

## **Nursing 201 – Nursing Care of Special Populations Anatomy and Physiology of Pregnancy**

- Demands are made on the mother by the fetus for nutrition, respiration, excretion, and physiologic adaptation.
- Systems are interdependent, in that a change in one system often causes a change in another.

### **Reproductive System**

- Increased levels of estrogen and progesterone are produced first by the corpus luteum for the first 6-10 weeks of pregnancy
- Placenta then takes over as the primary source of estrogen and progesterone
- Ovulation ceases due to suppression of FSH and LH
- Menstrual cycle ceases, most experience amenorrhea
- Some experience slight painless spotting during early gestation
- hCG pregnancy hormone is produced by the fertilized ovum and chorionic villi to maintain corpus luteum's production of estrogen and progesterone until placenta takes over

### **Development of the Placenta**

- Placenta begins to form at implantation, forms from the trophoblast cells of the chorionic villi
- Supplies O<sub>2</sub>, nutrients, serves as waste removal organ
- Maternal-placental-embryonic circulation is in place by day 17 (week 3) after conception
- Produces 4 vital hormones for pregnancy: hCG, progesterone, estrogen, hPL
- Takes over the job the corpus luteum had been doing during the early pregnancy around week 12

### **Structural Changes during Pregnancy**

- Ovaries- ovum production ceases as there is suppression of FSH and LH
- Uterus- Before pregnancy, small semisolid pear-shaped organ.

Enlargement of uterus due to hypertrophy of pre-existing muscle fibers and fibroelastic tissue, hyperplasia which is a new production of muscle fibers and tissues, increased vascularity, and dilation of blood vessels within the uterus

- Weight and size of uterus increase drastically
- During 1<sup>st</sup> trimester uterus is a pelvic organ, by 12 weeks it rises into abdomen
- As uterus enlarges more tension on broad and round ligaments
- Uterine blood flow increased greatly during pregnancy and is responsive to C.O.
- Uterine blood flow can be altered with uterine contractions, low maternal arterial pressure, and maternal supine positioning

- Cervix- firm, closed structure to maintain the pregnancy, then changes to a soft and highly elastic tissue capable of dilation during labor and birth
  - Pelvic congestion and edema occur during pregnancy
  - Mucus by endocervical cells increase= mucus plug forms
- Vagina- mucosa thickens, connective tissue loosens, vaginal vault lengthens, structure enlarges
  - Increased vascularity causes color changes to vagina and cervix- bluish tinge
  - Leukorrhea discharge increases due to estrogen and progesterone
  - Microbiome of vagina changes- lower ph of secretions; favorable for yeast infection
- Breasts
  - Fullness, heaviness begins early in pregnancy due to increased estrogen and progesterone
  - Darkening of the areola and nipples, veins superficially prominent
  - Estrogen stimulates growth and proliferation of milk ducts
  - Progesterone causes growth and development of mammary lobes
  - Prolactin stimulates production of colostrum, hPL stimulates colostrum secretion
- Metabolic system
  - Basal metabolic rate (BMR): increases as well as appetite
  - Skin requires increase BF to dissipate heat generated by increased metabolism
- Respiratory System
  - ↑ oxygen requirements during pregnancy, increased o<sub>2</sub> consumption
  - ↑tidal volume, i.e. deeper breaths as there is less airway resistance
  - ↑ respiratory minute volume (*volume of air inspired/expired in 1 minute*)
  - Greater awareness of breathing, no real difference in RR
  - Breathing changes from abdominal to thoracic- chest breathing
  - Nasopharyngeal edema= nasal stuffiness, nosebleeds
- Cardiovascular system
  - Pregnancy creates a hypervolemic state!
  - There is increase in blood volume of approx 40-50%.
  - Increased blood volume is a protective mechanism.
  - C.O increases 30-50%
  - Pulse increases
  - BP remains same or drops a little due to reduced systemic vascular resistance
  - Vena cava syndrome- compression of the vena cava reduces C.O.
  - Pressure of the gravid uterus- can cause edema, varicose veins, hemorrhoids
- Hematologic changes
  - Physiologic anemia of pregnancy – aka psuedoanemia- results from increased blood plasma which is greater than the increase in RBC production= State of hemodilution.
  - Anemia- diagnosed if hgb is < 11 or hct is < 33% during the first or third trimester, or if during the second trimester hgb < 10.5 or hct < 32% as a general rule, but can be adjusted depending on the case
  - WBCs – increases during 2<sup>nd</sup> trimester and peaks at 3<sup>rd</sup>.

