

The Fetal Skull

Bikila (MSc.)

The fetal skull

- The fetal head is large in relation to the fetal body compared with the adult
- It is largest part of the fetal body to be born
- Adaptation b/n the **skull and pelvis** is necessary to allow the head to pass through the pelvis without complications.
- The **bones of the vault are thin and pliable** and if subjected to great pressure, damage to the brain may occur.

Divisions of the fetal skull

- **Vault:-** large, dome shaped part above an imaginary line drawn between the orbital ridges and the nape of the neck.
- **Face:-** is composed of united small bones
- **Base:-** comprises bones that are firmly united to protect the vital centers in the medulla

Bones of the vault

- Bones of the vault are not ossified at birth, leaving a small gaps between the bones, known as the sutures, and fontanelles.
- Ossification is not complete until early adulthood.

The bones of the vault

- The *occipital bone* lies at the back of the head.
- The *two parietal bones* lie on each side of the skull.
- The two frontal bones form the forehead or sinciput.
- The upper part of the *temporal bone* on both sides of the head forms part of the vault.

Sutures and fontanelles

- The *sutures* are the cranial joints formed where two bones meet
- Where two or more sutures meet, a *fontanelle* is formed
- The *lambdoidal suture* separates the occipital bone from the two parietal bones
- The sagittal suture lies between two parietal bones
- The *coronal suture* separates the frontal bones from the parietal bones
- The *frontal suture* runs b/n halves of the frontal bones.

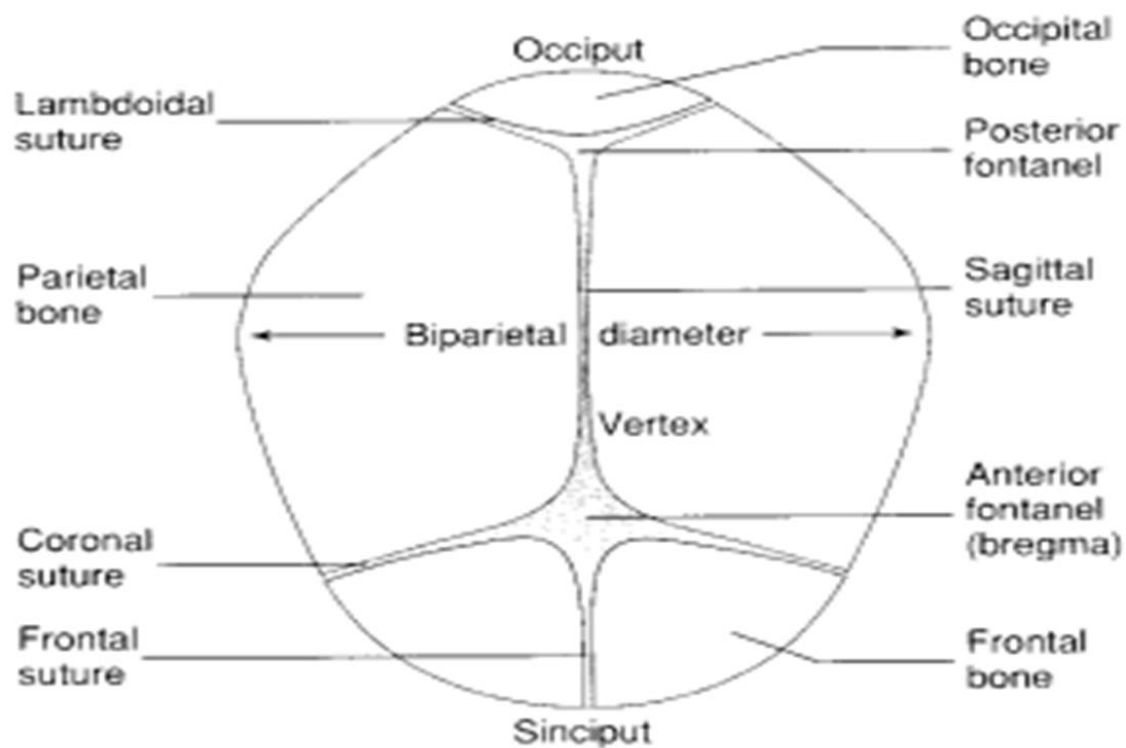


FIGURE 26-8 Fetal skull: Landmarks, bones, fontanelles, sutures, and biparietal diameter.

- **The *posterior fontanelle* or lambda (λ):**
 - situated at the junction of lambdoidal and sagittal sutures.
 - It is small, triangular in shape
 - can be recognized vaginally
 - Closes by 6 weeks
- **Anterior fontanelle/bregma:**
 - At the junction of sagittal, coronal and frontal sutures.
 - Broad, diamond shaped
 - Can be recognized vaginally
 - Closes by 18 months of age

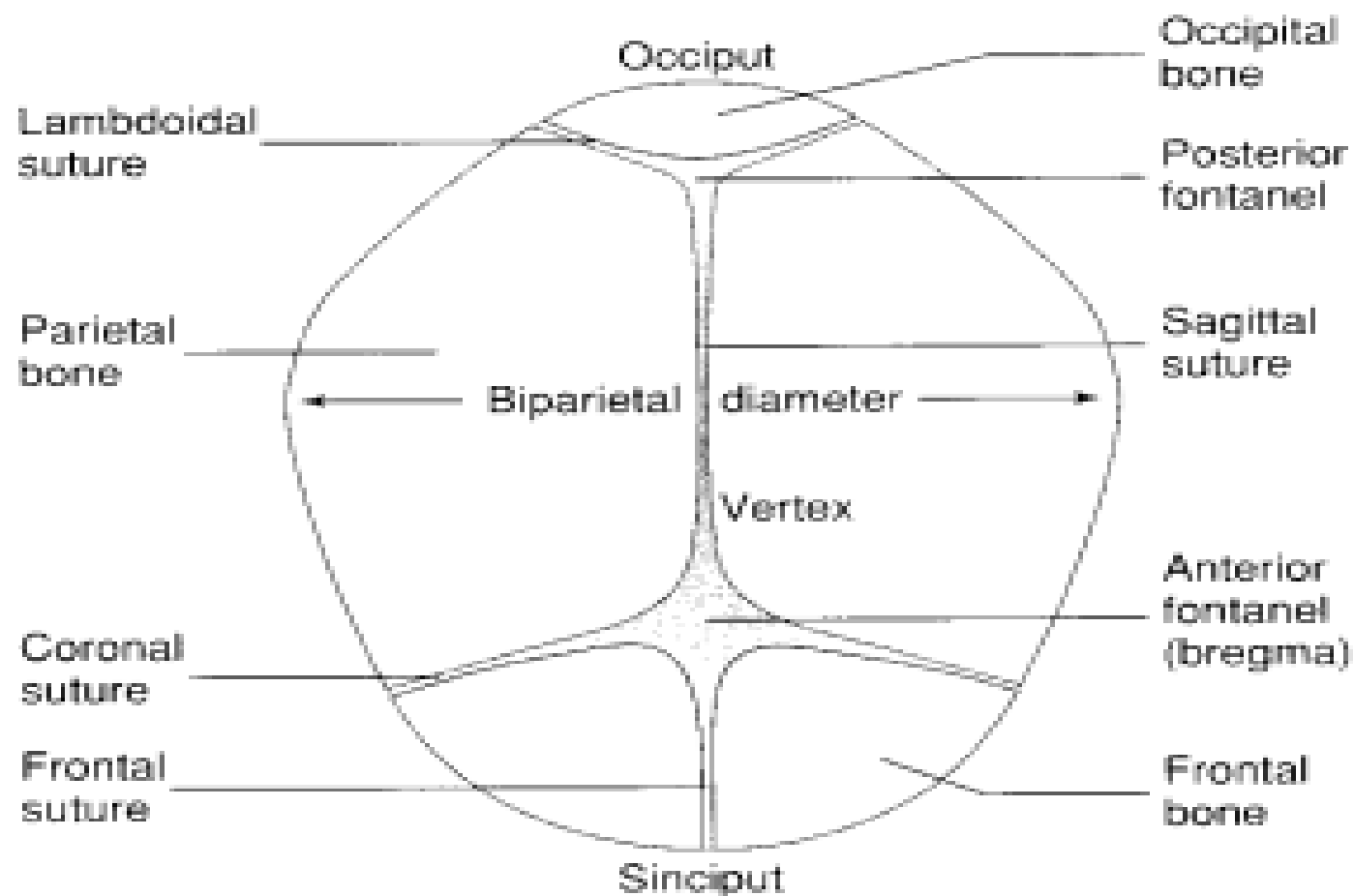


FIGURE 26-8 Fetal skull: Landmarks, bones, fontanels, sutures, and biparietal diameter.

Diameters of the fetal skull

- Purpose: determine the relationship between the fetal head and the mother's pelvis
- There are longitudinal and transverse diameters
- Longitudinal:-
- *Sub-occipitobregmatic* (SOB) diameter (9.5cm)
measured from below the occipital protuberance to the center of anterior fontanelle/bregma.

