year follow-up. *Eur Spine J* 2002, 11(3):267-71.

15. Nilsson-Wikmar L, Pilo C, Pahlback M, Harms-Ringdahl K: Perceived pain and self-estimated activity limitations in women with back pain post-partum. *Physiother Res Int* 2003, 8(1):23-35.

16. Stapleton DB, MacLennan AH, Kristiansson P. The prevalence of recalled low back pain during and after pregnancy: a South Australian population survey. Aust N Z J Obstet Gynaecol 2002;43:482-5.

17. Gutke A, Ostgaard HC, Oberg B. Pelvic girdle pain and lumbar pain in pregnancy: a cohort study of the consequences in terms of health and functioning. Spine 2006;31:E149-56.

18. Sihvonen T, Huttunen M, Makkonen M, Airaksinen O. Functional changes in back muscle activity correlate with pain intensity and prediction of low back pain during pregnancy. Arch Phys Med Rehabil 1998;79:1210-2.

19. Skaggs CD, Prather H, Gross G, George JW, Thompson PA, Nelson DM. Back and pelvic pain in an underserved United States pregnant population: a preliminary descriptive survey. J Manipulative Physiol Ther 2007;30:130-4.

20. Stuge B, Hilde G, Vollestad N: Physical therapy for pregnancy related low back and pelvic pain: a systematic review. *Acta Obstet Gynecol Scand* 2003, 82:983-990.

21. Sandler SE. The management of low back pain in pregnancy. Manual Ther 1996;1:178–85.

22. Botsford DJ, Esses SI, Oglivie-Harris DJ. In vivo indurnal variation in intervertebral volume and morphology. Spine 1994;19:935–40.

23. Rodacki CL, Fowler NE, Rodacki AL, Birch K. Stature loss and recovery in pregnant women with and without low back pain. Arch Phys Med and Rehab 2003;84(4):507–12.

24. Dumas GA, Reid JG, Wolfe LA, Griffin MP, McGrath MJ. Exercise, posture, and back pain during pregnancy, Part 1. Exercise and back pain. Clin Biomech 1995;10(2):104–9.

25. MacLennan AH, Nicolson R, Green RC, Bath M. Serum relaxin and pelvic pain of pregnancy. Lancet 1986;ii:243–5.

26. Albert H, Godskesen M, Westergaard JG, Chard T, Gunn L. Circulating levels of relaxin are normal in pregnant women with pelvic pain. Eur J Obstet Gynecol Reprod Biol 1997;74:19–22.

27. Hansen A, Jensen DV, Larsen E, Wilken-Jensen C, Pedersen LK. Relaxin is not related to symptom-giving pelvic girdle relaxation in pregnant women. Acta Obstet Gynecol Scand 1996;75:245–9.

28. Fast A, Weiss L, Parich S, Hertz G. Night backache in pregnancy hypothetical pathophysiological mechanisms. Am J Phys Med Rehab 1989;68:227–9

29. Orvieto R, Achiron A, Ben-Rafael Z, Gelernter I, Achiron R. Low back pain of pregnancy. Acta Obstet Gynecol Scand 1994; 73(3):209–14.

30. Kristiansson P, Sva¨rdsudd K, von Schoultz B. Back pain during pregnancy. Spine 1996;6:702–9.

31. Berg G, Hammar M, Moller-Neilsen J, Linden U, Thorblad J. Low back pain during pregnancy. Obstet Gynecol 1988;71:71–5.

32. Nore´n L, O¨ stgaard S, Neilsen T, O¨ stgaard HC. Reduction of sick leave for lumbar back and posterior pelvic pain in pregnancy. Spine 1997;22(18):2157–60.

33. Damen L, Buyruk HM, Gu¨ler-Uysal F, et al. Pelvic pain during pregnancy is associated with asymmetric laxity of the sacroiliac joints. Acta Obstet Gynecol Scand 2001;80:1019–24.

34. Mens JMA, Vleeming A, Snijders CJ, Stam HJ, Ginai AZ. The active straight leg raising test and mobility of pelvic joints. Eur Spine J 1999;8:468–73.

35. Mens JMA, Vleeming A, Snijders CJ, Ronchetti I, Ginai AZ, Stam HJ. Responsiveness of outcome measurements in rehabilitation of patients with posterior pelvic pain since pregnancy. Spine 2002;27:1110–5.

