RAMA UNIVERSITY

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FACULTY OF NURSING

MATERNAL ADAPTATION: PHYSIOLOGICAL AND PSYCHOLOGICAL

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INTRODUCTION

the anatomic , physiological, endocraniological and psychological changes are the positive adaptation of the mother to accommodate and support the fetus throughout gestation , for delivery and lactation of fetus

PREGNANCY:-

pregnancy, or gestation , is a period of approximately 9 months when a women carries an embryo or fetus in her uterus.

DEFINITION:-

The period from conception to birth. After the egg is fertilized by a sperm and then implanted in the lining of the uterus, it develops into the placenta and embryo, and later into a fetus. Pregnancy usually lasts 40 weeks, beginning from the first day of the woman's last menstrual period, and is divided into three trimesters, each lasting three months.

PHYSIOLOGICAL CHANGES DURING PREGNANCY

Physiological changes that take place in a mother's body during pregnancy are associated with and caused by the effect of specific hormones. These changes enables her to nurture the fetus , prepare her body for labor and develop her breasts for production of milk during the puerperium.

CHANGES IN GENITAL ORGANS

- Vulva
- Vagina
- Uterus
- Isthmus
- Cervix
- Fallopian Tube
- Ovary

VULVA

- Oedematous
- More Vascular
- Superficial varicosities may appear specially in multiparae.
- Labia minora are pigmented and hypertrophied

VAGINA

- Vaginal walls become hypertrophied, oedematous and more vascular.
- Increased blood supply of the venous plexus surrounding the walls
- The length of the anterior vaginal wall is increased.
- Secretion becomes copious, thin and curdy

UTERUS

The uterus show maximum changes because it provides a nutritive and protective environment in which the foetus will develop and grow. Changes occur in all the parts of uterus body, isthmus and cervix.

- **Size**
  - ❖ Height and weight (hyperplasia)
    - ➢ the height increases from 7.5 cm to 35cm
    - ➢ the weight increases from 50g to 1000g at term
    - ➢ & capacity of uterus increases from 50ml - 5 liters.
    - ➢ The mass of the uterus varies

- **Shape**
  - Non pregnant pyriform shape is maintained in early months. Becomes globular at 12 weeks.
  - As the uterus enlarge, the shape once more becomes pyriform or ovoid by 28 weeks
  - Changes to spherical beyond 36th week

- **Position**

- Normal anteverted positions exaggerated up to 8 weeks
- The enlarged uterus may lie on the bladder
- Afterwards, it becomes erect, the long axis of the uterus conforms more is a tendency of ante version
- Primigravidae with good tone of the abdominal muscles, it is held firmly against the maternal spine.

- **Decidua :-**

the decidua is the name given to the endometrium during pregnancy, there is increased thickness and vascularity of the lining of uterus. these changes are brought about by progesterone and estrogen. it provide glucogen rich environment for the blastocyst until the placenta is formed

