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Semester VI & VII

Essentials of
Midwifery/Obstetrics and Gynecology (OBG) Nursing

As per the Revised INC Syllabus for BSc Nursing

Includes Modules and OSCE

Jyoti R Thakur

JAYPEE

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UNIT 3

Normal Pregnancy: Maternal Assessment, Care, and Management (Antenatal)

Unit Outline

- **Pre-pregnancy:** Preconception care, preconception counseling, planned parenthood, genetic counseling.
- **Normal pregnancy:** Terminologies related to pregnancy, physiological and psychological changes during pregnancy, diagnosis of pregnancy, calculation of EDD.
- **Antenatal assessment and care:** Antenatal assessment, care and advice, obstetric abdominal examination, fetus in utero, fetopelvic relationship, antenatal fetal assessment, antenatal exercises, nursing diagnosis and objectives for antenatal mother, application of nursing theories for nursing care of normal antenatal mother.
- **Ongoing care:** Minor ailments/discomforts of pregnancy, warning signs in pregnancy, Birth Preparedness and Complication Readiness (BPCR).

Learning Objectives

Upon completion of this unit, the learner will be able to:

- Describe the components and importance of preconception care and provide appropriate guidance to eligible couples.
- Explain the physiology of normal pregnancy and recognize methods of confirmation and diagnosis of pregnancy.
- Assess and manage maternal health effectively across all trimesters of a normal pregnancy.
- Demonstrate competency in delivering respectful and culturally sensitive maternity care during the antenatal period.
- Develop and demonstrate competencies in performing various midwifery procedures.
- Utilize and apply nursing process in care of a mother with normal pregnancy.
- Utilize and apply appropriate nursing theories in management of antenatal mothers.

PRECONCEPTION CARE

Preparation for pregnancy is an important way to improve pregnancy outcomes. Preconception care, a key component of obstetric health services, has been practiced for nearly 40 years. Preconception care is a set of interventions that are to be provided before pregnancy, to promote the health and well-being of women and couples, as well as to improve the pregnancy and child-health outcomes.

The preconception period is often defined as 3 months before conception, possibly because this is the average time to conception for fertile couples.

Preconception health is important for every woman of reproductive age regardless of her marital status, and not only for those who are actively planning a pregnancy. The effectiveness of preconception care has been well demonstrated, particularly among women who are at increased risk of adverse pregnancy outcomes.

Definition

Preconception care is defined as a set of interventions that aim to identify and modify biochemical, behavioral and social risks to the woman's health or pregnancy outcome through prevention and management.

According to the WHO, preconception care is the provision of biomedical, behavioral and social health interventions to women and couples before conception occurs.

Goal

Preconception care aims to improve the health status of couple and reduce unhealthy behaviors, as well as individual

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and environmental factors, that contribute to poor maternal and child health outcomes. Its ultimate aim is to improve maternal and child health, in both the short and long term.

The goal of preconception care is to improve pregnancy outcomes and women's health in general through prevention of disease and management of risk factors that affect pregnancy outcome and the health of future generations. Even if preconception care aims primarily at improving maternal and child health, it brings health benefits to the adolescents, women and men, irrespective of their plans to become parents.

Components

The principal components of preconception care include:

1. **Health promotion and risk assessment:** Preconception care emphasizes promoting healthy behaviors. This includes encouraging maintaining a balanced diet, engaging in regular physical activity, and avoiding smoking, and unsafe sexual practices.. Additionally, preconception care involves assessing individuals' health risks and providing appropriate guidance and interventions to address and mitigate these risks.
2. **Family planning and contraception:** Preconception care supports couples in making informed decisions about family planning. It involves providing access to effective contraception methods and discussing contraceptive options.
3. **Screening and managing pre-existing conditions:** Preconception care focuses on identifying and managing pre-existing medical conditions that may impact pregnancy outcomes. This includes screening for diabetes, hypertension, or infections. By identifying these conditions early, appropriate management strategies, such as medication, lifestyle modifications, or referrals, can be implemented.
4. **Genetic counseling and screening:** Preconception care recognizes the importance of assessing the risk of inherited genetic conditions. Genetic counseling is provided to individuals or couples to discuss their genetic testing options and make informed decisions about family planning.
5. **Immunizations and infectious disease prevention:** Preconception care highlights the significance of immunizations in protecting individuals and their future children from preventable infections. It also guides preventing and managing infections that may pose risks during pregnancy.
6. **Psychosocial support and mental health considerations:** Preconception care involves addressing emotional well-being, supporting stress management, and screening for mental health conditions. Preconception care also includes appropriate referrals for counseling or treatment, if needed.