- *Sub-occipitofrontal* (SOF) diameter (10cm) measured from below the occipital protuberance to the center of the frontal suture.
- *Occipitofrontal* (OF) diameter (11.5cm), measured from the occipital protuberance to the glabella
- *Mentovertical* (MV) diameter (13.5cm) measured from the point of the chin to the highest point on the vertex
- *Transverse* diameter
- *Biparietal* diameter (9.5 cm) the diameter between the two parietal eminences.
- *Bitemporal* diameter (8.2cm):- b/n the furthest pts of the coronal suture at the temples

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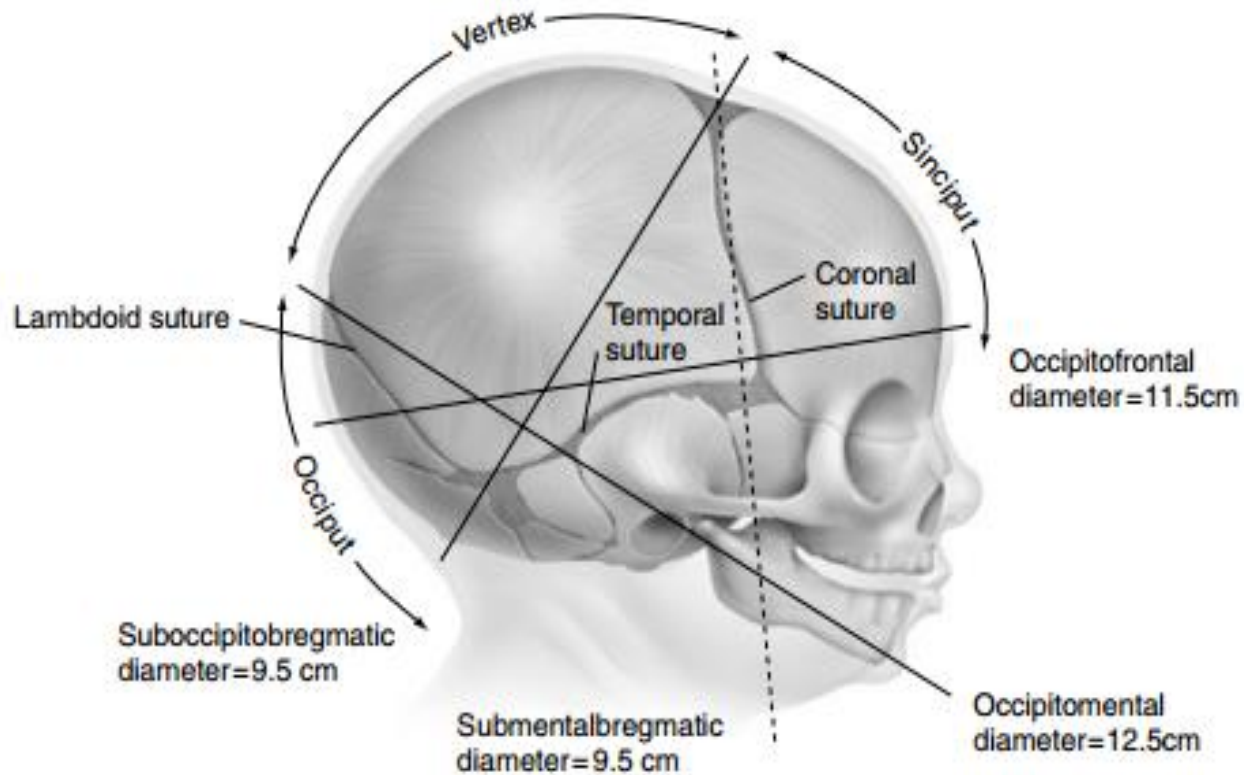


FIGURE 28-3 Diameters of the term fetal head.

Diagnosis of pregnancy

Diagnosis of Pregnancy

Objectives:

- ⊕Assure couples
- ⊕Prevent exposure
- ⊕Antenatal care

Cont'd

- The reproductive period in women is between menarche to menopause, usually 13-45 years of age.

Youngest: 5 years and seven months

Oldest: 63 years

- ✓ Pregnancy (gestation) is the maternal condition of having a developing fetus in maternal body.

Cont'd

- Normal duration of gestation is **280 days** (40 completed weeks) or 10 lunar months.

Preterm: < 37 weeks

Term : 37-42 weeks

Post term: > 42 weeks

- Normal pregnancy is divided into three equal trimesters

1st Trimester: 1- 14 weeks

2nd Trimester: 14-28 weeks

3rd Trimester: 28- 42 weeks

- Gestational age Vs fertilization(ovulatory) age

- ✓ Gravidity, parity, grand multiparity, greatgrand multi.

Cont'd

Differential diagnosis

- Uterine fibroids
- Ovarian cysts
- Hematometra
- Ascites
- Full bladder
- Pseudocyesis

Cont'd

- The diagnosis of pregnancy usually begins when a woman presents with **symptoms**, and possibly a positive home urine pregnancy test.
- Typically, such women receive **confirmatory** testing for human chorionic gonadotropin (HCG) in urine or blood.
- ❖ The manifestations of pregnancy are classified into three groups: **presumptive, probable, and positive.**

1. Presumptive manifestations

Amenorrhea: *amenorrhea is a fairly reliable sign of conception in women with regular menstrual cycles.*

- *In women with irregular cycles, amenorrhea is not a reliable sign*

Nausea and Vomiting :

- This common symptom occurs in approximately **50% of pregnancies** and is most marked at **2–12 weeks' gestation.**
- ✓ Extreme nausea and vomiting may be a sign of **multiple gestation or molar pregnancy.**

Fatigue: Due to the **soporific (tedious) effects of progesterone**

Cont'd

🦋 Mastodynia

- Mastodynia, or **breast tenderness**, may range from tingling to frank pain caused by hormonal responses of the mammary ducts and alveolar system.
- **Circulatory increases result in breast engorgement** and venous prominence. Similar tenderness may occur just before menses.

🦋 Montgomery's Tubercles

- Enlargement of Circum lacteal **Sebaceous Glands** of the Areola (Montgomery's Tubercles)
- Enlargement of these glands occurs at **6–8 weeks' gestation** and is a result of hormonal stimulation.

🦋 Colostrum Secretion

- Colostrum secretion may begin after **16 weeks' gestation**.

Cont'd

🦋 Secondary Breasts

- Secondary breasts may become more prominent both in size and in coloration. These occur along the **nipple line**.

🦋 Quickening:

- First perception of fetal kick by the mother
- **Prim ; 18-20 weeks , Multi: 14-16 weeks**

✓ Confusion with peristalsis

🦋 Urinary frequency

- **Because of increased bladder circulation and pressure from the enlarging uterus.**
- UTI must always be ruled out because pregnant women are more likely than nonpregnant women to have significant bacteriuria which may be **asymptomatic (7% versus 3%)**.
- Asymptomatic bacteruria can also lead to pyelonephritis, which is associated **with miscarriage, preterm birth**

Presumptive Signs

🦋 Increased Basal Body Temperature

- Persistent elevation of basal body temperature over a **3-week period usually** indicates pregnancy if temperatures have been carefully charted

🦋 Chloasma

- Chloasma, or **the mask of pregnancy**, is darkening of the skin over the forehead, bridge of the nose, or cheekbones and is most marked in those with dark complexions.
- It usually occurs **after 16 weeks' gestation** and is intensified by exposure to sunlight.

🦋 Linea Nigra

- Linea Nigra is darkening of the **nipples and lower midline** of the abdomen from the umbilicus to the pubis (darkening of the linea alba).
- The basis of these changes is stimulation of the **melanophores** by an increase in **melanocyte-stimulating hormone**.

Cont'd

🦋 Stretch Marks

- Stretch marks, or striae of the breast and abdomen, are caused by separation of the underlying collagen tissue and appear as irregular scars.
- This is probably an **adrenocorticosteroid** response.
- These marks generally appear later in pregnancy when the skin is under greater tension.

🦋 Spider Telangiectases

- Spider telangiectases are common skin lesions that result from high levels of circulating **estrogen**
- These vascular stellate marks **blanch** when compressed.
- ✓ Palmar erythema is often an associated sign.
- Both of these signs are also seen in patients with liver failure

2. Probable Manifestations

- **Symptoms:** Symptoms are the same as presumptive manifestations.
- **Signs:** Are **pelvic organs changes** including the following
 - ✿ **Chadwick's Sign:** Congestion of the pelvic vasculature causes **bluish** or purplish discoloration of the **vagina and cervix**.
 - ✿ **Hegar's Sign:** This is **widening of the softened area of the isthmus**, resulting in compressibility of the isthmus on bimanual examination.
 - ✿ **This occurs by 6–8 weeks.**
 - ✿ **Goodell's sign:** **cyanosis and softening** of the **cervix** is due to increased vascularity of cervical tissue.
 - ✿ This change can occur as **early as 4 weeks.**
 - ✿ **Leukorrhea**

Relaxation of ligaments

Cont'd

🦋 Abdominal enlargement

12 weeks- symphysis pubis

16 weeks- midway b/n symphysis & umbilicus

20 weeks- at umbilicus

36 weeks- xiphisternum

🦋 Braxton- Hicks contraction: irregular contraction

🦋 Ballotment of the uterus:

🦋 Uterine souffle: same as maternal pulse

=heard on auscultation which seems FHB.

3. Positive Evidences

1. Fetal heart tones
Fetoscope: 18-20 weeks
Doppler: 10-12 weeks
2. Perception of fetal movements & Outlining of the fetus
3. Ultrasound demonstration of fetus
4. Radiological demonstration of fetal skeleton
Usually at 16 weeks as primary ossification centers appear at 12-14 weeks
Replaced by ultrasound.
5. **Pregnancy Tests:** Test accuracy ranges from 98.6-99%.
✓ Serum and urine hcG levels ***reach to non-pregnant level*** (<5miu/ml) in **21-24 days after delivery**.