36. Van De Pol G, De Leeuw JRJ, Van Brummen HJ, Bruinse HW, Heintz APM, et al. The pregnancy mobility index: a mobility scale during and after pregnancy. Acta Obstet Gynecol Scand 2006;85(6):647–56.

37. Albert H, Godskesen M, Westergaard J. Evaluation of clinical tests used in classification procedures in pregnancy-related pelvic joint pain. Eur Spine J 2000;9:161–6.

38. Timins J. Pregnancy and medical radiation: part I. J Women's Imaging 2002;4(1):31–2.

39. Doll R, Wakeford R. Risk of childhood cancer from fetal irradiation. Br J Radiol 1997;70:130–9.

40. Hellawell GO, Cowan NC, Holt SJ, Mutch SJ. A radiation perspective for treating loin pain in pregnancy by double-pigtail stents. BJU Int 2002;90(9):801–8.

41. Walde J: Obstetrical and gynaecological back and pelvic pains, especially those contracted during pregnancy. *Acta Obstet Gynecol Scand* 1962, 41:11-53.

42. Albert H, Godskesen M, Westergaard J: Prognosis in four syndromes of pregnancy-related pelvic pain. *Acta Obstet Gynecol Scand* 2001, 80:505-510.

43. Ostgaard HC, Zetherström G, Roos Hansson E: The posterior pelvic pain provocation test in pregnant women. *Eur Spine J* 1994, 3:258-260.

44. Mens JM, Vleeming A, Snijders CJ, Koes BW, Stam HJ: Reliability and validity of the active straight leg raise test in posterior pelvic pain since pregnancy. *Spine* 2001, 26:1167-1171.

45. Hansen A, Jensen D, Wormslev M, Minck H, Johansen S, Larsen E, Wilken-Jensen C, Davidsen M, Hansen T: Symptom-giving pelvic girdle relaxation in pregnancy II:Symptoms and clinical signs. *Acta obstetricia et gynecologica scandinavica* 1999, 78:111-115.

46. Waddell G: Diagnostic triage. In *The Back Pain Revolution Volume Chapter 2*. Edinburgh, London, New York, Philadelphia, Sysney, Toronto, Churchill Livingstone; 1998:9-26.

47. Linton SJ, Boersma K: Early identification of patients at risk of developing a persistent back problem: the predictive validity of the Orebro Musculoskeletal Pain Questionnaire. *Clin J Pain* 2003, 19:80-86.

48. Bongers PM, de Winter CR, Kompier MA, Hildebrandt VH: Psychosocial factors at work and musculoskeletal disease. *Scand J Work Environ Health* 1993, 19:297-312.

49. Stuge B, Laerum E, Kirkesola G, Vollestad N: The efficacy of a treatment program focusing on specific stabilizing exercises for pelvic girdle pain after pregnancy: a randomized controlled trial. *Spine* 2004, 29:351-359.

50. Pennick VE, Young G. Interventions for preventing and treating pelvic and back pain in pregnancy. Cochrane Database of Syst Rev 2007; Issue 2. Art No.: CD001139. DOI:10.1002/14651858.CD001139.pub2.

51. Perkins J, Hammer RL, Loubert PV. Identification and management of pregnancy-related low back pain. J Nurs Midwifery 1998;43:331-40.

52. Miller J, Stevens P, Worthington S. Is chiropractic care beneficial to help alleviate the musculoskeletal pain of pregnancy? Eur J Chiropr 2003;51:117-23.

53. Borggren CL. Pregnancy and chiropractic: a narrative review of the literature. J Chiropr Med 2007;6:70-4.

54. Wahlqvist ML: Physical activity for health: an overview. *World Rev Nutr Diet* 2005, 95:62-72.

55. Aaron DJ, Jekal YS, LaPorte RE: Epidemiology of physical activity from adolescence to young adulthood. *World Rev Nutr Diet* 2005, 94:36-41.

56. Borg-Stein J, Dugan SA, Gruber J: Musculoskeletal aspects of pregnancy. *Am J Phys Med Rehabil* 2005, 84(3):180-92.

57. Da Costa D, Rippen N, Dritsa M, Ring A: Self-reported leisuretime physical activity during pregnancy and relationship to psychological well-being. *J Psychosom Obstet Gynaecol* 2003, 24(2):111-9.