Importance

- **Improved pregnancy outcomes:** Engaging in preconception care has been associated with a reduced risk of complications such as preterm birth, low birth weight, and congenital disabilities by addressing potential risk factors before conception, individuals can optimize their health and increase the chances of a healthy pregnancy and favorable birth outcomes.
- **Enhanced maternal health:** Preconception care allows for identifying and managing pre-existing conditions, reducing the risks associated with chronic diseases during pregnancy. It can optimize their health and reduce the likelihood of complications during pregnancy.
- **Identification and management of modifiable risk factors:** Through preconception care, lifestyle factors that can impact pregnancy outcomes, such as smoking, excessive alcohol consumption, or inadequate nutrition, can be assessed and addressed. By providing guidance and support, preconception care enables individuals to make positive changes to their lifestyle, reducing the risks associated with these modifiable factors.
- **Early detection and interventions:** Preconception care includes screening and counseling aimed at identifying potential risks and providing timely interventions to promote a healthy pregnancy and maternal well-being. By assessing factors, such as genetic disorders, infectious diseases, or mental health conditions, preconception care can facilitate early detection and management of these conditions before pregnancy.

Positive Effects

The preconception care helps to:

- Reduce maternal and child mortality
- Prevent unintended pregnancies
- Prevent complications during pregnancy and delivery
- Prevent stillbirths, preterm birth and low birth weight
- Prevent birth defects
- Prevent neonatal infections
- Prevent underweight and stunting
- Prevent vertical transmission of HIV/STI
- Lower the risk of some forms of childhood cancers
- Lower the risk of type 2 diabetes and cardiovascular disease later in life.

Conditions Addressed

The following conditions are addressed in preconception care.

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- Those that need to correct prior to pregnancy.
- Interventions not usually undertaken in pregnancy.
- Interventions considered only because the pregnancy is planned.
- Conditions that might change the choice or timing to conceive.

Areas Addressed by the Preconception Care Package (Table 3.1)

Table 3.1: Areas addressed by the preconception care package.

- Nutrition conditions
- Tobacco use
- Genetic conditions
- Environmental health
- Infertility/Sub fertility
- Interpersonal violence
- Too early unwanted and rapid successive pregnancy
- Sexually transmitted Infections
- HIV
- Mental Health
- Psychoactive substance use
- Vaccine preventable diseases
- Female Genital Mutilation (FGM)

For each area, evidence-based interventions are recommended in this package. Opportunities to prevent and control diseases occur across multiple stages of life, and strong public health programs that adopt a life-course approach—from infancy through childhood, adolescence, and adulthood—are essential. Preconception care supports these efforts and can make a significant difference in improving health outcomes.

Risk Assessment at Preconception Visit

Generally, the risk assessment is done for the mother at preconception visit by identification of high-risk factors by detailed evaluation of obstetric, medical, family and personal history and lab investigation and general physical examination. Inheritable genetic diseases (sickle cell disease, cystic fibrosis) are also screened before conception with importance of prenatal diagnosis for chromosomal or genetic diseases are discussed with the couple. Also, the need of medical treatment for existing problems, maternal immunization for rubella and hepatitis and use of folic acid 4 mg/day for 1 month before pregnancy and for first 3 months during pregnancy to prevent neural tube defects in fetus is also discussed.

Limitations

Only a small percentage of women take the advantage of preconception care due to lack of awareness, less importance to pre-pregnant health of mother and due to unplanned pregnancy. The people who most need it rarely attend such care.

Unplanned pregnancy, financial issues, inadequate training of health care providers, lack of coordination between primary and secondary care providers, risk factors for adverse outcome, lack of knowledge and education about health and pregnancy are some of the factors which adversely affect the preconception care.

