

**THE EFFECTS OF HOLISTIC MANUAL OSTEOPATHIC THERAPY
ON PREGNANCY**

Thesis – Graduation Project

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Introduction

Pregnancy is the production of one or more offspring inside a woman. It is a meaningful time in a woman's life. The process starts with implantation (sexual intercourse or assisted reproductive technologies), follows with fetal growth and ends with birth. A normal pregnancy gestation will take about 40 weeks (10 lunar months or 266 days) from the last menstrual period. It divides into three different main stages which are termed such as:

- **First trimester:** day 1 - 14 weeks.
- **Second trimester:** 14-28 weeks.
- **Third trimester:** 28-40 weeks.

During pregnancy, a woman will experience:

- **Physical changes:** weight, postural changes, joint dysfunction, fluid retention.
- **Hormonal changes:** frequent urination, constipation, blood pressure, breast changes, mood swings, muscular changes.
- **Lifestyle changes:** professional life, sex life, diet and habits.

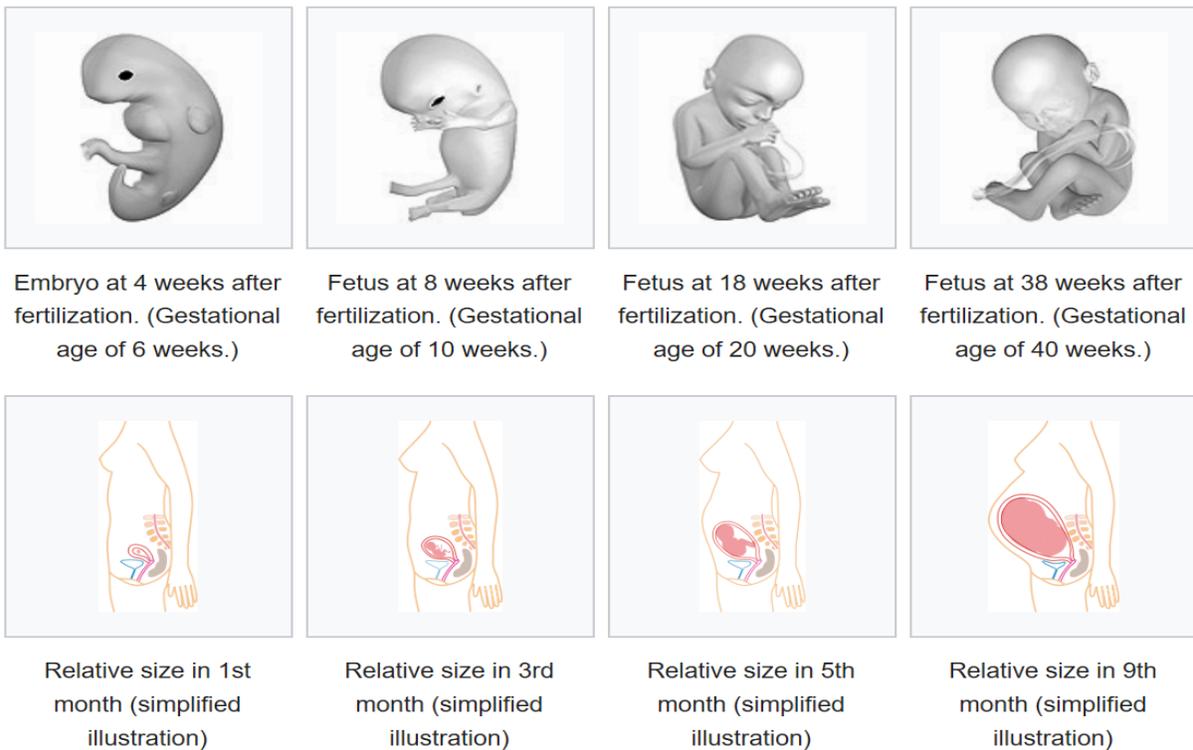
Some changes may continue for six months to one or two years after childbirth depending on how long she breast-feeds her baby. This stage is called "postpartum". Through out the pregnancy and postpartum, a woman's body will have a great "transformation" of health and appearance, which may mentally cause anxiety and depression during and after childbirth.