Presumptive		Probable		Positive
Symptoms	Signs	Symptoms	Signs	Evidences
Amenorrhea	Increased Basal Body Temperature	The same as presumptive	Chadwick's Sign: (Cx and Vx)	Fetal heart tones
Nausea and Vomiting	Chloasma		Hegar's Sign: (Isthmus)	perception of Fetal part and mov,t
Mastodynia	Linea Nigra		Goodell's sign: (Cx) Braxton-hicks contraction	Ultrasound demonstration of fetus
Montgomery's Tubercles	Stretch Marks		Leukorrhea Relaxation of ligaments	X- ray demonstration of fetus
Colostrum Secretion	Spider Telangiectases		Abdominal enlargement	Pregnancy test hcG=(98.6-99%)
Quickening			Uterine balloatement	
Secondary breast			Uterine souffle	8/26/2021
Urinary frequency				

Physiological and Psychological Changes in Pregnancy

- A 26-year-old gravida I woman came to ANC clinic with a complaint of burning type of pain around the epigastric area. Her LNMP was on 20/02/2013 making EDD and GA of ----- and ----- respectively. On P/E: Vital signs are stable, Pink conjunctiva, SFH is 28 wks., FHB is positive and OB ultrasound shows alive intrauterine pregnancy.
- What is the most likely diagnosis for this woman?
- What is the appropriate management option for this woman?

Introduction

- As adaptation to pregnancy, virtually every organ system undergoes **anatomical and functional** changes
- Many of these remarkable changes begin soon after fertilization and continue throughout gestation
- most occur in response to physiological stimuli provided by the fetus.

Reproductive system

➤ Uterus

- During pregnancy, the uterus is transformed into a relatively thin-walled muscular organ
- The total volume of the contents at term averages about 5 L but may be 20 L or more and weighs approximately 1100 g
- It becomes almost spherical and out of the pelvis by 12 weeks

Cont'd

- The uterus usually undergoes rotation to the right called “*dextrorotation*” likely is caused by the recto-sigmoid on the left side of the pelvis
- As the uterus rises, tension is exerted on the broad and round ligaments

Contractility

- Beginning in early pregnancy, the uterus undergoes irregular contractions that are normally painless called ***Braxton-Hicks*** contractions
- Late in pregnancy, these contractions may cause some discomfort and account for so-called *false labor*

Cervix

- At the 1st month , the cervix begins to undergo pronounced softening and cyanosis
- These changes result from increased vascularity and edema of the entire cervix, together with **hypertrophy** and **hyperplasia** of the cervical glands
- The endocervical mucosal cells produce copious amounts of a tenacious mucus that obstruct the cervical canal soon after conception called **mucus plug**
- This mucus is rich in immunoglobulins and cytokines

Ovaries

- Corpus luteum of pregnancy which functions maximally during the first 6 to 7 weeks of for the production of progesterone and Relaxin
- These act on the cervix and myometrium contractility
- There is ovarian tumor that developed during pregnancy which regress after delivery called ***Pregnancy Luteoma***

Vagina and Perineum

- During pregnancy, increased vascularity and hyperemia develop in the skin and muscles of the perineum and vulva and the vagina
- This change results in *Chadwick sign*
- The vaginal walls undergo changes considerable increase in the thickness of the mucosa, loosening of the connective tissue, and hypertrophy of smooth muscle cells.

Skin

- There are *striae gravidarum* or "*stretch marks*." and *linea nigra*.
- Irregular brownish patches of varying size appear on the face and neck, giving rise to *chloasma* or *melasma gravidarum*, which is the so-called *mask of pregnancy*

Breasts

- In the early weeks of pregnancy, women often experience breast tenderness and paresthesias
- After the second month, the breasts increase in size, and delicate veins become visible just beneath the skin.
- The nipples become considerably larger, more deeply pigmented, and more erectile.
- After the first few months, a thick, yellowish fluid (colostrum) can often be expressed

Metabolic Changes

- By the third trimester, maternal basal metabolic rate is increased by 10 to 20 percent compared with that of the nonpregnant state
- This is increased by an additional 10 percent in women with twin gestations
- Additional total pregnancy energy demands are estimated to be as high as 80,000 kcal or about 300 kcal/day

Weight Gain

- Most of the normal increase in weight during pregnancy is attributable to the uterus and its contents, the breasts, and increases in blood volume and extravascular extracellular fluid.
- The average weight gain during pregnancy is approximately 12.5 kg or 27.5 lb

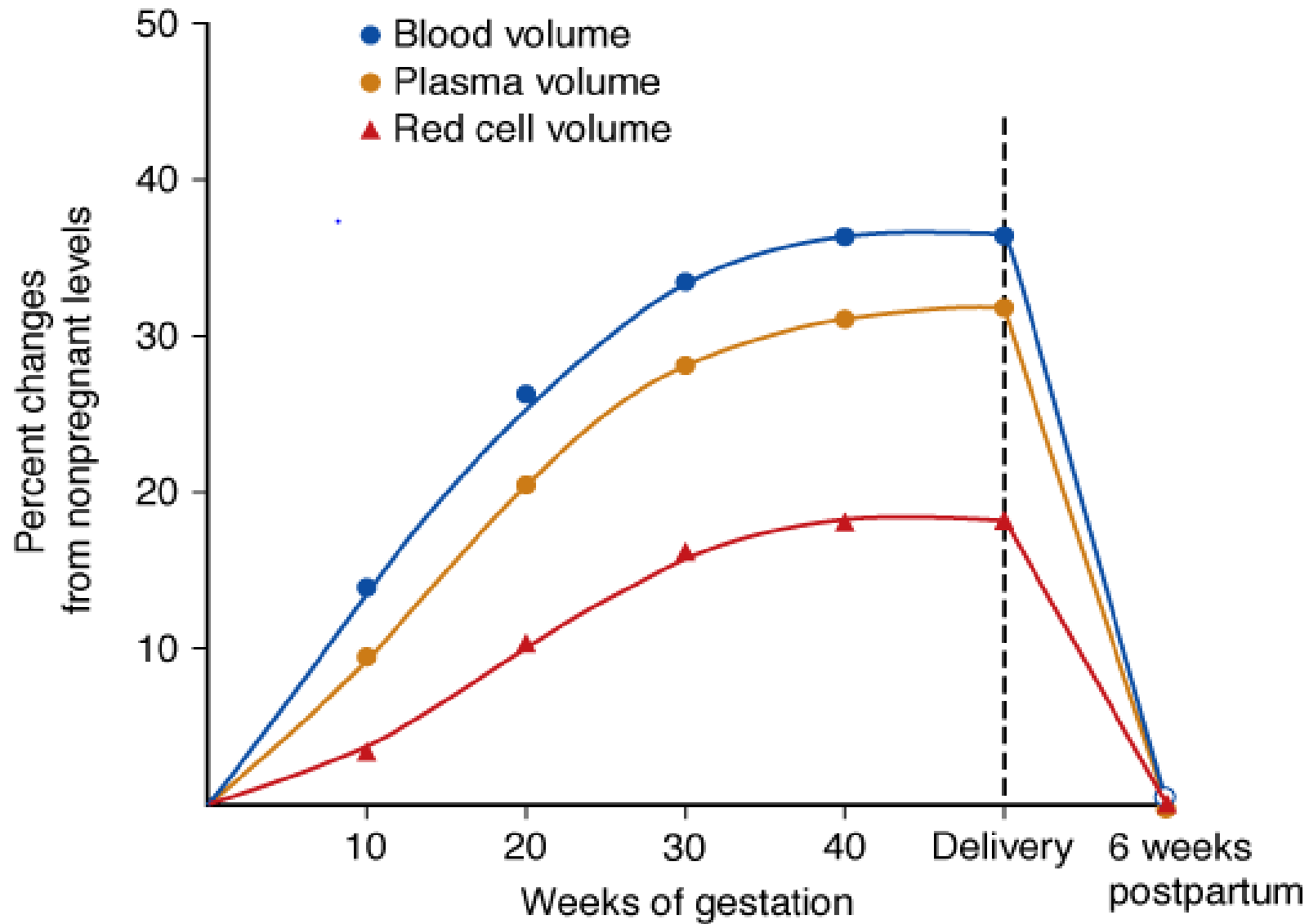
The current recommendations for weight gain during pregnancy

BMI(kg/m ²)	weight gain in kg singleton	weight gain in kg Twins
<18.5 (underweight)	12.5 to 18.0	no recommendation due to limited data
18.5 to 24.9 normal weight)	11.5 to 16.0	16.8 to 24.5
25.0 to 29.9 overweight)	7.0 to 11.5	14.1 to 22.7
≥ 30.0 kg/m ² (obese)	5 to 9.0	11.4 to 19.1

Hematological Changes

Blood Volume

- The blood volume during normal pregnancy increases by 40 to 45 percent on average after 32 to 34 weeks
- Blood volume expansion results from an increase in both plasma and erythrocytes.
- Erythropoietin levels, which peak early during the third trimester and correspond to maximal erythrocyte production



Cont'd

Pregnancy-induced hypervolemia has important functions:

1. To meet the metabolic demands of the enlarged uterus with its greatly hypertrophied vascular system
2. To provide an abundance of nutrients and elements to support the rapidly growing placenta and fetus.
3. To protect the mother and in turn the fetus, against the deleterious effects of impaired venous return in the supine and erect positions.