58. Clarke PE, Gross H: Women's behaviour, beliefs and information sources about physical exercise in pregnancy. *Midwifery* 2004, 20(2):133-41.

59. Ning Y, Williams MA, Dempsey JC, Sorensen TK, Frederick IO, Luthy DA: Correlates of recreational physical activity in early pregnancy. *J Matern Fetal Neonatal Med* 2003, 13(6):385-93.

60. Blum JW, Beaudoin CM, Caton-Lemos L: Physical activity patterns and maternal well-being in postpartum women. *Matern Child Health J* 2004, 8(3):163-9.

61. Treuth MS, Butte NF, Puyau M: Pregnancy-related changes in physical activity, fitness, and strength. *Med Sci Sports Exerc* 2005, 37(5):832-7.

62. Brown W: The benefits of physical activity during pregnancy. *J Sci Med Sport* 2002, 5(1):37-45.

63. Artal R, O'Toole M: Guidelines of the American College of Obstetricians and Gynecologists for exercise during pregnancy and the postpartum period. *Br J Sports Med* 2003, 37(1):6-12.

64. Sampselle CM, Seng J, Yeo S, Killion C, Oakley D: Physical activity and postpartum well-being. *J Obstet Gynecol Neonatal Nurs* 1999, 28(1):41-9.

65. Garshasbi A, Faghih Zadeh S. The effect of exercise on the intensity of low back pain in pregnant women. Spine 2005;30(8):983–91.

66. Granath AB, Hellgren MSE, Gunnarsson RK. Water aerobics reduces sick leave due to low back pain during pregnancy. JOGNN 2006;35(4):465–71.

67. Kihlstrand M, Stenman B, Nilsson S, Axelesson D. Water-gymnastics reduced the intensity of back/low back pain in pregnant women. Acta Obstet Gynecol Scand 1999;7:180–5.

68. O¨ stgaard HC, Zetherstro¨m G, Roos-Hansson E. Regression of back and posterior pelvic pain after pregnancy. Spine 1997;22(24):2945–50.

69. Eisenberg DM, Davis RB, Ettner SL, Appel S, Wilkey S, Van Rompay M, Kessler RC. Trends in alternative medicine use in the United States, 1990–1997: results of a follow-up national survey. JAMA 1998;280:1569–75.

70. Wang SM, DeZinno P, Fermo L, William K, Caldwell-Andrews AA, Bravemen F, Kain ZN. Complementary and alternative medicine for low-back pain in pregnancy: a cross-sectional survey. J Alt Comp Medicine 2005;11(3):459–64.

71. Skaggs CD, Gross G, Ducar D, Thompson PA, Nelson DM. A comprehensive musculoskeletal management program reduces pain and disability in pregnancy. J Chiropr Educ 2005;19:31-2.

72. Diakow RP, Gadsby TA, Gadsby JB, Gleddie JG, Leprich DJ, Scales AM. Back pain during pregnancy and labor. J Manipulative Physiol Ther 1991;14:116-8.

73. Lisi AJ. Chiropractic spinal manipulation for low back pain of pregnancy: a retrospective case series. J Midwifery Womens Health 2006;51:e7-e10.

74. Guadagnino MR. Spinal manipulative therapy for 12 pregnant patients suffering from low back pain. Chiropr Tech 1999;11: 108-11.

75. Fallon JM. The effect of chiropractic treatment on pregnancy and labor: a comprehensive study. In: Haldeman S, editor. 1991 World Chiropractic Congress: proceedings of the scientific symposium; 1991 May 4-5; Toronto, Canada. Toronto: Chiropractic Report; 1994. p. 24-5.

76. Lisi AJ. Chiropractic spinal manipulation for low back pain of pregnancy: a retrospective case series. J Chiropr Educ 2005;19:20-1.

77. Shaw G. When to adjust: chiropractic and pregnancy. J AChiropr Assoc 2003;40(11):8 - 16.

78. Dooley W. Osteopathy's contribution to prenatal care. J AmOsteopath Assoc 1946;46:6 -7.