In the **first trimester**, symptoms differ from woman to woman, but some of the most significant symptoms are delayed or missed period, tender breasts, fatigue, nausea or morning sick, a sickly feeling of nausea which mostly leads into vomiting. These symptoms normally occur in the morning, but sometimes can occur all day long depending on individual's reaction to the pregnancy. However, these symptoms will decrease after 10 weeks of the gestation, and most of them will disappear after week 14th, but in some cases they would remain in both first and second trimesters, and sometimes, they last through the entire pregnancy. This first period of pregnancy has the greatest risk of miscarriage. Because of this reason, some certain essential oils are not allowed to be used, mobilization, muscle energy and deep fascial techniques should be avoided on the abdominal, sacral (lower back) areas to prevent any potential risk of miscarriage. In addition, care must be taken in all joint playing techniques and abdominal and lower back treatment.

Second trimester, the morning sick symptoms start to subside. The fetus starts moving and be seen in the ultrasound images between week 18-21, the mother starts to hear the heartbeats and movements of her child in her stomach and develop a motherhood awareness. By month five of the pregnancy, test results will be able to determine if there are any potential problems with the fetus. A fetus can also survive at the end of second trimester if a premature birth occurs. In second and third trimesters, many women will start to have edema in the feet and ankles, shortness of breath, heart burn, nasal congestion, back pain due to postural dysfunction (hyperlordosis) from the weight of expanding uterus, stretch marks, and hypertension/preeclampsia, eclampsia develop in some women. This is a condition which occurs

in the 20th -23rd week and can remain or become chronic after childbirth. More than 40% of the total maternal death and more than a half million babies and fetus die because of pre-eclampsia disease. So, it is a serious disease globally (health economic times india time – Sept 2017). Other complications such as ectopic pregnancy, gestational diabetes, placental abnormalities pregnant women also could experience.

Since the risk of miscarriage has decreased in this stage, after month 4th of the pregnancy, a general relaxation osteopathic soft tissue treatment, especially light strokes on the abdominal and lower back will be very efficient for both mother and baby. However, care must be taken with abdominal and lower back treatment during entire pregnancy. No aggressive joint play and mobilization techniques are applied to entire body due to increased joint laxity.



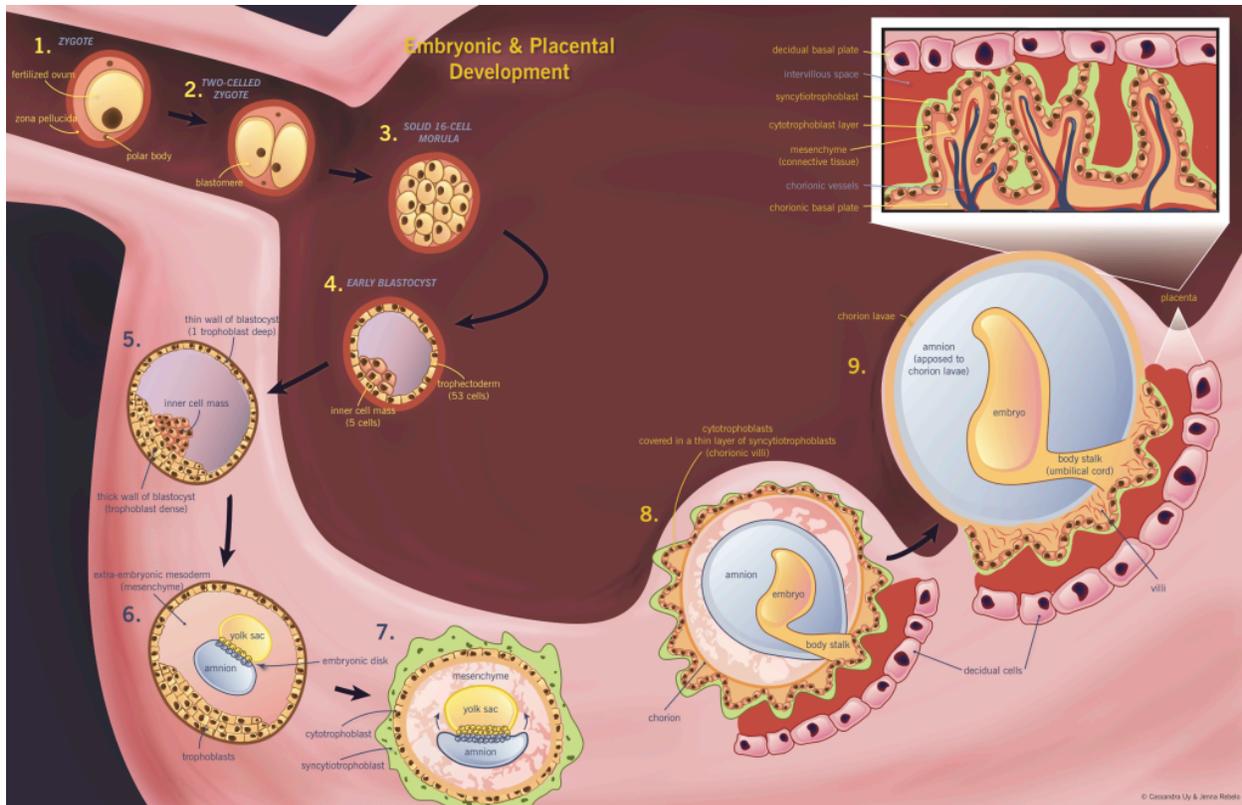
Third trimester is a unique experience for all pregnant women. This is the most uncomfortable period in the entire pregnancy. Many women will likely suffer from high blood pressure, heart burn, muscle cramps, diabetes, edema, and several kinds of pain such as: shoulder, neck, upper and back pain, hip pain, and pelvic pain. The increase in the size of uterus puts great stress on the pelvic bone causing all surrounding components such as muscles, ligaments, and bone to be painful. This pain not only makes the mother exhausted but also cause difficulty walking, sitting, or standing. It also affects the woman’s appetite, sleep and creates mood swings.