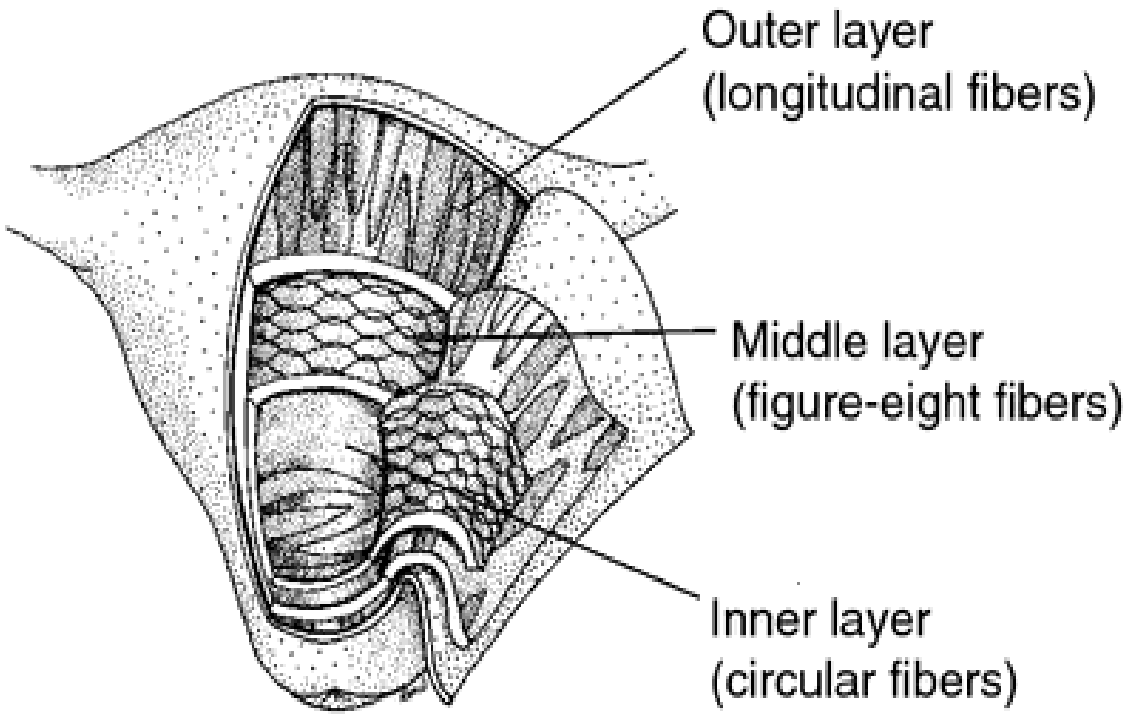
Changes in the muscles

(1). Hypertrophy and hyperplasia- occur under the influence of the hormones- oestrogen and progesterone

(2). Stretching:- The muscle fibres further elongate beyond 20 weeks due to distension by the growing foetus. The wall becomes thinner and at term, measures about 1.5cm or less.

Arrangement of the muscle fibres

1)Outer longitudinal – follows a hood like arrangement over the fundus; some fibres are continuous with the round ligaments



(2) Inner circular – It is scanty and have sphincter like arrangement around the tubal prifices and internal os

(3) Intermediate – It is the thickest and strongest layer arranged in criss-cross fashion through which the blood vessels run.

Braxton Hicks contraction:

sporadic, irregular, asymmetrical, and painless, low pressure, lasting < 30 sec

Vascular system

- Uterine artery diameter becomes double
- Blood flow increases by eight fold at 20 weeks of pregnancy.
- Vasodilatation is mainly due to estradiol and progesterone.
- Veins become dilated and are valveless.
- Numerous lymphatic channels open up.
- Vascular changes are most pronounced at the placental

ISTHMUS

- During the first trimester isthmus hypertrophies and elongates to about 3times its original length

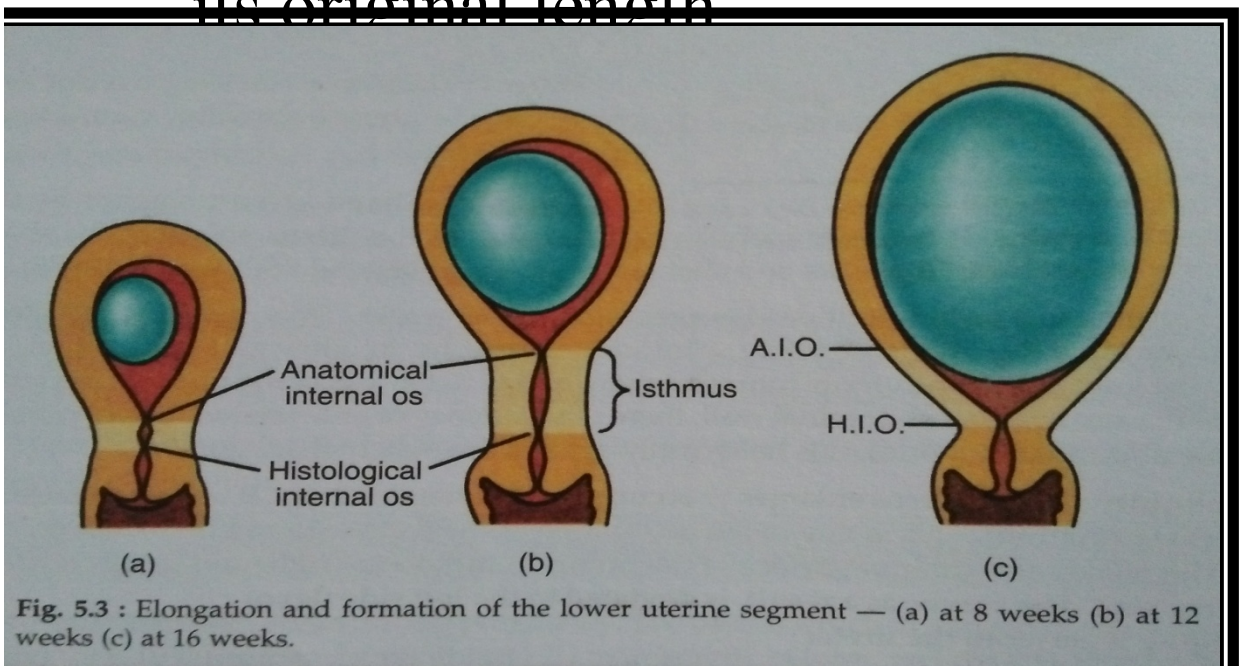


Fig. 5.3 : Elongation and formation of the lower uterine segment — (a) at 8 weeks (b) at 12 weeks (c) at 16 weeks.