Role of Nurse/Midwife

Role of a nurse midwife in preconception care

- The nurse midwife should provide guidance to the couple on health-promoting behaviors before planning a pregnancy.
- She must carefully assess any risk behaviors or activities and review health and environmental factors that may influence pregnancy outcomes.
- The nurse midwife should participate in genetic counseling, referrals, and screening as needed.
- She must also offer psychological support to the couple and play a significant role in creating awareness about the importance of preconception care among eligible couples.
- The nurse midwife should support the couple in planning for pregnancy and encourage them to attend initial and regular follow-up visits throughout the recommended period.
- The nurse should provide the couple with adequate information about the need for and advantages of preconception care.
- She should also ensure that all aspects included in the preconception care package are thoroughly addressed.

Preconception Counseling

Preconception counseling is a part of preventive medicine/obstetrics and it is different from the antenatal care.

Meaning

When a couple is seen and counseled about pregnancy, its course and outcome well before the time of actual conception, it is called preconception counseling.

Objective

The main objective of preconception counseling is to ensure that a mother enters pregnancy with an optimal state of health which would be safe for both the mother and the fetus.

Components of Preconception Counseling

Preconception counseling consists of three integral components:

- **Risk assessment:** Identifying medical, genetic, behavioral, and environmental risks that may affect the woman, her partner, or a future pregnancy. It is done by history taking, physical examination, and laboratory assessment and screening before pregnancy.

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- **Health promotion and education:** Providing education and guidance on healthy lifestyle practices such as balanced nutrition, regular exercise, cessation of smoking and alcohol, immunization, and stress management.
- **Intervention:** Managing or treating identified risk factors, ensuring necessary medical or genetic referrals, and initiating preventive measures to optimize maternal and fetal outcomes.

The key factors that should be addressed through preconception counseling, ideally between three and six months before conception, are:

- **Healthy weight:** A mother should control her diet and exercise to start her pregnancy at optimal weight. Starting pregnancy at a healthy weight can reduce the risk of diabetes and PIH, fetal growth anomalies, preterm birth, IUD, and hemorrhage after delivery.
- **Folic acid:** Taking folic acid not less than 3 months before getting pregnant could prevent cases of neural tube defects, such as spina bifida, by up to 70%.
- **Quit smoking:** This helps to reduce the risk of ectopic pregnancy, miscarriage, birth defects, death in the womb, placental abruption, low birth weight and preterm birth.
- **Undernutrition and anemia:** Maternal undernutrition and iron deficiency anemia causes at least one maternal death out of five.
- **Alcohol and drugs:** Severe problems for the fetus resulting from maternal alcohol consumption include Fetal Alcohol Syndrome (FAS). Exposure to certain drugs, including some painkillers, during pregnancy can lead to Neonatal Abstinence Syndrome (NAS) and increase the risk of Sudden Infant Death Syndrome (SIDS). Addiction to alcohol, cannabis and opioids may lead to miscarriages, birth defects, intrauterine growth restriction, preterm birth, admission to the neonatal intensive care unit. There is also a strong association between exposure to these substances and poor growth after birth as well as behavioral and developmental problems in the child.

Other Important Aspects

The fear of pregnancy is alleviated through proper counseling. The couple is advised about the importance of prenatal diagnosis and informed about genetic disorders, possible medical complications, and the need for timely treatment and care.

Counseling Team

Generally, the counseling is provided by a team comprising by obstetrician, physician, geneticist, and a nurse-midwife as primary care giver.

Role of Nurse/Midwife

Role of a nurse midwife in preconception counseling

- The nurse midwife should be well-acquainted with the mother's medical, obstetric, and family history, as well as relevant health data, to provide appropriate and personalized preconception counseling.
- She should be able to convince the couple effectively helping them understand the importance of preconception care and motivating them to adopt healthy practices for a safe pregnancy.
- She ought to offer them psychological assistance. She ought to focus on the crucial aspects of counseling that need to be addressed.
- She must ensure that the couple is made to understand everything in their own language and level of comprehension.
- She is responsible for making it sure that the couple undergoes the preconception investigations and risk assessment.
- She must ensure that the couple receives the best optimal medical treatment and referral services as needed.

Planned Parenthood

Planned Parenthood is practice of measures designed to regulate the number and spacing of children within a family.

The concept is that a couple or a mother may choose when to conceive and give birth. This is accomplished only by the careful and proper use of some form of birth control.