However, this can be reduced by osteopathic wellness soft tissue treatment with gentle repetitive strokes on the iliac crest, gluteus, neck, and head. Muscle energy techniques are useful in reducing muscle cramps as well as strengthening the weakened muscles during the gestation.

The treatment should be full body because at this stage the mother has aches and pain everywhere because of the growing fetus.

Etiology

Pregnancy is the reproduction of one or more newborns. It is a complicated process that has several steps. The first step of conception is the fertilization between an egg and a sperm cell. A woman's due day is calculated from the first day of her last menstrual period. Conception occurs about two weeks from this day, and that is when she is considered to be pregnant. During the menstrual cycle, one of the two ovaries matures an egg within a follicle. The hormones that are controlled by the brain cause one or two follicles to release an egg. The long finger-like projector swipes the egg into the fallopian tube. The egg travels down the fallopian tube pushed by tiny hairs. About a tea spoon of sperm entering the vagina in each ejaculation in a healthy man, containing roughly 300 million sperm. But only less than one thirds will pass into the cervix and begin their seeking journey to the eggs. Sperm are cells are made in the testicle. They are made with other fluids to become semen, which comes out of the penis during ejaculation. After being ejaculated, the sperm cells are able to travel up to six days through the cervix, uterus and into the fallopian tube to look for a matured egg that roams around during ovulation period. Despite there being millions of sperm cells in an ejaculation, most sperm will lose their way, only about 200 sperms successfully reach the egg. Fertilization occurs when one sperm penetrates the egg combining their generic material. A sperm and an egg, each contains 23 chromosomes, holding all the information that determine the baby gender and contribute to the child generic makeup including physical appearance, intelligence, and personality.



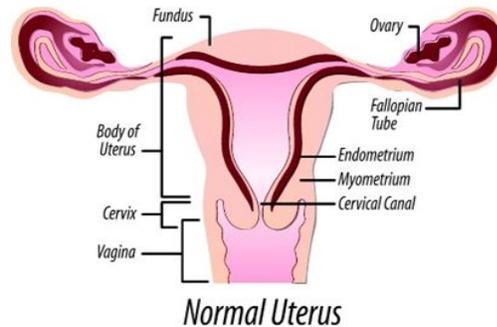
Within 24 hours of fertilization, the fertilized egg will begin the cell division process and form a ball of cells while moving down to the uterus from the fallopian tube. During this early stage, if the cell splits into 2 or more separate groups instead of remaining attached, the woman will have twins or multi-pregnancy. A few days later, by the time the ball reaches the uterus, normally it takes between three to four days, it has about 500 cells in total. After being in the uterus for three to four days, the egg will start the implantation into the uterus wall, where it develops an embryo from the cell in the ball, and a placenta outside of the ball, which nurses the developing fetus. By the 38 weeks, the fertilized egg grows into an infant that has more than two trillion cells.