CERVIX

- **stroma**

➢ The cervix remains tightly closed during the pregnancy.

➢ Hypertrophy and hyperplasia of the elastic and connective tissues

➢ Vascularity is increased

➢ Softening of the cervix (Goodell's sign) (6weeks)

- **Epithelium**

  Squamous cells also become hyperactive Mucosal changes stimulate basal cell hyperplasia or cervical intraepithelial neoplasia (CIN)

- **Secretion**

  is copious and tenacious –physiological leucorrhoea of pregnancy

- **Anatomical**

  The length of the cervix remain unaltered but becomes bulky.

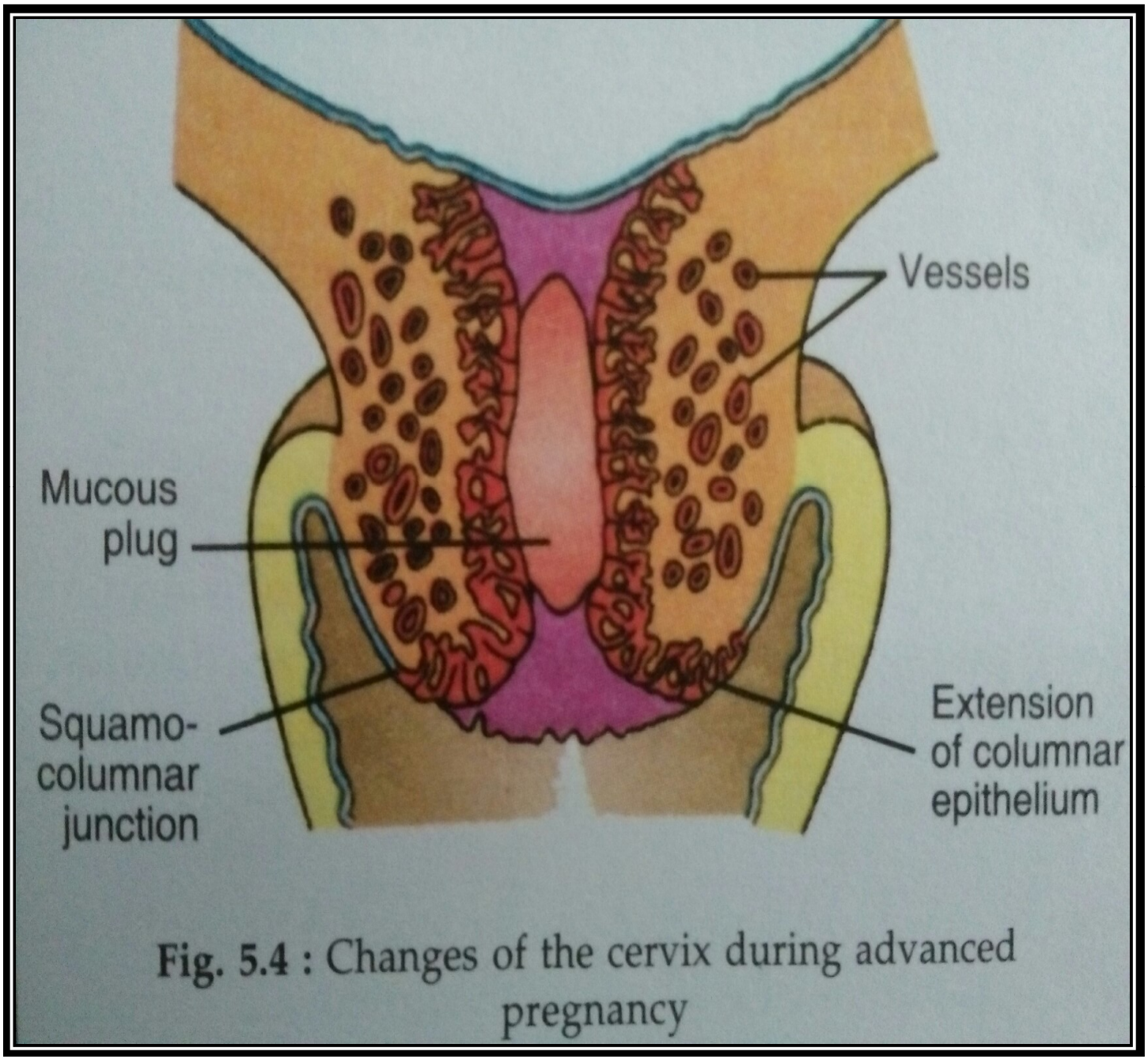


Fig. 5.4 : Changes of the cervix during advanced pregnancy

FALLOPIAN TUBE

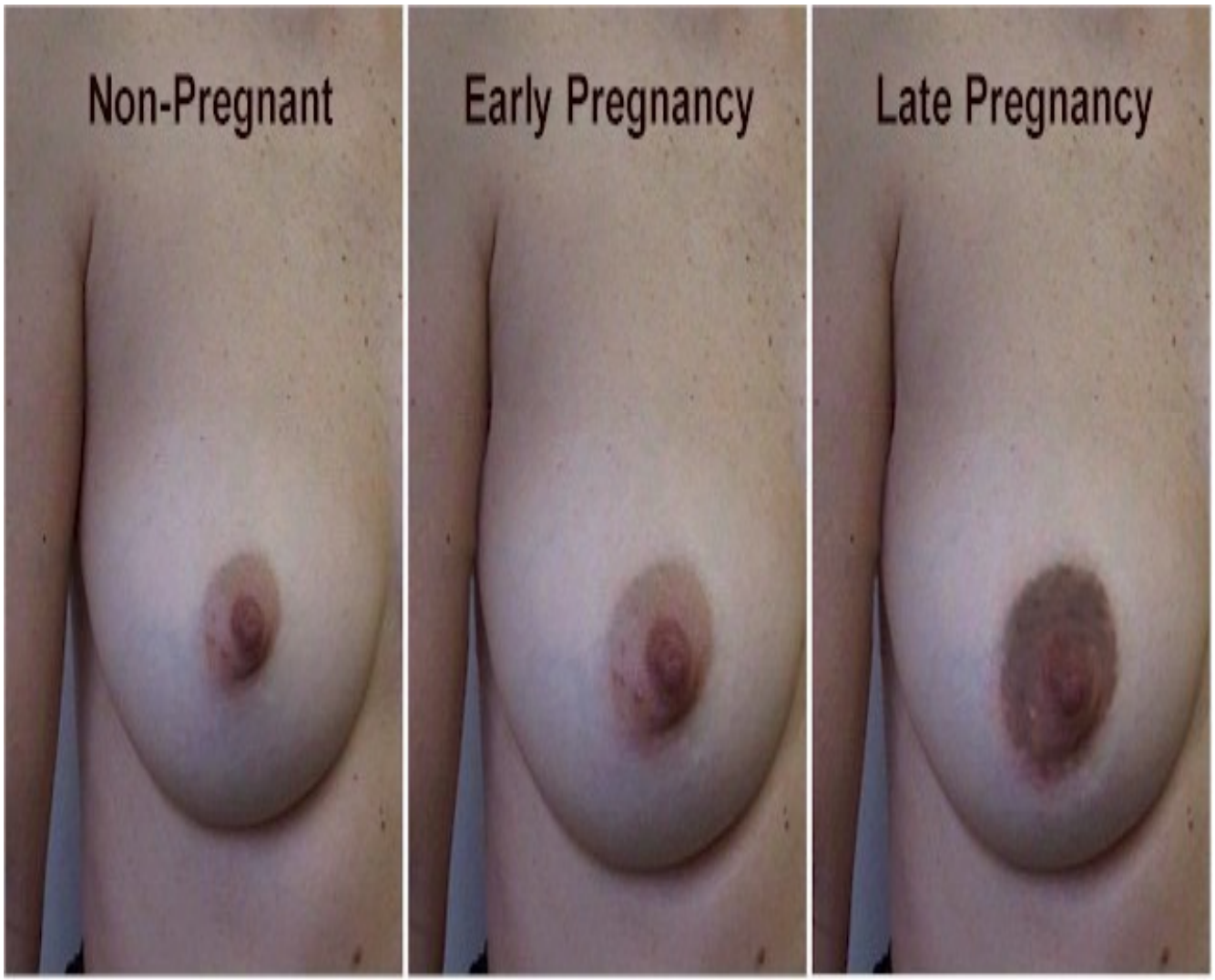
- Total length is increased
- Tube becomes congested
- Muscles undergo hypertrophy

OVARY

- Growth and function of the corpus luteum reaches its maximum at 8th week
- Hormones-oestrogen and progesterone secreted by the corpus luteum maintain the environment for the growing ovum
- Control the formation and maintenance of decidua of pregnancy
- Inhibit ripening of the follicles

BREAST CHANGES

- Increased size of the breasts
- Marked hypertrophy and proliferation of the ducts (oestrogen and progesterone)
- Vascularity is increased
- The nipples become larger, erectile and deeply pigmented


Non-Pregnant
Early Pregnancy
Late Pregnancy

- Sebaceous glands (5-15) become hypertrophied and are called Montgomery's tubercles