Cont'd

4. To safeguard the mother against the adverse effects of blood loss associated with parturition.

Cont'd

Hemoglobin Concentration

- Because of great plasma augmentation, hemoglobin concentration and hematocrit decrease slightly during pregnancy
- Hemoglobin concentration at term averages 12.5 g/dL,
- Thus, a hemoglobin concentration below 11.0 g/dL, especially late in pregnancy, should be considered abnormal

Immunological Functions

- Pregnancy is thought to be associated with suppression of a variety of humoral and cell-mediated immunological functions to accommodate the "foreign" fetal graft
- But in cervical mucus, peak levels of immunoglobulins A and G (IgA and IgG) are significantly higher during pregnancy

Cont'd

Leukocytes

- Some polymorphonuclear leukocyte chemotaxis and adherence functions are depressed beginning in the second trimester and continuing throughout pregnancy
- This possible increased susceptibility to certain infections.
- The leukocyte count varies considerably during pregnancy, usually it ranges from 5000 to 12,000/ μ L

Cont'd

Inflammatory Markers

- Measured C-reactive protein levels across pregnancy found that median values were higher than for nonpregnant women
- Another marker of inflammation, the *erythrocyte sedimentation rate (ESR)*, is increased in normal pregnancy because of elevated plasma globulins and fibrinogen

Cont'd

Coagulation and Fibrinolysis

- During normal pregnancy, both coagulation and fibrinolysis are augmented but remain balanced to maintain hemostasis
- Increased concentrations of all clotting factors, except factors XI and XIII
- The clotting time of whole blood, however, does not differ significantly in normal pregnant women

Cont'd

Platelets

- The average platelet count decreases slightly during pregnancy to $213,000/\mu\text{L}$, which is $250,000/\mu\text{L}$ in nonpregnant
- Decreased platelet concentrations are partially due to the effects of hemodilution

Cardiac Output

- Cardiac output increases approximately by 40% during pregnancy, with maximum values achieved at 20–24 weeks' gestation.
- This rise in cardiac output is thought to result from the hormonal changes of pregnancy as well as the arteriovenous-shunt effect of uteroplacental circulation

Cont'd

- **Thus, elevations in cardiac output after 20 weeks of gestation depend critically on the rise in heart rate**
- **Stroke volume increases 25–30% during pregnancy**
- **Maximum cardiac output is associated with a 24% increase in stroke volume and a 15% rise in heart rate**

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- The resting maternal heart rate at term is about 10 beats/min more than the nonpregnant rate
- During late pregnancy with the woman in the supine position, the large pregnant uterus rather consistently compresses venous return from the lower body, it also may compress the aorta
- The results are that cardiac filling may be reduced with diminished cardiac output

Blood Pressure

- Systemic arterial pressure declines slightly during pregnancy, reaching at lowest point at 24–28 weeks of gestation
- The fall is greater for diastolic than for systolic pressures
- Systolic and diastolic pressures (and mean arterial pressure) increase to pre-pregnancy levels by about 36 weeks.

Cont'd

- Venous pressure progressively increases in the **lower extremities**, particularly when the patient is supine, sitting, or standing.
- The rise in venous pressure, which can cause edema and varicosities
- This results from compression of the inferior vena cava by the gravid uterus and possibly from the pressure of the fetal presenting part on the common iliac vein

Cont'd

- **Lying in lateral recumbency minimizes changes in venous pressure**
- **Venous pressure in the upper extremities is unchanged by pregnancy**

Supine Hypotension

- In about 10 percent of women, supine compression of the great vessels by the uterus causes significant arterial hypotension
- This sometimes referred to as the *supine hypotensive syndrome*
- Also when supine, uterine arterial pressure and blood flow is significantly lower than that in the brachial artery
- This may directly affect fetal heart rate patterns

Cont'd

Heart Murmurs and Rhythm

- The physiologic changes of pregnancy alter several clinical findings.
- The systolic ejection murmurs, which result from increased cardiac output and decreased blood viscosity, can be detected in 90% or more gravidas

Respiratory Tract

- The diaphragm rises about 4 cm during pregnancy
- The subcostal angle widens appreciably as the transverse diameter of the thoracic cage increases approximately 2 cm
- The thoracic circumference increases about 6 cm
- Diaphragmatic excursion is greater in pregnant than in nonpregnant women.

Cont'd

Lung Volumes and Capacities

- Several lung volumes and capacities are altered by pregnancy
- Dead space volume increases because of relaxation of the musculature of conducting airways

Cont'd

- Tidal volume and inspiratory capacity increase
- Elevation of the diaphragm is associated with reduction in total lung capacity and functional residual capacity.
- The residual capacity involves a decrease in both expiratory reserve and residual volumes

Cont'd

Respiration

- Pregnancy has little affect on respiratory rate
- The increase in minute ventilation (approximately 50%) results from the rise in tidal volume
- This increment in minute ventilation is disproportionately greater than the rise (approximately 20%) in total oxygen consumption in maternal muscle tissues
- This hyperventilation decreases maternal PCO_2 and slightly increases arterial PO_2

Urinary System

The Kidney

- During pregnancy *Kidney size* increases slightly, 1.5 cm longer
- The *glomerular filtration rate (GFR)* and *renal plasma flow* increase approximately by 50%
- In renal excretion there is a remarkably increased amounts of various nutrients lost in the urine

Cont'd

- *Serum creatinine* levels decrease during normal pregnancy from a mean of 0.7 to 0.5 mg/dL
- *Creatinine clearance* in pregnancy averages about 30 percent higher than the 100 to 115 mL/min in non-pregnant women
- *Glucosuria* during pregnancy may not be abnormal.

Cont'd

- The appreciable increase in glomerular filtration, together with **impaired tubular reabsorptive capacity** for filtered glucose, accounts in most cases for **glucosuria**
- *Proteinuria* normally is not evident during pregnancy except occasionally in slight amounts during or soon after vigorous labor

Cont'd

Ureters

- After the uterus rises completely out of the pelvis, it rests upon the ureters, laterally displacing and compressing them at the pelvic brim
- This results in Ureteral dilatation found it to be greater on the right side

Cont'd

Bladder

- As the uterus enlarges, the urinary bladder is displaced upward and flattened in the anteroposterior diameter
- One of the earliest symptoms of pregnancy is increased urinary frequency, which may be related to pregnancy hormones

Cont'd

- In later gestation, mechanical effects of the enlarged uterus may contribute to the increased frequency.
- Bladder vascularity increases and muscle tone decreases, which increases bladder capacity up to 1500mL.

Gastrointestinal System

Oral Cavity

- Salivation appears to increase although this may be caused in part by swallowing difficulty associated with nausea.
- The gums may become hypertrophic and hyperemic; often, they are so spongy and friable that they bleed easily.
- This may be caused by increased systemic estrogen.

Cont'd

Esophagus and Stomach

- Reflux symptoms (**heartburn**) affect 30–80% of pregnant women
- Gastric production of hydrochloric acid is variable and sometimes exaggerated but more commonly reduced.
- Pregnancy is associated with greater production of gastrin, which increases stomach volume and acidity of gastric secretions.
- Gastric production of mucus also may be increased.

Cont'd

- Esophageal peristalsis is decreased, although the symptoms can become more severe with advanced gestation.
- The underlying predisposition to reflux in pregnancy is related to **hormone-mediated relaxation** of the lower esophageal sphincter
- With advancing gestation there decreased motility, increased acidity of gastric secretions, and reduced function of the lower esophageal sphincter

This contribute to the increased gastric reflux.

Cont'd

Intestines

- Intestinal transit times are decreased in the second and third trimesters
- Transit times return to normal within 2 to 4 days postpartum.
- The slow transit time of food through the gastrointestinal tract potentially enhances water absorption, predisposing to constipation.
- However, diet and cultural expectations may be more important factors in this disorder.

Minor complaints of pregnancy

Minor complaints of pregnancy

Nausea and Vomiting :

- About 50 percent of women have both nausea and vomiting, 25 percent have nausea only, and 25 percent are unaffected .
- **About two thirds of women with severe nausea in a prior pregnancy have similar symptoms in subsequent pregnancies**
- Nausea severe enough to cause significant weight loss or hospitalization is seen rarely, affecting **0.5 to 2 of pregnant women**
- There are four main categories of interventions for nausea: **dietary changes, behavior modification, medications and acupressure.**
- Non pharmacologic measures are usually recommended initially to treat nausea and vomiting in early pregnancy.

Cont'd

- Behavior modification centers on women **avoiding personal triggers** for nausea that they identify themselves.
- Dietary modification **with frequent small feedings** in order to keep some food in the stomach at all times is helpful. There is some evidence that small, protein rich meals may help reduce nausea.
- Drug and alternative therapies
- **Heartburn** is a common complaint in pregnancy because of relaxation of the esophageal sphincter. **Overeating contributes to this problem.** Pillows at bedtime may help. If necessary, antacids may be prescribed. **Liquid antacids coat the esophageal lining more effectively than do tablets.** Aluminum hydroxide, Magnesium trisilicate.

Cont'd.

Backache

- Back pain is a common complaint in pregnancy affecting over 50% of women.
- Numerous physiologic changes of pregnancy likely contribute to the development of back pain including **ligament laxity related to relaxin and estrogen, weight gain, hyper lordosis, and anterior tilt of the pelvis.**
- These altered biomechanics lead to mechanical strain on the lower back.
- Backache can be prevented to a large degree by avoidance of excessive weight gain, and a regular exercise program before pregnancy.
- **Exercises** to strengthen back muscles can also be helpful.
- Posture is important, and **sensible shoes**, not high heels, should be worn.
- **Scheduled rest periods** with elevation of the feet to flex the hips may be helpful.
- **Acetaminophen**, narcotics, prednisone, and rarely antiprostaglandins (if remote from term) can be used.