Anatomy

The anatomy involved in pregnancy is the uterus or womb, which is located in the middle of the pelvis, behind the bladder and in front of the rectum. It is an inverted, pear shaped and a hollow, muscular productive organ which has three layers: the inner layer (endometrium), middle muscular layer (myometrium), and the outer layer (perimetrium). It is the link between the cervix and vagina (via the cervix), and the fallopian tube. The fundus is the upper part of the uterus, the fallopian tube attaches to the uterus just below fundus. The corpus is the main body of uterus. It is very muscular and can stretch to accommodate the growing fetus. During pregnancy, the uterus stretches and increases its size enormously to accompany the unborn baby until childbirth.

Uterus

- The major portion of the uterus is referred to as the body
- Its superior rounded region above the entrance of the fallopian tube is the fundus
- Its narrow outlet which protrudes into the vagina below is the cervix



The function of uterus during pregnancy

- Accept the fertilized ovum that passes through the fallopian tube.
- Create placenta for the development of the fetus.
- Nurtures the fetus with nutrients by developing blood vessels.
- House and nourish the fetus until it is ready for birth.
- Post delivery, shrinks back and starts preparing for the next menstrual cycle.

Pathophysiology

Pregnancy is a normal and healthy state that many women experience at some point in their lives. However, during the pregnancy gestation, women can become more susceptible to certain pathologies. Pathologies in pregnancy are a combined term that contains a list of some certain symptoms and complications in pregnancy. Most of these factors should not be serious threats to the mother and her fetus, and they should be gone after childbirth or abortion. However, symptoms in pregnancy are vary by the individual. Some lucky women have very easy pregnancies while others have to face many complications from early to later stages of the gestation or even after childbirth. The mother's health status, age, genes, and lifestyles which were before, during and after conceiving a child contribute to the development of the fetus, which determine the course of pregnancy. Young and healthy women who are under 35 years of age and have a healthy lifestyle, potentially have less complications in their pregnancies than older, overweight or the ones who already have underlying conditions before they become pregnant.

As the baby is growing, the uterus is expanding which creates weight bearing pressure on the pelvis, bladder, pubic bone as well as postural changes and shifting for balance and hormonal changes. This affect stresses the ligaments, muscles, bones around the hip and abdomen which

leads into backpain, nerve pathway compression, joint dysfunction in many women. In addition, twins or multi pregnancies are certainly more difficult for the mother as the weight is greater than single pregnancy.

Any symptoms that affect the mother and the fetus must be monitored at all times during the entire gestation before they become serious and lead into other conditions.

Common signs and symptoms are:

- **Early symptoms – first trimester**
 - Missed period
 - Tiredness
 - Implantation bleeding
 - Nausea, vomiting
 - Tender breasts
 - Mood swings
 - Back pain
 - Insomnia
 - Increase urinary frequency
 - Sensitive to scents and food
- **Later symptoms in second and third trimesters**
 - Craving for wacky food combination
 - Breast tenderness
 - Shortness of breath
 - Fatigue
 - Constipation
 - Hyperpigmentation on the skin and the linea alba
 - Stretch marks
 - Nasal congestion - snoring
 - Absentmindedness: dizzy, forgetful
 - Changes in sex drive
 - Regurgitation, heartburn, and nausea.
 - Pelvic girdle pain and back pain in the sacroiliac joint/lower back. The cause including:
 - Weight gain: where the spine supports the weight of the growing baby and uterus puts pressure on the blood vessels and nerves in the pelvis and back
 - Postural changes: weight shifting, adjusting posture in sleeping, sitting, standing and walking
 - Hormonal changes: relaxing hormones cause the ligaments, joints and pelvis to relax, leads into instability and pain
 - Muscle separation: rectus abdominis muscle separation due to uterus expansion from the growing baby
 - Stress: emotion cause muscle tension at the back, which leads into muscle hypertonicity or muscle spasm