Planned Parenthood refers to an organization that plays a key role in the development and distribution of modern contraceptive technologies, as well as in promoting large-scale family planning programs worldwide.

Planned Parenthood is a nonprofit American organization that provides reproductive healthcare services, including the promotion of accessible means of voluntary fertility control, operation of clinics, conduction of educational programs, conduction of research, and dissemination of information.

Planned Parenthood in India is represented by the Family Planning Association of India (FPA India), a nongovernmental organization that promotes sexual and reproductive health. It is the national affiliate of the International Planned Parenthood Federation. FPA India has 39 permanent clinics under them.

The essential healthcare services Planned Parenthood provides include STD testing and treatment, birth control, well-mother exams, cancer screening and prevention, abortion, hormone therapy, infertility services, and general health care. It provides medically accurate education that advances the understanding of human sexuality, healthy relationships, and body autonomy; promote research and technology that enhances reproductive healthcare and access.

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GENETIC COUNSELING

Genetic counseling is a process to evaluate and understand a family's risk of an inherited medical condition. In this the patients, families and clinicians are informed about the inheritance pattern, genetic and genomic basis of traits and clinical disorders.

Definition

Genetic counseling is the process through which knowledge about the genetic aspects of illnesses is shared by trained professionals with those who are at an increased risk or either having a heritable disorder or of passing it on to their unborn offspring.

Aim

The overall aim is to help individuals, couples and families understand and adapt to the medical, psychological, familial and reproductive implications of the genetic contribution to specific health conditions. The sessions aim to:

- Increase the family's understanding of a genetic condition.
- Discuss options regarding disease management and the risks and benefits of further testing and other options.
- Help the individual and family identify the psychosocial tools required to cope with potential outcomes.
- Reduce the family's anxiety.

Aspects Covered

It covers four main aspects.

1. Diagnostic
2. Risk calculation and estimation
3. Management and preventive measures
4. Support

Diagnostic: Focuses on identifying genetic or hereditary conditions.

Risk calculation and estimation: Involves assessing the likelihood of the condition occurring or recurring in the family or future pregnancies.

Management and preventive measures: Provides guidance on treatment options, preventive strategies, and reproductive choices to minimize risk.

Support: Offers emotional and psychological support to help individuals and families understand and cope with the implications of genetic findings.

Importance

Genetic counseling provides individuals and families with clear information and support to understand their genetic health, and make healthy decision for the future.

- It provides individuals and families with the knowledge and support to understand their genetic health.
- It is vital in helping individuals and families make sense of their genetic health.
- It offers guidance for a healthier, more informed, and empowered future.
- It helps people to understand their genetic inheritance.
- It helps in assessing the risk of genetic conditions and to make informed decisions about their genetic health.

Recommendations

Genetic counseling is recommended in a variety of situations. It helps people and families dealing with many different genetic problems like:

- Family history of genetic conditions, infertility
- Pregnancy planning, advanced maternal age, pregnancy with abnormal screening,
- Recurrent pregnancy loss, consanguineous marriage
- History of cancer, carrier testing, unexplained health issues

Stages

- **Planning for pregnancy**: Genetic counseling before pregnancy can address concerns about factors that might affect baby during infancy or childhood or women's ability to become pregnant, including
  - Genetic conditions in either family
  - History of infertility, multiple miscarriages, or stillbirth
  - Previous pregnancy or child affected by a birth defect or genetic condition
  - Assisted Reproductive Technology (ART) options
- **During pregnancy**: Genetic counseling during pregnancy can address certain tests that may be done during pregnancy, any detected problems, or conditions that might affect the baby during infancy or childhood, including
  - History of infertility, multiple miscarriages, or stillbirth
  - Previous pregnancy or child affected by a birth defect or genetic condition
  - Abnormal test results, such as a blood test, USG, CVS, or amniocentesis
  - Maternal infections, other exposures like medicines, drugs, chemicals, X-rays
- **Caring for children:** Genetic counseling can address concerns if the child is showing signs and symptoms of a disorder that might be genetic, including
  - Abnormal newborn screening results
  - Birth defects
  - Autism, vision and hearing problems
  - Intellectual or developmental disabilities

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- **Managing health**: Genetic counseling for adults includes specialty areas such as cardiovascular, psychiatric, and cancer.
  - Hereditary breast and ovarian cancer (HBOC) syndrome
  - Lynch syndrome (heredity colorectal cancer)
  - Familial hypercholesterolemia
  - Muscular dystrophy and other muscle diseases
  - Inherited movement disorders
  - Inherited blood disorders such as sickle cell disease

Following genetic counseling session, the person may be advised to have genetic testing. Genetic counseling after testing can help to better understand the test results and further treatment options.