Cont'd.

Pica: There has been considerable historical interest in the cravings (pica) of pregnant women for strange foods and, at times, nonfoods such as

Ice (pagophagia),

Starch (amylophagia), or

Clay (geophagia).

This desire has been considered by some to be triggered by severe **iron deficiency.**

Cont'd

- **Exercise:** Avoid excessive fatigued or risk injury. Avoid diving to swim
- **Bathing:** There are no contraindications to bathing during pregnancy or the puerperium. Early pregnancy exposure to a hot tub or Jacuzzi at 100°F or higher has been associated with an increased risk of miscarriage & neural-tube defects
- **Clothing:** Comfortable and non constricting
- **Coitus:** Whenever abortion or preterm labor threatens, avoid coitus
- **Dentition:** Pregnancy is not a contraindication to dental treatment.
- **Caffeine:** Caffeine is not a teratogen. The risk of spontaneous abortion related to caffeine consumption is controversial.

Cont'd

- **Travel : ACOG** has concluded that pregnant women can safely fly up to 36 weeks
- The patient should be advised against prolonged sitting during car or airplane travel because of the risk of venous stasis and possible thromboembolism.
- The usual recommendation is a maximum of **6 hours per day driving**, with stopping at least **every 2 hours for 10 minutes** to allow the patient to walk around and increase venous return from the legs.
- Hydration and support stockings are also recommended.

Cont'd

Restless Legs Syndrome

- About one **in 5 to 10 women** will develop restless legs syndrome (RLS) during the second half of pregnancy.
- RLS usually occurs as women **fall asleep and is characterized** by tingling or other uncomfortable sensations in the lower legs, resulting in the **overwhelming urge to move the legs.**
- Unfortunately, movement, walking around or other measures do not relieve RLS.
- **Iron deficiency anemia** has been associated with an increased risk for RLS, and in anemic women, iron supplementation may reduce leg restlessness.
- **Avoidance of caffeine containing drinks like coffee, tea or sodas** in the last half of the day should also be recommended, as caffeine may increase symptoms.

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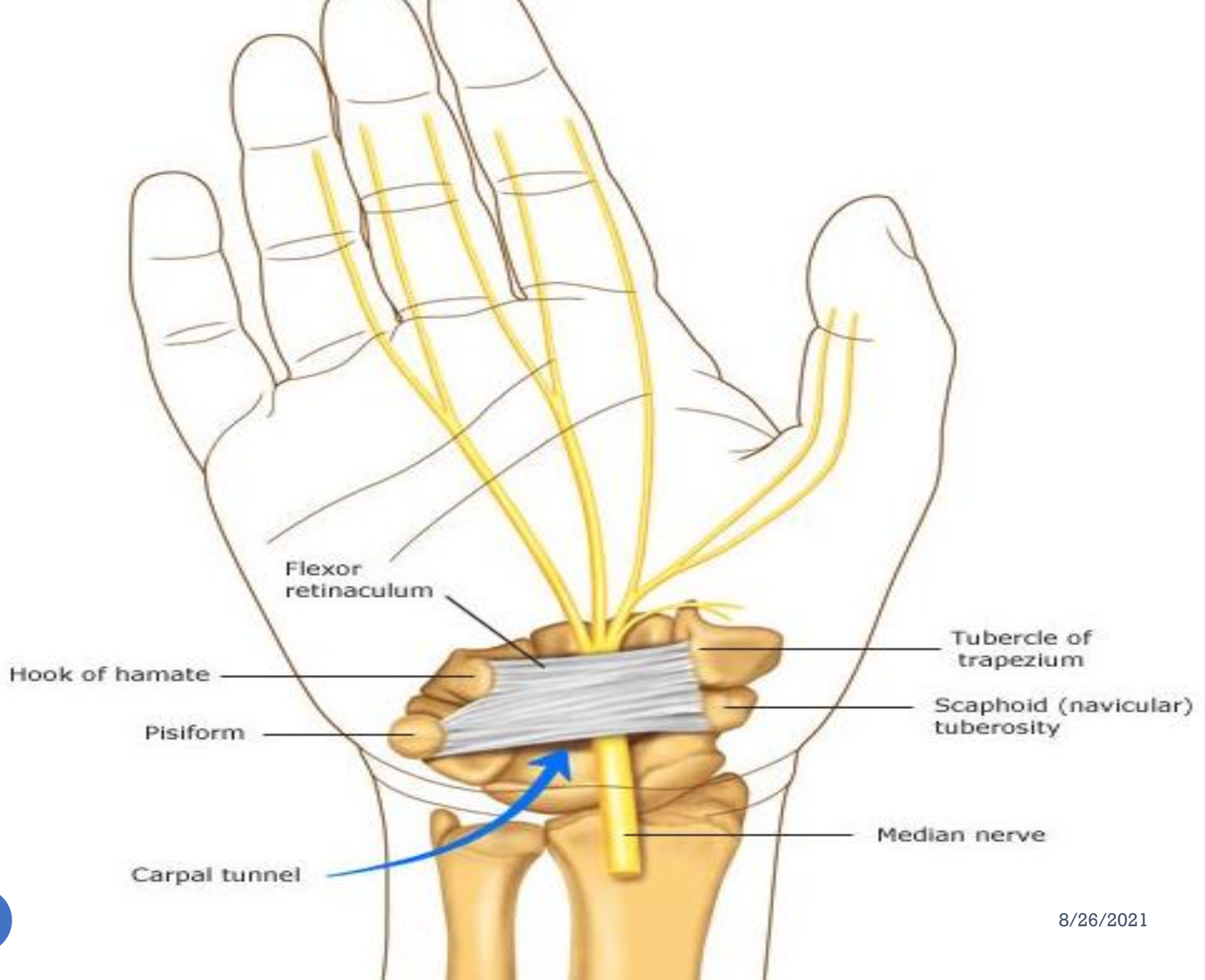
Sciatica

- Sciatica refers to nerve pain that **shoots rapidly** down **from the buttocks and unilaterally down one leg**, usually ending in the foot.
- **True sciatica is rare in pregnancy, affecting less than 1% of pregnancies.**
- True sciatica is caused either by a herniated disc, or **less commonly by uterine pressure on the sciatic nerve.**
- In addition to pain, other signs of nerve compression include numbness in the affected leg.
- True sciatica should prompt referral to an orthopedic surgeon for further evaluation.

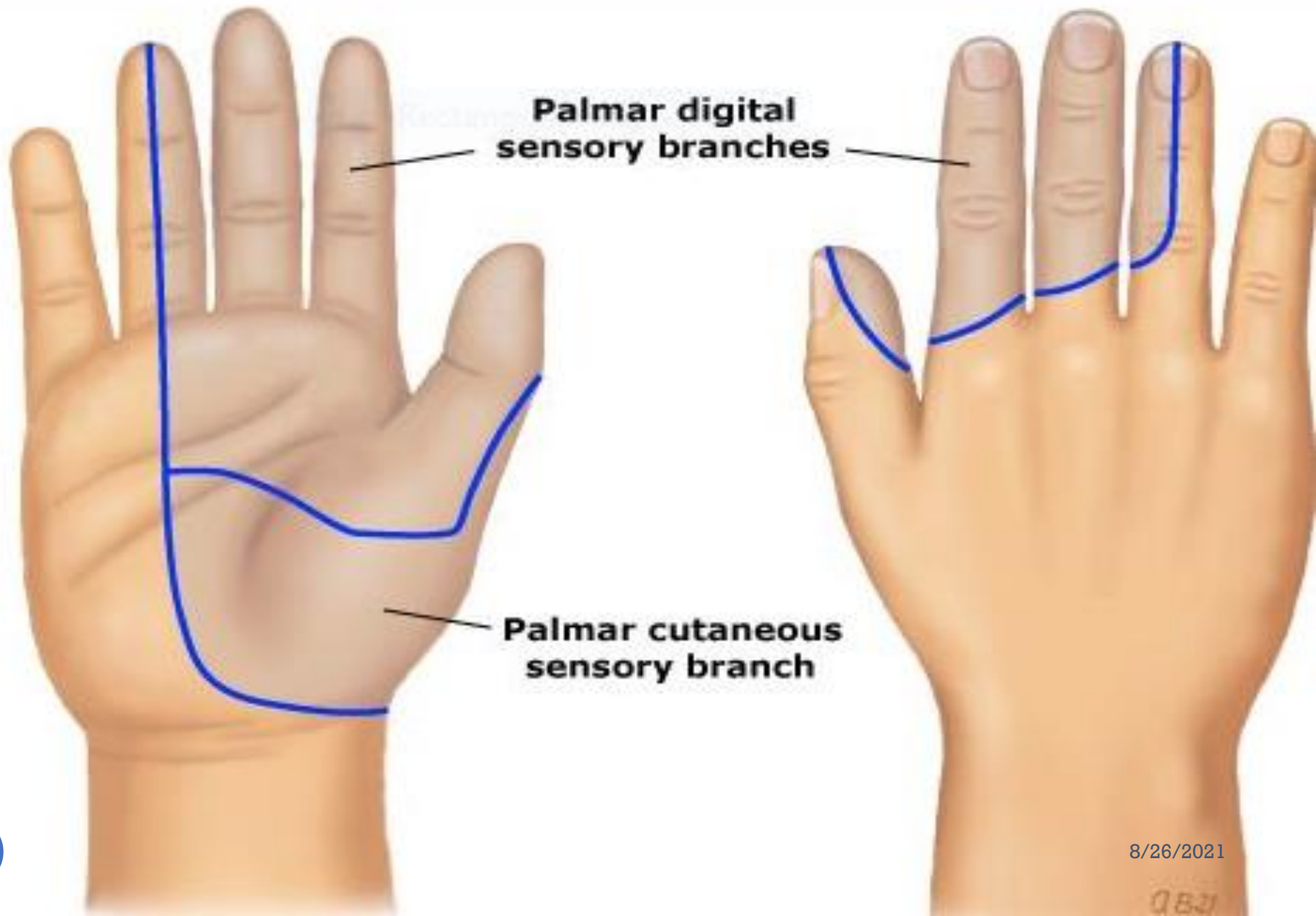
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Carpal Tunnel Syndrome