- Edema in the feet and ankle: Compression of the inferior vena cava and pelvic veins by the uterus leads into increased hydrostatic pressure in lower extremities
- Increased urinary frequency: increased intravascular volume, elevated glomerular filtration rate, and compression of the bladder by the expanding uterus
- Varicose veins (caused by relaxation of the venous smooth muscle and increased intravascular pressure)
- Haemorrhoids (piles). Swollen veins at or inside the anal area. Caused by impaired venous return, straining associated with constipation, or increased intra-abdominal pressure)
- **Other complications**
 - Hyperemesis gravidarum (HG): severe, persistent nausea and vomiting during pregnancy. Sometimes it lasts through out the entire pregnancy
 - Miscarriage: loss from natural causes before 20 weeks – cramping or abdominal pain, vaginal bleeding, fluid or tissue passing from the vagina
 - Anemia: lower number of healthy red blood cells
 - Varicose vein: in the leg or vulva. It is painful, tender and has the potential of developing into blood clog
 - Hypertention/preeclampsia: a condition starting after weeks 20th of pregnancy that causes high blood pressure and kidney problems – high blood pressure, swelling of face and hand, too much protein in urine, stomach pain, blurred vision, dizziness, headaches
 - Eclampsia:
 - Depression: extreme sadness during pregnancy or after birth may make the mother tempted to harm self or the baby or both
 - Ectopic pregnancy: the implantation of the egg is outside of the uterus, usually in the fallopian tube - leads to abdominal pain, shoulder pain, vaginal bleeding, feeling dizzy or faint
 - Fetal problems: unborn baby has a health issue, such as down syndrome, poor grow, heart problems
 - Gestational diabetes: too high blood sugar level during pregnancy – extreme thirst, hunger, fatigue
 - Placenta previa: placenta covers part or entire opening of cervix inside of the uterus – painless vaginal bleeding during second or third trimester
 - Placental abruption: placenta separates from uterine wall before delivery, which can lead fetus into lack of oxygen – vaginal bleeding, cramping or abdominal pain, uterus tenderness
 - Preterm labor: going into labor before 37 weeks of pregnancy – increased vaginal discharge, pelvic pressure and cramping, back pain radiating to the abdomen, contractions
 - Macrosomia: excessive growth of the fetus, which can lead increase the likelihood of caesarean delivery and the risk of birth injuries

- **Infections during pregnancy**

- Urinary tract infection (UTI): bacterial infection in the urinary tract: pain or burning when urinating, frequent urination, pelvic, back, stomach pain, shaking, chills, fever, sweats => if left untreated, it can spread to the kidneys which can cause preterm labor
- Yeast infection: overgrowth of bacteria found in the vagina
- Toxoplasmosis: a parasite found in cat feces, soil, and raw or undercooked meat => if the unborn baby is infected => can cause hearing loss, blindness, or intellectual disabilities

The symptoms and their intensity of each condition above are various in individuals. Besides the ligament, bone, all of the organs may be affected during pregnancy, here are the common muscles that are being more affected:

Tight muscles

- Iliopsoas
- Quadriceps, especially rectus femoris
- Quadratus lumborum
- Pectoralis major
- Internal rotators and elevators of the shoulders: rhomboids, levator scapulae, upper trap
- Suboccipitalis
- Scalenes

Weak muscles

- Gluteals or hip extensors
- Hamstring muscles
- Abdominal muscles
- Mid and lower trapezius
- Serratus anterior
- Intercostal; ribcage muscles

The Effects of Holistic Manual Osteopathy on Pregnancy

Osteopathic manual therapy (OMT) is one of the most effective therapies in keeping health in good alignment and maintaining homeostasis. In pregnancy OMT is particularly effective because of its broad integrated and unique techniques which are very gentle and safe. Naturally, during a reproductive process, a woman must go through significant changes in her body (physically, psychologically, emotionally, socially) with different complex stages throughout the entire gestation. The richness of manual osteopathic techniques is designed for an osteopathic manual practitioner to customize a specific treatment plan, with treatment frequency for each prenatal patient's needs precisely and effectively.