- Clotting Factors – Pregnancy is a slightly hypercoagulable state. Increase in fibrin & fibrinogen- at risk for blood clots
- Gastrointestinal System
  - Major change: decrease in peristalsis. Delayed gastric motility and gastric emptying. Delayed gallbladder emptying. Relaxation of the sphincter between esophagus and stomach =heartburn.
  - Nausea, vomiting, ptialism
- Renal System
  - Kidneys become heavier and larger
  - Bladder affected by position of uterus- causes urinary frequency in 1<sup>st</sup>/3<sup>rd</sup> trimester
  - Ureters dilate due to hormones- urine stasis occurs
  - Renal blood flow increases and there is an increase in GFR
  - Glycosuria: may see this due to kidneys inability to reabsorb all glucose filtered
- Musculoskeletal System
  - Postural changes:
  - Diastasis Recti – Vertical separation of the rectus abdominis muscle
- Integumentary System
  - Facial Chloasma- mask of pregnancy, pigmentation changes
  - Striae- stretch marks
  - Linea Nigra- pigmented line from umbilicus to pubic area
- Immunologic System
  - ↑ Susceptibility to bacterial & viral infections
  - Major maternal serum immunoglobulin – IgG which crosses placenta
  - Other- IgM does not cross placenta
- Endocrine System
  - Thyroid gland: enlarges and produces higher t3 t4 levels. BMR increases
  - Pituitary gland: enlarges and responsible for prolactin level increase
- Pancreas
  - After 1<sup>st</sup> trimester insulin needs increase for mom
  - Hormones of pregnancy protect fetus and allow adequate glucose supply

### Hormone Review

- Human chorionic gonadotropin (hCG): source is the fertilized ovum and chorionic villi
  - Maintains corpus luteum production of estrogen & progesterone until placenta takes over and produced at implantation
  - Implicated in the cause of morning sickness
  - Basis for pregnancy tests- should double in amount every 2 days for first few weeks of pregnancy (~4)
- Estrogen: source is the corpus luteum until placenta takes over
  - Suppresses FSH & LH secretion
  - Causes maternal fat stores during pregnancy
  - Promotes enlargement of genitals, uterus, breasts
  - Relaxes pelvic ligaments and joints
  - Promotes retention of sodium and water to maintain balance during pregnancy
  - Decreases mother's ability to use insulin
- Progesterone: source is the corpus luteum until placenta takes over

- Suppresses FSH & LH secretion
- Maintains pregnancy by relaxing smooth muscles and decreasing uterine contractility
- Causes maternal fat stores during pregnancy
- Decreases mother's ability to use insulin
- Human placental lactogen (hPL): source is the placenta
  - Prepares the body for lactation.
  - Stimulates development of breast and milk production
  - Stimulates fetal growth
- Prolactin: source anterior pituitary gland
  - Stimulates breast growth, necessary for milk production
  - After delivery, prolactin levels diminish in 1 week if not breast-feeding
  - Inhibits ovulation during breast feeding by inhibiting release of LH

### **Discomforts of Pregnancy**

- Fatigue- 1<sup>st</sup> & 3<sup>rd</sup> trimester. Due to hormones, anemia, increased BMR, disrupted sleep.
- Urinary Frequency- Growing uterus putting pressure on the bladder in first trimester, then in 3<sup>rd</sup> large fetal size pressure on bladder. 2<sup>nd</sup> trimester= temporary relief
- Breast Tenderness- Due to changes from engorgement, milk lobe development.
- Nausea and Vomiting- food aversion, morning vomiting, all day vomiting. hCG
- Ptyalism-Increased saliva, cause unknown
- Food Cravings- Common in pregnancy. PICA is a warning sign (eating strange items like laundry sheets)
- Vaginal Discharge- leukorrhea, may get a yeast infection
- Nasal Stuffiness & Epistaxis- Edema of the nasal mucosa r/t hormones
- Heartburn- hormones cause relaxation of smooth muscles, reflux can occur
- Varicose Veins- Due to decreased venous return b/c of gravid uterus
- Constipation-more smooth muscle relaxation, reduced peristalsis lead to this
- Hemorrhoids- From pressure of gravid uterus and constipation.
- Carpal Tunnel Syndrome- compression of the median nerve from edema, increased blood volume, causes numbness to fingers
- Leg Cramps- Most often at night, unsure why. Maybe pressure on nerves
- Faintness- Due to blood volume changes. Blood pools in dependent veins, postural hypotension can occur if quick position changes occur or if pt gets too hot.
- Difficulty Sleeping- due to physical discomfort of growing body, anxiety, frequent urination etc.
- Round Ligament Pain- Round ligaments stretch to support uterus as it enlarges. Described as a grabbing sensation in lower abd.
- Ankle Edema- due to poor venous return, increased blood volume, warm weather
  - Report to MD if accompanied by headache, vision changes, increased BP
- Headache- due to increased blood volume on cerebral arteries, stress, fatigue.

### **Sexuality in Pregnancy**

- Sexuality is a human need
- In a normal pregnancy with no risk factors, there is no indication or need for sexual abstinence
- May have to change sexual positions, may have to reduce number of encounters, may have body changes that make the woman tender in her breasts or perhaps with constant back pain-but do not need to abstain if mother is comfortable.
- Gentle intercourse is ok, as long as it's not uncomfortable.
- Couples should communicate fears, wants, needs with each other and the health team
- Pregnant women sometimes have increased needs for touch, cuddling and affection-reassure woman it's a normal feeling.
- Some pregnant women feel like they are unattractive= Need support reassurance from partner
- Sexual intercourse contraindicated for: a partner with risk of STD's, uterine bleeding, history of abortion, history of premature birth, placenta Previa, poor obstetric history or history of premature rupture of membranes
- Encourage couple to only resume sexual intercourse postpartum once cleared by MD.