- The extra fluid retention of pregnancy can exacerbate **carpal tunnel syndrome**.
- **Higher weight** gain during pregnancy is also a risk factor.
- The most common symptoms of carpal tunnel syndrome are pain and numbness in **the thumb, index and middle fingers** and weakness in the muscles that move the thumb.
- Between **25 and 50%** of pregnant women will notice some symptoms of carpal tunnel syndrome.
- **Treatment : nighttime splinting** that may help reduce increased pressure on the nerve that occurs when the wrist is bent; about 80% of women will notice reduction in symptoms with splinting alone.
- severe cases of carpal tunnel syndrome can be treated **with steroid injections** into the area around the carpal tunnel to reduce swelling and inflammation.
- After delivery, symptoms generally **resolve within 4 weeks**



Sensory territory of the median nerve



Cont'd.

Urinary incontinence :

- About 40–50% of women will experience urinary incontinence during their pregnancy.
- Rule out for infection.

Round Ligament Pain

- Frequently, patients **will notice sharp groin pains** caused **by spasm of the round ligaments associated with movement.**
- This is more frequently felt on the right side as a result of the **usual dextrorotation of the uterus.**
- Patients may awaken at night with this pain after having suddenly rolled over in their sleep without realizing it.
- During the daytime, however, modification of activity with gradual rising and sitting down, as well as **avoidance of sudden movement**, will decrease problems with this type of pain. Analgesics are rarely necessary.

Prenatal natal care

Prenatal natal care

- **Maternal mortality** has been an under-recognized issue worldwide despite an estimated **600,000 maternal deaths** per year from pregnancy-related causes.
- Put in numeric perspective, this is equivalent to **six jumbo jet crashes per day** with the deaths of all 250 passengers on board, all of them women in the reproductive years of life.
- To put this in a time perspective, **every minute of every day**, a woman dies from pregnancy-related causes.
- There is also a marked inequity in geographic distribution, because **95 percent** of these deaths occur **in developing** countries

Cont'd

- WHO estimates that more than **80 percent of maternal deaths** could be prevented through actions that have been proven to be
- **Effective and affordable,**
- **Trained birth attendants,**
- **Aseptic birth environments,**
- **Identification of maternal/fetal/neonatal complications and transport to higher level of care when indicated.**
- **Prenatal care is an excellent example of preventive medicine**

Cont'd

- The American Academy of Pediatrics and the ACOG (2012) have defined **prenatal** care as:
- "**A comprehensive antepartum care** program that involves a coordinated approach to **medical care** and **psychosocial support** that optimally begins before conception and extends throughout the antepartum period,."
- Care provided at each visit impacts not only pregnancy outcome but ultimately **long-term health outcomes for the woman and her family**

Cont'd

- New development in medicine **1901** and ANC clinics started in 1911, Boston
- It is General health care given to pregnant women to promote & maintain optimal health of mother with having and rearing healthy babies
- Meaningless unless an attended delivery
- **Obstetric care** includes
 - pre-conceptual care,
 - prenatal care
 - Intrapartum care
 - postpartum care.

Cont'd

Objectives of Prenatal care

- To establish diagnosis of pregnancy and GA
- To screen high risk cases
- To deal with minor ailments of pregnancy
- To prevent or to detect & treat at the earliest any complications.
- To ensure continued medical surveillance & prophylaxis
- To educate the mother about physiology of pregnancy & labor
- To discuss with couple about delivery and care of newborn
- To motivate couple about family planning.
- **ANC is effective in : anemia treatment, syphilis, and detection of hypertension**

Psychosocial Screening

- The AAP and the ACOG(2012) define **psychosocial issues** as non biomedical factors that affect mental and physical well-being.
- Women should be screened regardless of:
 - Social status
 - Education level,
 - Race, or
 - Ethnicity.

Cont'd

- ❖ Such screening should seek barriers to care
 - ❖ Communication obstacles,
 - ❖ Nutritional status,
 - ❖ Unstable housing,
 - ❖ Desire for pregnancy,
- Safety concerns that include intimate partner violence, depression, stress, and use of substances such as tobacco, alcohol, and illicit drugs

Initial Prenatal Evaluation

- Prenatal care should be initiated as soon as there is a reasonable likelihood of pregnancy
- Timing of first visit **WHO 16 weeks**
- Each visit of ANC requires about 20 minutes
- The contents of(Prenatal care) ANC are
 1. **Risk assessment:**
 2. **Care provision:**
 3. **Health promotion:**

Risk Assessment

Present obstetric history:

- Name, age, address, gravidity, parity, abortion,
- LNMP, GA, EDD
- Use of contraception
- symptom and sign of pregnancy
- Quickening
- Any complaint/concerns
- Danger signs of pregnancy
- Alcohol use
- Cigarette smoking
- Use of illicit drugs
- Occupational hazards
- History of physical abuse
- planned/ wanted/ supported Vs -----

Cont'd

Gestational age estimation

- A. Menstrual date:** The most reliable clinical estimator of GA is an accurate LMP
- B. Clinical parameters of gestational age are**
1. Fundal Height
 2. Quickening
 3. Fetal Heart Sounds
 4. Ultrasound
 5. Johnson's estimate of fetal weight

Fetal weight (in grams) = (SFH – n) x 155 ± 375gm

- **n= 12** if the vertex is at or above the ischial spines
- **n= 11** if the vertex is below the spines

If the patient is more than **91 kg** subtract **1 cm** from the fundal height.

- The calculation is accurate in **75 % of cases.**

Cont'd

Past obstetric history

- APH
- PPH
- Stillbirths, IUGR
- Macrosomia
- LBW
- Post term/ preterm
- Hypertensive disorders of pregnancy
- Gestational diabetes
- operative deliveries
- Personal or family history of multiple gestation
- History of genital cutting
- History of STIs

History of past medical and surgical illness

Cont'd

Physical examination

General Physical examination

- General appearance
- vital signs
- Height and Weight
- General systemic examination
- Clinical signs of anemia
- signs of physical abuse.

Obstetric examination

- symphysis fundal height Fetal lie, presentation, attitude, engagement
- Fetal growth and wellbeing
- Fetal movement
- FHT, EFW

Special examinations: pelvic assessment, speculum examination

Cont'd

Laboratory Investigations

Base line:	Indicated
HC(hgb) Blood group & RH VDRL Urine analysis Stool HIV	Pap smear, CBC, Pregnancy test Glucose tolerance test Maternal serum AFP screening Cystic fibrosis screening Urine culture Rubella titer Gonococcal culture Chlamydia culture Hepatitis B surface antigen Group B streptococcus culture Imaging studies -Ultrasonography, Doppler -X-ray, CT, MRI

Care provision

- **Minimum care provided at each visit:**

- Development of individualized birth plan
- Discuss women's preference of place of delivery
- Ascertain transport means
- Provide treatment for problems and complaints
- Provide immunization for **TT,HBV, PMTCT**
- Supplementation **of Fe, folate, malaria prophylaxis, treat intestinal parasites**
- Stress importance of next visit
- **Anti D for RH** negative unsensitized women
- Inform place In case of emergency

Cont'd.

Immunizations

- Pregnant women or women likely to become pregnant **should not be given live, attenuated-virus vaccines like measles, mumps and Rubella.**
- Influenza vaccination should be given during flu season.
- Yellow fever and oral polio may be given to women exposed to these infections.
- There is no evidence of fetal risk from inactivated virus vaccines, bacterial vaccines, toxoids, or tetanus immunoglobulin, which should be administered if appropriate.
- **TT is administered** at first encounter, then after 4 weeks of first dose, then at 6 months of second dose, then at one year of third dose then at one year of fourth dose.

Deworming

- Mebendazol 500 mg po stat any time after the first trimester

Cont'd

Malaria prevention: Malaria causes 30% LBW. 3-5% neonatal deaths .