Osteopathic manual therapy assists in reducing anxiety, life stress, depression, poor posture, muscular tightness, breathing difficulties, digestive disturbance, sleep deprivation, exhaustion, functional pains, preventing post-natal depression and potential chronic pain. OMT increases endorphins hormone production in the brain, which is made and stored in the anterior pituitary gland and center nervous system. Endorphins play a major role in the body's inhibitory respond to pain, stress, and enhance joy, uplifting a feeling of happiness. Since these hormones are released in response to pain, stress, physical exercise, and doing joyful activities (eating or watching a fun movie) they help in pregnancy and childbirth can go easier on the body, make the mother feel happier and healthier both physically and mentally.

Treatment recommendations

First trimester

In the first trimester of pregnancy, a woman potentially has the least physical changes but most hormonal affects. This can lead to nausea, vomiting and dizziness which causes a lot of discomfort and feeling sick. If the morning sickness is severe, sometimes it can lead into a condition called hyperemesis gravidarum (Mayo clinic)¹.

Insomnia (cannot fall asleep) often occurs in the first and third trimesters with different factors. In the first trimester, it is a result of hormonal changes, specifically due to an increase of progesterone. However, in the third trimester, it is exceedingly difficult to get comfortable due to the growing fetus and a good sleep suddenly becomes luxurious.

During the first trimester, gentle manual osteopathic soft tissue techniques and cranial therapy are mainly recommended for relaxing, circulating blood flow and soothing the patient's mood to promote sleep and better homeostasis overall.

Contraindication on the lower back for all aggressive techniques but gentle strokes for safety because miscarriages occur during the first 12 weeks of pregnancy.

Second and third trimesters

Many pregnant women complain about lower back and sciatica nerve pain during the second and third trimesters because the expanded uterus invading the hip and buttocks area. This increased pressure compresses the surrounding components which causes pain, numbness or tingling in the buttocks, lower back, and legs. The changes in the posterior pelvic, hips and sacroiliac joints directly stretch the intrapelvic structures. This can generate pain in the lower back and glutes down to the posterior thighs. Along with these symptoms, majority of women are prone to leg swelling during these periods because of water increases of 6 to 8 liters (4 to 6 liters of which are extracellular, of which at least 2 to 3 liters are interstitial (National Library of Medicine)

Proximately 50-80% of pregnant patients complain about lower back and pelvic pain. One-third of them reported that lower backpain is a concerned problem (Current Reviews in

¹ <https://pubmed.ncbi.nlm.nih.gov/9185112/>

Musculoskeletal Medicine)², but challenges persist in identifying safe, effective treatment options. For instance, most pain medications are not safe during pregnancy, leaving few options for pain relief.

Due to the discomforts of hormonal, postural and weight change, as well as mood swings, muscle energy techniques can be combined with soft tissue massage to reduce the hypertonicity, spasm or cramps, and strengthen the hypotonicity in the tissues to manage pain and maintain and/or restore balance. Similarly, gentle joint mobilization can be used on the neck and upper thoracic spines to reduce tightness and soreness from the bad posture due to weight gain and one-sided sleeping (mainly on the left side). In addition, leg swelling can be reduced for comfort, increase range of motion and better function by manual lymphatic drainage techniques. Cranial osteopathic therapy can also be used to relax and/or unclog the fluid flow obstructions in the shoulders and neck that may have been caused by bad posture, which creates headaches and soreness in the muscles that are being innervated by the compressed nerve underneath. Gentle muscle energy techniques can stretch tight muscles and strengthen weak muscles at the same time, keeping the joints in alignment.

Conclusion

Humans are a combination of body, mind, and spirit and the interrelation between function and structure (one cannot live healthily without the other). Going through a complex process of making another human, women sacrifice parts of their lives to accomplish this precious duty. Pregnancy and new motherhood bring significant physical, emotional, psychological, and social changes, and it is essential that women are supported and cared for throughout this period of transition. For this reason, osteopathic manual therapy should be the first chosen remedial therapy because it is a structural correction treatment that controls the bodies function, which results in a holistic conservative option for pain relief in pregnancy. This helps to increasing comfort, circulation related to function, and keeping a woman's health in good alignment. A regular OMT treatment during the pregnancy will benefit the homeostasis in women's health, including, but not limited to better sleep, maintaining good posture, circulating blood flow, managing and improving mood, pain reduction and/or prevention.

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