- Outer zone of less marked and irregular pigmented area appears in the second trimester and is called secondary areola
- Secretion (colostrum) can be squeezed out of the breast at about 12th week

CUTANEOUS CHANGES

- Face (cholasma gravidarum or pregnancy mask) an extreme form of pigmentation around the cheek, forehead and around the eyes

- Breast changes
- Abdomen
  - **Linea nigra :** a brownish black pigmented area in the midline stretching from the xiphisternum to the symphysis pubis

- **Straie graviderum :**slightly depressed linear marks with varying length and breadth found in pregnancy

Alimentary System

- Gums become congested and spongy and may bleed to touch

- Nausea and vomiting around 4 to 8 week , which may continue until about 14 to 16 weeks Risk of peptic ulcer disease is reduced.

- change in the sense of taste can occur in early period of pregnancy.
- Craving for bizzare substances such as coal,wall plaster, mud,etc, termed as pica.
- Atonicity of the gut leads to constipation

– Liver and gall bladder

- The gall bladder increases in size and empties more slowly durinng pregnancy causing stagnation of bile.
- Liver functions are depressed
- High blood cholesterol level during pregnancy, favour stone formation

METABOLIC CHANGES

- **General Metabolic Changes**
  - Total metabolism is increased due to the needs of the growing fetus and the uterus
  - Basal metabolic rate is increased to the extent of 30% higher than that of the average for the nonpregnant women.
- **Protein Metabolism**
  - Positive nitrogenous balance throughout pregnancy
  - At term, the fetus and the placenta contain about 500 gm. of protein and the maternal gain is also about 500 gm.

- **Carbohydrate Metabolism**
  - Insulin secretion is increased in response to glucose and amino acids.
  - Hyperplasia and hypertrophy of beta cells of pancreas.
  - Increased insulin level favours lipogenesis (fat storage).This mechanism ensures continuously supply of glucose to the fetus

- **Fat Metabolism**
  - An average of 3-4 kg of fat is stored during pregnancy mostly in the abdominal wall, breasts,hips and thighs
- **Lipid metabolism:-**
  - HDL level increased by 15%
  - The activity of lipoprotein lipase is increased

- **Iron Metabolism**
  - Iron is absorbed in ferrous form from duodenum and jejunum and is released into the circulation as transferrin
  - 10 percent of ingested iron is absorbed
  - Total iron requirement during pregnancy is estimated approximately 1000mg
  - In the absence of iron supplementation, there is drop in haemoglobin, serum iron and serum ferritin concentration at term pregnancy

WEIGHT GAIN

- In early weeks, the patient may lose weight because of nausea and vomiting
- During subsequent months, the weight gain is in progressive until the last one or two weeks, when the weight remains static
- The total weight gain during the course of a singleton pregnancy for a healthy woman averages 11 kg
- Distributed to 1 kg in first trimester and 5 kg each in second and third trimester

The total weight gain at term is distributed approximately as :

Reproductive weight gain: 6 kg	Net maternal weight gain: 6 kg
➢ Fetus – 3.3 kg, ➢ placenta –0.6 kg and liquor – 0.8 kg ➢ uterus – 0.9 kg and ➢ breast -0.4 kg, ➢ accumulation of the fat and protein – 3.5 kg	➢ Increases in blood volume – 1.3 kg ➢ Increases in extracellular fluid – 1.2 kg

HEMATOLOGICAL CHANGES

- **Blood volume**
  - Due to increased vascularity of the enlarging uterus, Blood volume is markedly raised during pregnancy
  - The blood volume starts to increase from about 6th week, expends rapidly thereafter to maximum 40-50% above the nonpregnant level at 30-32 weeks

- **Plasma Volume**
  - Starts to increase by 6 weeks
  - Rate of increase almost parallels to that of blood Volume
  - Reached to the extent of 50%
  - Total plasma volume increases to the extent of 1.25 litters

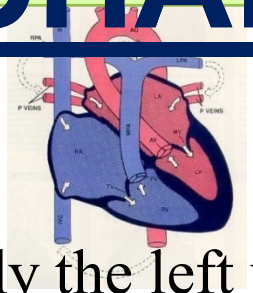
- **RBC And Haemoglobin**
  - The RBC mass is increased to the extent of 20-30%

    Increase demand of oxygen transport during pregnancy
  - Disproportionate increase in plasma and RBC volume

    produces state of haemodilution (fall in haemocrit)
  - Hb fall is about 2 gm.% from the non-pregnant value.