1. Insecticide treated bed nets (ITN)

2. Intermittent preventive therapy(IPTs): Decreases parasitic load

- Give treatment dose of Sulfadoxine Pyrimethamine (SP) 2 times during pregnancy after quickening(16 weeks of GA) even if the client is not symptomatic
- One tablet of (SP) contains 500 mg of Sulfadoxine and 25 mg of pyrimethamine. Different brands available eg. Fansidar
- Therapeutic dose of SP is 3 tabs stat. It should be given under directly observed therapy(DOTs).
- There is additional benefit of giving third dose

3. Effective case management of malaria & its complication

Cont'd

Iron supplementation

- **27 mg of ferrous iron supplement** be given daily to pregnant women
- The pregnant woman may benefit from **60 to 100 mg** of iron per day if she **is large, has twin fetuses, begins supplementation late in pregnancy**, takes iron irregularly, or has a somewhat depressed hemoglobin level.
- Because iron requirements are slight during the first **4 months of pregnancy**, it is *not necessary* to provide supplemental iron during this time.
- Withholding **iron supplementation during the first** trimester of pregnancy avoids the risk of **aggravating nausea and vomiting**.
- **Ingestion of iron at bedtime or on an empty stomach** facilitates absorption and appears to minimize the possibility of an adverse gastrointestinal reaction

	Nonpregnant women years RDA				Lactation (months)	
	15–18	19–24	25–50	Pregnancy	1–6	7–1
Calories (kcal)	2500				2800	
Protein (g)	44	46	50	60	65	62
Vitamin A (μg RE)	800	800	800	800	1,300	1,200
Vitamin D (μg)	10	5	5	10	10	10
Folate (μg)	180	180	180	400	280	26
Vitamin B ₁₂ (μg)	2.0	2.0	2.0	2.2	2.6	
Iron (mg)	15	15	15	30	15	15
Zinc (mg)	12	12	12	15	19	16
Iodine (μg)	150	150	150	175	200	200

Health promotion

- **Advice given on**

- Balanced diet, avoid alcohol, drugs and smoking

- Rest, activity, coitus

- **Minor complaints of pregnancy**

- Personal hygiene

- Planned place of delivery

- Transportation

- Care of newborn, breast feeding, **child spacing**

- Importance of interventions like immunization, malaria prophylaxis, etc.

- Danger signs and symptoms

- Prevention of intestinal parasites

Cont'd

Advise on birth spacing

- Maternal, newborn, and familial benefits have been associated with **optimal birth spacing**, is estimated to be approximately **2 to 5 years**.
- **Short pregnancy intervals** are associated with increased **low birth weight, preterm birth, and other adverse** pregnancy outcomes attributed to decreased maternal reserves
- **Prolonged birth spacing** has been associated with increased risk of breast **cancer, preeclampsia, and stillbirths**.
- The benefits of intermediate birth spacing needs to be emphasized by health care practitioners and more widely disseminated.

The 2002 FANC Visits

- There was **no difference** in outcomes for patients undergoing reduced frequency of visits as measured by rates of preterm birth and low birth weight, and the reduced frequency model has been shown to be cost effective.
- However, fewer visits has been associated with **decreased maternal satisfaction** with care as well as increased maternal anxiety.
- Recent studies support the concept of reduced antenatal visits for selected women

Scheduling of visits

2002 WHO focused ANC recommendation: 4 or 5 visits.

1st- up to 16 weeks

2nd- 24-28 weeks

3rd- at 32 weeks

4th- at 36 weeks

5th- 40-42 weeks- optional

Follow-up prenatal visits

Assessment in subsequent visits:

History

- Revising history for
- social support
- Complaints and concerns
- Fetal kicks

Repeat physical examination:

- General appearance
- Vital signs and weight
- Clinical signs of anemia and physical abuse
- Examination based on complaints
- Examination of previously detected problem

Obstetric examination:

- -SFH, FHT, Fetal lie and presentation

Repeat investigations:

- Hgb, U/A, OGTT, U/S on indication
- Coomb's test if Rh negative

2nd and 3rd ANC Visit

- Screen for HTN, twin pregnancy, anemia, preterm labor, DM, Rh iso-immunisation
- Ascertain fetal growth and well being
- Develop individualized birth plan
- Continue with health promotion and care provision
- Assess maternal **weight gain**

2nd & 3rd visits contd.

- If the patient does not show a 1kg fortnight weight gain by midpregnancy, her nutritional status should be reviewed

- **Weight gain distribution**

Fetus=3500gm

Placenta, amniotic fluid, uterus=900 gm

Interstitial fluid & blood volume=1200-1600 gm each

Breast= 400 gm,

Maternal fat= 1640 gm

- **Weight Retention after Pregnancy**

- Not all the weight put on during pregnancy is lost during and immediately after parturition.
- The average-sized normal woman who gains 28 lb (12.5 kg) in pregnancy is about 9 lb (**4.4 kg**) *above her prepregnant weight when discharged postpartum.*
- Effect of breast feeding on maternal weight loss was negligible.

The current recommendations for weight gain during pregnancy

BMI(kg/m ²)	weight gain in kg singleton	weight gain in kg Twins
<18.5 (underweight)	12.5 to 18.0	no recommendation due to limited data
18.5 to 24.9 normal weight)	11.5 to 16.0	16.8 to 24.5
25.0 to 29.9 overweight)	7.0 to 11.5	14.1 to 22.7
≥ 30.0 kg/m ² (obese)	5 to 9.0	11.4 to 19.1

The 4th ANC visit

- Screen for HTN, APH, multiple gestation
- Ascertain fetal growth, wellbeing, lie & presentation.
- Update individualized birth plan
- Strengthen health promotional services & discuss women's concern

5th ANC VISIT- Optional

- Assess fetal lie, presentation, wellbeing
- Assess Bishop's score and termination vs. expectant management.
- Update birth plan

The 2016 WHO new Model (current model)

❖ Why new model?

- The four-visit FANC doesn't offer women adequate contact with HCPs
- FANC is associated with higher perinatal deaths than higher number of visits
- More number of ANC visit is associated with greater maternal satisfaction

The decision regarding the number of contacts with a health system was influenced by the following:

- Evidence supporting improving safety during pregnancy through increased frequency of maternal and fetal assessment to detect problems;
- Evidence supporting improving health system communication and support around pregnancy for women and families

Cont'd

- Evidence indicating no important differences in maternal and perinatal health outcomes between ANC models that included at least eight contacts and ANC models that included more (11–15) contacts
- Evidence indicating that more contact between pregnant women and knowledgeable, supportive and respectful health-care practitioners is more likely to lead to a positive pregnancy experience

Types of intervention

- A. Nutritional interventions
- B. Maternal and fetal assessment
- C. Preventive measures
- D. Interventions for common physiological symptoms
- E. Health systems interventions to improve the utilization and quality of ANC.

A. Nutritional interventions

- Pregnancy requires a healthy diet that includes an adequate intake of energy, protein, vitamins and minerals to meet maternal and fetal needs.
- However, for many pregnant women, dietary intake of vegetables, meat, dairy products and fruit is often insufficient to meet these needs, particularly in low and middle-income countries (LMICs) where multiple nutritional deficiencies often co-exist

A. Nutritional interventions

Dietary interventions	Recommendation	type of recommendation
	A.1.1: Counselling about healthy eating and keeping physically active during pregnancy is recommended for pregnant women to stay healthy and to prevent excessive weight gain during pregnancy	Recommended
	A.1.2: In undernourished populations, nutrition education on increasing daily energy and protein intake is recommended for pregnant women to reduce the risk of low-birth-weight neonates.	Context-specific recommendation
	A.1.3: In undernourished populations, balanced energy and protein dietary supplementation is recommended for pregnant women to reduce the risk of stillbirths and small-for-gestational-age neonates	Context-specific recommendation
	A.1.4: In undernourished populations, high-protein supplementation is not recommended for pregnant women to improve maternal and perinatal outcomes	Not recommended
Iron and folic acid supplements	A.2.1: Daily oral iron and folic acid supplementation with 30 mg to 60 mg of elemental iron and 400 g (0.4 mg) of folic acid is recommended for pregnant women to prevent maternal anaemia, puerperal sepsis, low birth weight, and preterm birth	Recommended

A. Nutritional interventions

	Recommendation	type of recommendation
Iron and folic acid supplements	A.2.2: Intermittent oral iron and folic acid supplementation with 120 mg of elemental iron and 2800 micro g (2.8 mg) of folic acid once weekly is recommended for pregnant women to improve maternal and neonatal outcomes if daily iron is <i>not acceptable due to side-effects</i> , and in populations with an anaemia prevalence among pregnant women of less than 20%	Context-specific recommendation
Calcium supplements	A.3: In populations with low dietary calcium intake, daily calcium supplementation (1.5–2.0 g oral elemental calcium) is recommended for pregnant women to reduce the risk of pre-eclampsia	Context-specific recommendation
Vitamin A supplements	A.4: Vitamin A supplementation is only recommended for pregnant women in areas where vitamin A deficiency is a severe public health problem to prevent night blindness	Context-specific recommendation
Zinc supplements	A.5: Zinc supplementation for pregnant women is only recommended in the context of rigorous research	Context-specific recommendation
Multiple micronutrient supplements	A.6: Multiple micronutrient supplementation is not recommended for pregnant women to improve maternal and perinatal outcomes	Not recommended

A. Nutritional interventions

	Recommendation	type of recommendation
Vitamin B6 (pyridoxine) supplements	A.7: Vitamin B6 (pyridoxine) supplementation is not recommended for pregnant women to improve maternal and perinatal outcomes	Not recommended
Vitamin E and C supplements	A.8: Vitamin E and C supplementation is not recommended for pregnant women to improve maternal and perinatal outcomes.	Not recommended
Vitamin D supplements	A.9: Vitamin D supplementation is not recommended for pregnant women to improve maternal and perinatal outcomes	Not recommended
Restricting caffeine intake	A.10: For pregnant women with high daily caffeine intake (more than 300 mg per day) lowering daily caffeine intake during pregnancy is recommended to reduce the risk of pregnancy loss and low-birth-weight neonates	Context-specific recommendation