- Leucocytes And Immune System In the second and third trimester, the action of the polymorphoneuclear leukocytes may be depressed, perhaps accounting for the increased susceptibility of pregnant women to infection
- Total plasma protein increases from the normal 180 gm. (non-pregnant) to 230 gm Due to haemodilution(increase plasma volume), the plasma protein concentration falls from 7 gm. to 6 gm.%
- Blood Coagulation Factor Pregnancy is a hypercoagulable state. Plasma fibrinogen (factor 1) increases from the third month of pregnancy

CARDIOVASCULAR CHANGES



- **The Heart :**
  - muscle, particularly the left ventricles, hypertrophies leading to enlargement of the heart
  - The growing uterus pushes the heart upward and to the left
  - During pregnancy the heart rate and stroke volume (the amount of the blood pumped by heart with each beat) increases due to the increase blood volume and oxygen requirement of the maternal tissues and growing fetus

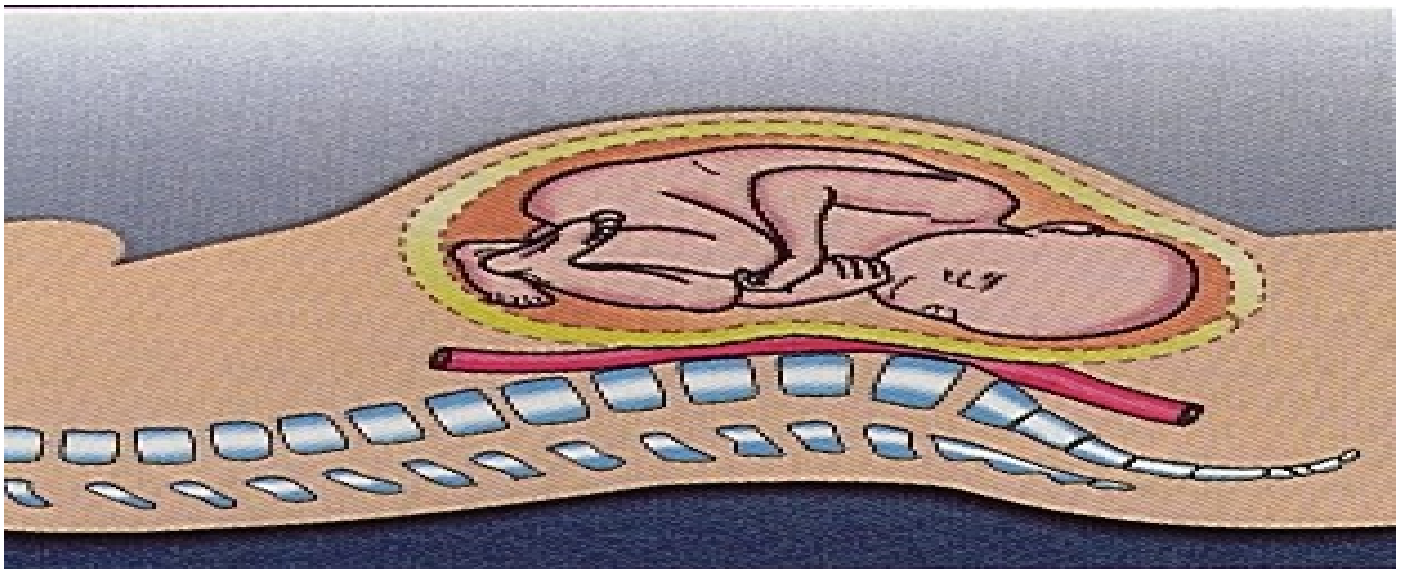
- **Cardiac Output :**

  - increases markedly by the end of the first trimester.
  - In the third trimester, a rise, fall or no change at all has been showed to occur, depending on individual variables.
  - lowest in the sitting or supine position and highest in the right or left lateral or knee chest position.
  - The capacity of veins and venules increases.
  - Arterial walls relax and dilate due to the effect of progesterone. The increase production of vasodilator prostaglandin also contributes to this.

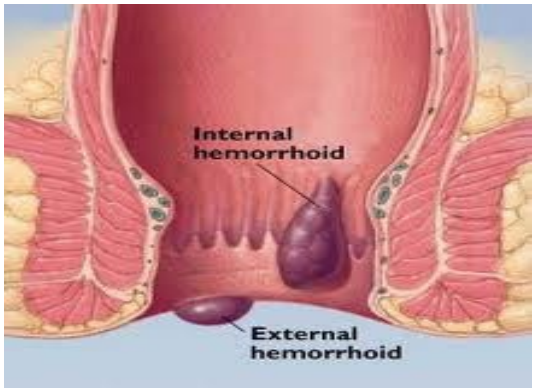
- **Regional Distribution Of The Blood Flow**
  - Uterine blood flow is increased from 50 ml per minute in non-pregnant state about 750 ml near term
  - Pulmonary blood flow (normal 6000ml/min) is increased by 2500 ml per minute
  - Renal blood flow (normal 800 ml) increases by 400 ml per minute at 16th week remains at this level till term
  - Heat sensation, sweating or stuffy nose complained by the pregnant women can be explained by the increased blood flow

- **Blood Pressure**
  - During the mid-trimester, changes in blood pressure may occur causing fainting
  - In later pregnancy Cardiac output is reduced by 25-30 percent and the blood pressure may fall by 10-15 percent

- hypotension may occur in 10% of women in unsupported supine position. This termed as “supine hypotensive syndrome”
- The pressure of gravid uterus compresses the vena cava, reducing the venous return



- **Venous pressure: Venous blood flow**
  - Significantly increases in the lower extremities, esp. during supine, sitting or standing position, returns to near normal in lateral recumbent position



Respiratory System

- Shape of the chest and the circumference increases in pregnancy by 6 cm
- Progressive increase in oxygen consumption, which is caused by the increased metabolic needs of the mother and fetus
- The mucosa of the nasopharynx becomes hyperaemic and oedematous
- A state of hyperventilation occurs during pregnancy leading to increase tidal volume
- The woman feels shortness of breath

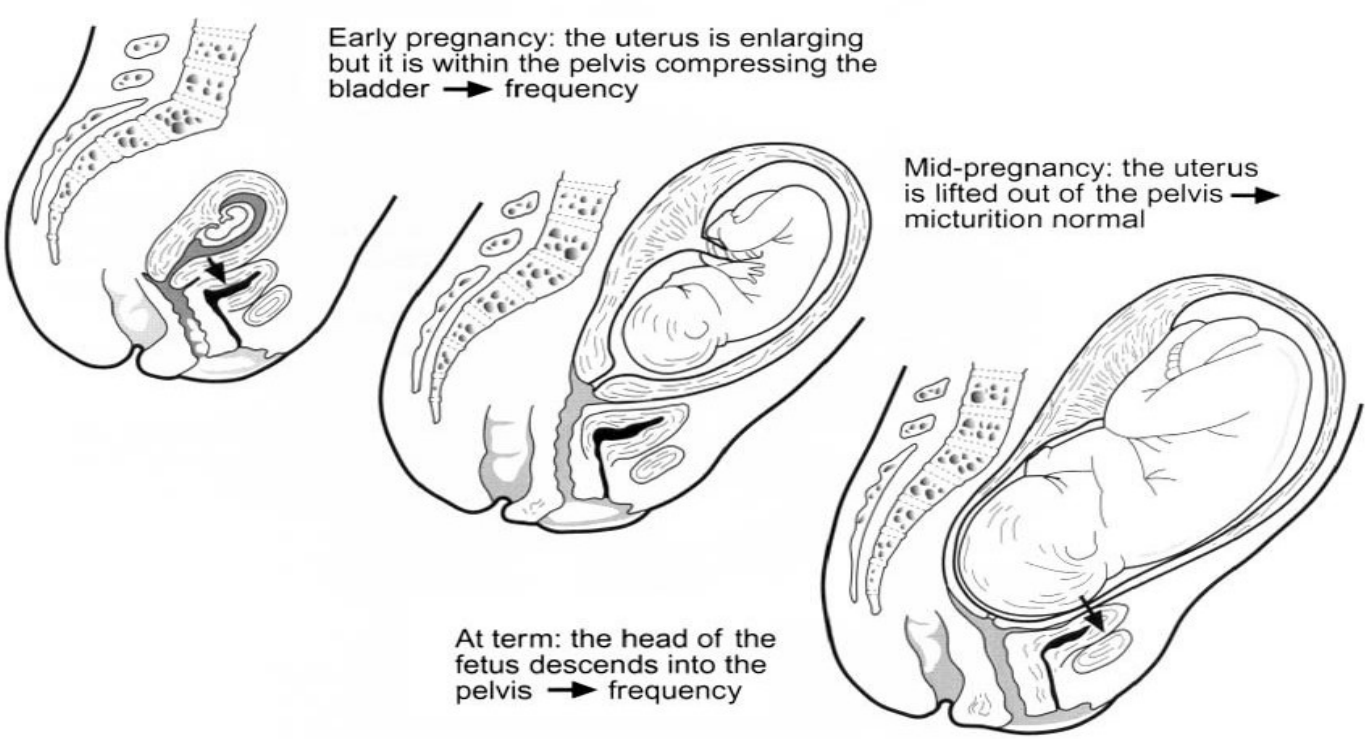
- **Acid base balance :-**
  - The hyperventilation causes changes in the acid base balance. The arterial PaCO2 falls from 38-32 mm Hg and PaO2 reises from 95-105 mm Hg.
  - The pH rises in order of 0.02 unit and there is a base excess of 2mEq/ L. thus Pregnancy is a state of respiratory alkalosis

Urinary System

- **kidney**
  - Dilatation of the ureter, renal pelvis and calyces. The kidneys enlarge in length by 1 cm.
  - Renal plasma flow is increased by 50-75%, maximum by the 16 weeks and is maintained until 34 weeks. Thereafter it falls by 25%.
  - Glomerular filtration rate (GFR) is increased by 50% all throughout the pregnancy

- **Ureter**
  - Ureters become atonic due to high progesterone level.
  - Dilatation of the ureter above the pelvic brim with stasis is marked on the right side specially in primigravidae.