B. Maternal and Fetal Assessment

B1. Maternal Assessment

Anaemia	Recommendation	type of recommendation
	B.1.1: Full blood count testing is the recommended method for diagnosing anaemia in pregnancy. In settings where full blood count testing is not available, on-site haemoglobin testing with a haemoglobinometer is recommended over the use of the haemoglobin colour scale as the method for diagnosing anaemia in pregnancy	Context-specific recommendation
Asymptomatic bacteriuria (ASB)	B.1.2: Midstream urine culture is the recommended method for diagnosing asymptomatic bacteriuria (ASB) in pregnancy. In settings where urine culture is not available, on-site midstream urine Gram staining is recommended over the use of dipstick tests as the method for diagnosing ASB in pregnancy	Context-specific recommendation
Intimate partner violence (IPV)	B.1.3: Clinical enquiry about the possibility of intimate partner violence (IPV) should be strongly considered at antenatal care visits when assessing conditions that may be caused or complicated by IPV in order to improve clinical diagnosis and subsequent care, where there is the capacity to provide a supportive response (including referral where appropriate) and where the WHO minimum requirements are met	Context-specific recommendation

B. Maternal and Fetal Assessment

B1. Maternal Assessment

Gestational diabetes mellitus (GDM)	Recommendation	type of recommendation
	B.1.4: Hyperglycaemia first detected at any time during pregnancy should be classified as either gestational diabetes mellitus (GDM) or diabetes mellitus in pregnancy, according to WHO criteria	Recommended
Tobacco use	B.1.5: Health-care providers should ask all pregnant women about their tobacco use (past and present) and exposure to second-hand smoke as early as possible in the pregnancy and at every antenatal care visit	Recommended
Substance use	B.1.6: Health-care providers should ask all pregnant women about their use of alcohol and other substances (past and present) as early as possible in the pregnancy and at every antenatal care visit	Recommended
Human immune deficiency virus (HIV) and syphilis	B.1.7: In high-prevalence settings provider-initiated testing and counselling (PITC) for HIV should be considered a routine component of the package of care for pregnant women in all antenatal care settings. In low-prevalence settings, PITC can be considered for pregnant women in antenatal care settings as a key component of the effort to eliminate mother-to-child transmission of HIV, and to integrate HIV testing with syphilis, viral or other key tests, as relevant to the setting, and to strengthen the underlying maternal and child health systems	Recommended

B. Maternal and Fetal Assessment

B1. Maternal Assessment

Tuberculosis (TB)	Recommendation	type of recommendation
	B.1.8: In settings where the tuberculosis (TB) prevalence in the general population is 100/100 000 population or higher, systematic screening for active TB should be considered for pregnant women as part of antenatal care	Context-specific recommendation

B.2: Fetal assessment

Daily fetal movement counting	B.2.1: Daily fetal movement counting, such as with “count-to-ten” kick charts, is only recommended in the context of rigorous research	Context-specific recommendation
Symphysis-fundal height (SFH) measurement	B.2.2: Replacing abdominal palpation with symphysis-fundal height (SFH) measurement for the assessment of fetal growth is not recommended to improve perinatal outcomes. A change from what is usually practiced (abdominal palpation or SFH measurement) in a particular setting is not recommended	Context-specific recommendation
Antenatal cardiotocography	B.2.3: Routine antenatal cardiotocography is not recommended for pregnant women to improve maternal and perinatal outcomes	Not recommended
Ultrasound scan	B.2.4: One ultrasound scan before 24 weeks of gestation (early ultrasound) is recommended for pregnant women to estimate gestational age, improve detection of fetal anomalies and multiple pregnancies, reduce induction of labour for post-term pregnancy, and improve a woman’s pregnancy experience	Recommended

B. Maternal and Fetal Assessment

B2. Fetal Assessment

Doppler
ultrasound of
fetal blood
vessels

Recommendation

type of
recommendation

B.2.5: Routine Doppler ultrasound examination is not recommended for pregnant women to improve maternal and perinatal outcomes

Not recommended

C. Preventive measures

Antibiotics for asymptomatic bacteriuria (ASB)	Recommendation	type of recommendation
	C.1: A seven-day antibiotic regimen is recommended for all pregnant women with asymptomatic bacteriuria (ASB) to prevent persistent bacteriuria, preterm birth and low birth weight.	Recommended
Antibiotic prophylaxis to prevent recurrent urinary tract infections	C.2: Antibiotic prophylaxis is only recommended to prevent recurrent urinary tract infections in pregnant women in the context of rigorous research	Context-specific recommendation
Antenatal anti-D immunoglobulin administration	C.3: Antenatal prophylaxis with anti-D immunoglobulin in non-sensitized Rh-negative pregnant women at 28 and 34 weeks of gestation to prevent RhD alloimmunization is only recommended in the context of rigorous research	Context-specific recommendation
Preventive anthelmintic treatment	C.4: In endemic areas preventive anthelmintic treatment is recommended for pregnant women after the first trimester as part of worm infection reduction programmes	Context-specific recommendation
Tetanus toxoid vaccination	C.5: Tetanus toxoid vaccination is recommended for all pregnant women, depending on previous tetanus vaccination exposure, to prevent neonatal mortality from tetanus	Recommended

C. Preventive measures

Malaria prevention: intermittent preventive treatment in pregnancy (IPTp)	Recommendation	type of recommendation
	C.6: In malaria-endemic areas in Africa, intermittent preventive treatment with sulfadoxine-pyrimethamine (IPTp-SP) is recommended for all pregnant women. Dosing should start in the second trimester, and doses should be given at least one month apart, with the objective of ensuring that at least three doses are received	Context-specific recommendation
Pre-exposure prophylaxis (PrEP) for HIV prevention	C.7: Oral pre-exposure prophylaxis (PrEP) containing tenofovir disoproxil fumarate (TDF) should be offered as an additional prevention choice for pregnant women at substantial risk of HIV infection as part of combination prevention approaches	Context-specific recommendation
Antenatal anti-D immunoglobulin administration	C.3: Antenatal prophylaxis with anti-D immunoglobulin in non-sensitized Rh-negative pregnant women at 28 and 34 weeks of gestation to prevent RhD alloimmunization is only recommended in the context of rigorous research	Context-specific recommendation
Preventive anthelmintic treatment	C.4: In endemic areas preventive anthelmintic treatment is recommended for pregnant women after the first trimester as part of worm infection reduction programmes	Context-specific recommendation
Tetanus toxoid vaccination	C.5: Tetanus toxoid vaccination is recommended for all pregnant women, depending on previous tetanus vaccination exposure, to prevent neonatal mortality from tetanus	Recommended

D. Interventions for common physiological symptoms

Nausea and vomiting	Recommendation	type of recommendation
	D.1: Ginger, chamomile, vitamin B6 and/or acupuncture are recommended for the relief of nausea in early pregnancy, based on a woman's preferences and available options	Recommended
Heartburn	D.2: Advice on diet and lifestyle is recommended to prevent and relieve heartburn in pregnancy. Antacid preparations can be offered to women with troublesome symptoms that are not relieved by lifestyle modification	Recommended
Leg cramps	D.3: Magnesium, calcium or non-pharmacological treatment options can be used for the relief of leg cramps in pregnancy, based on a woman's preferences and available options	Recommended
Low back and pelvic pain	D.4: Regular exercise throughout pregnancy is recommended to prevent low back and pelvic pain. There are a number of different treatment options that can be used, such as physiotherapy, support belts and acupuncture, based on a woman's preferences and available options	Recommended
Constipation	D.5: Wheat bran or other fibre supplements can be used to relieve constipation in pregnancy if the condition fails to respond to dietary modification, based on a woman's preferences and available options.	Recommended
Varicose veins and oedema	D.6: Non-pharmacological options, such as compression stockings, leg elevation and water immersion, can be used for the management of varicose veins and oedema in pregnancy, based on a woman's preferences and available options	Recommended

E. Health systems interventions to improve the utilization and quality of antenatal care

- Woman-held case notes
- Group antenatal Care
- Community-based interventions to improve communication and support
- Task shifting components of antenatal care delivery
- Recruitment and retention of staff in rural and remote areas
- Antenatal care contact schedules

Outcomes of interest

- **Maternal outcomes**

- Infections
- Anemia
- Pre-eclampsia/eclampsia
- Gestational diabetes mellitus
- Mode of delivery
- Excessive weight gain
- Intimate partner violence
- Side-effects
- Symptomatic relief
- Maternal mortality
- Maternal satisfaction and/or women's rating of
- usefulness of treatment

- **Fetal/neonatal outcomes**

- Neonatal infections
- Small for gestational age
- Low birth weight
- Preterm birth
- Congenital anomalies
- Macrosomia/large for gestational age
- Fetal/neonatal mortality

Comparing ANC schedules

WHO FANC model

- **First trimester**
- Visit 1: 8–12 weeks
- **Second trimester**
- Visit 2: 24–26 weeks
- **Third trimester**
- Visit 3: 32 weeks
- Visit 4: 36–38 weeks

2016 WHO ANC model

- **First trimester**
- Contact 1: up to 12 weeks
- **Second trimester**
- Contact 2: 20 weeks
- Contact 3: 26 weeks
- **Third trimester**
- Contact 4: 30 weeks
- Contact 5: 34 weeks
- Contact 6: 36 weeks
- Contact 7: 38 weeks
- Contact 8: 40 weeks
- Return for delivery at 41 weeks if not given birth