- **Bladder**
  - Increased frequency of micturition is noticed at 6-8 weeks of pregnancy which subside after 12 weeks and In late pregnancy, frequency of micturition once more reappears due to pressure on the bladder as the presenting part descends down the pelvis.



- Stress incontinence may observe in late pregnancy due to urethral sphincter weakness

NERVOUS SYSTEM

- Temperamental changes are found during pregnancy and in the puerperium
- Nausea, vomiting, mental irritability and sleeplessness are probably due to some psychological background
- Compression of the median nerve underneath the flexor retinaculum over the wrist joint leading to pain and paresthesia in the hands and arm may appear in later ,months of pregnancy.

- Similar paresthesia and sensory loss over the anterolateral aspect of the thigh may occur, it is due to compression of the lateral cutaneous nerve of the thigh.
- Postpartum blues, depression or psychosis may develop in a susceptible individual

CHANGES IN THE ENDOCRINE SYSTEM

- **Placental Hormones**
  - Placenta produces several hormones
  - The high levels of estrogen and progesterone produced by the placenta are responsible for breast changes, skin pigmentations and uterine enlargement in the first trimester
  - Chorinonic gonadotrophin is the basis for the immunologic pregnancy tests
  - Human placental lactogen stimulates the growth of the breasts

- **Pituitary Hormones**
  - The secretion of prolactin, adrenocorticotrophic hormone, thyrotrophic hormone and melanocyte-stimulating hormone increases
  - Follicle stimulating hormone and luteinzing hormone secretion is greatly inhibited by placental progesterone and estrogen.
  - The effects of prolactin secretion are suppressed during pregnancy
  - Posterior pituitary gland releases oxytocin in low-frequency pulses throughout pregnancy. At term the frequency of pulses increases which stimulates uterine contractions

- **Thyroid Function**
  - Gland increases in size by about 13 percent due to hyperplasia of glandular tissue and increased vascularity
  - Increased uptake of iodine during pregnancy
  - Pregnancy can give the impression of hyperthyroidism, thyroid function is basically normal
  - The basal metabolic rate is increased mainly because of increased oxygen consumption by the fetus and the work of the maternal heart and lungs

PSYCHOLOGICAL CHANGES DURING PREGNANCY

INTRODUCTION:-

Pregnancy is an experience full of growth, change, enrichment, and challenge. Fears and expectations about becoming parents. Emotions in both mother and father

❑1st Trimester:

- **Establishing an Acceptance of Pregnancy**
  - There is feeling of surprise, ambivalence, emotional lability, money worries and body image changes especially to first time mothers and those who are not planning to have a child. What the impending future might bring and how it will undoubtedly change one's life are common worries of a woman in her first trimester.

Conti……

- The expecting mother could experience feelings of Denial, which is a sign of maladaption to pregnancy.
- The task of the expectant mother is to accept the biological facts of pregnancy: "I am pregnant".

❑ 2nd Trimester:

– Continuation of Pregnancy

- There is role identification in the part of the mother and a heightened sense of time as the day of childbirth approaches.
- Mother identifies the fetus as a separate entity due to quickening (feeling of the baby's movement in the womb).
- Mother begins to fantasize the appearance of baby.

- There is change in sexual interest. The father examines his own ability to parent.
- The developmental task of the mother is to accept the growing fetus as a baby to be nurtured: "I am going to have a baby."
- In the middle of the pregnancy period, the woman's interest lies in the growth and development of the fetus.

❑ 3rd Trimester:

- **Preparation for Separation of the Baby**

  - The mother has a personal identification on the appearance of the baby.
  - She may have fears about her large abdomen and the impending labor and delivery of the unborn child.
  - Safe passage for the her and the newborn are primary concerns of the mother near the end of her pregnancy.

Conti....

- Nesting behaviors may be observed. Busy days and restless nights may be present as the mother prepares for the coming of her child.
- The psychological task of the mother is to successfully prepare for birth and parenting of the child: "I am going to be a mother."
- This is the best time to prepare the baby's room, shop for clothes and things that the baby will use. Lamaze classes may also help to facilitate successful childbirth.

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thank
you