A Genetic Counselor and his Role

A genetic counselor is a healthcare professional with specialized training in medical genetics and counseling. He plays a broader and more integral role in healthcare. He provides information on the inheritance of illnesses and their recurrence risks; addresses the concerns of patients, their families, and their health care providers; and supports patients and their families dealing with these illnesses. He serves as a central resource of information about genetic disorders for other healthcare professionals, patients, and the general public. Their evolving responsibilities include counseling for common conditions, genetic testing, cancer risk assessment, patient advocacy and teaching and mental health support, ethical and legal guidance. The counselor also acts as a liaison in health care professionals, diagnostic labs and patients. He is also responsible for communication with policy makers, media, public about new and emerging medical genetic technologies and services.



Role of Nurse/Midwife

Role of a nurse midwife in genetic counseling

Midwives and nurses are crucial in every stage of genetic counseling. They play a vital role in genetic counseling by providing information, emotional support, and guidance to families at risk of genetic disorders.

- To evaluate both hereditary and nonhereditary risk factors and obtain a thorough family history.
- To evaluate families and people who are at risk.
- To go over all of the possibilities, explain the genetic screening processes, and let them make an informed choice.
- To prepare the couple for the investigations as needed.
- To allay the couple's fears and give comprehensive information regarding illnesses and genetic tests, including hazards.
- To get actively engage in pre-test and post-test counseling sessions.
- To provide reassurance to the family.

NORMAL PREGNANCY

A normal pregnancy is the period during which a fertilized ovum develops into a fetus inside the mother's uterus, resulting in childbirth.

Definition

Pregnancy is the physiological condition in which a fertilized ovum implants and develops inside the uterus, resulting in the growth of an embryo and later a fetus until childbirth.

Duration of Normal Pregnancy

A normal pregnancy lasts about 40 weeks (280 days), counted from the first day of the last menstrual period.

Trimesters of the Pregnancy

Pregnancy is divided into three trimesters, starting with period of fertilization and ends with onset of labor and delivery. Each trimester is marked by specific developmental and physiological changes in both the mother and the fetus:

- First trimester: 0 to 12 weeks, 1st to 3rd month.
- Second trimester: 13 to 28 weeks, 4th to 6th month.
- Third trimester: 29 to 40 weeks, 7th to 9th month.

Criteria of a Normal Pregnancy

A pregnancy is considered normal when it meets the following criteria:

- **Normal implantation:** The fertilized ovum implants in the uterine cavity.
- **Single fetus:** Usually involves one healthy fetus.
- **Normal growth and development:** The fetus grows appropriately for gestational age.
- **Absence of complications:** No maternal or fetal abnormalities or diseases during pregnancy.
- **Normal duration:** Lasts about 37 to 42 weeks.
- **Spontaneous onset of labor:** Labor begins naturally at term.
- **Normal outcome:** Delivery of a healthy baby and mother's recovery without complications.

TERMINOLOGIES USED IN OBSTETRICS

In obstetrics, several terms are used to refer to the pregnancy, its condition, and its outcome.

- **Gestation age:** It is the duration of pregnancy from first day of last menstrual period (LMP). It is also known as menstrual age. It generally starts 2 weeks before the ovulation and fertilization.
- **Gravida:** Gravida or gravidity describes the total number of confirmed pregnancies that a mother has had, regardless of the outcome.

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- **Para:** Para or parity is defined as the number of births that a mother has given after 20 weeks gestation.
- **Primigravida:** A mother who is first time pregnant.
- **Primipara:** A mother who have delivered one viable child.
- **Multigravida:** A mother who has been previously pregnant (mother may have live birth or abortion).
- **Multipara:** A mother who has delivered two or more children.
- **Nulligravida:** A mother who is not now and never has been pregnant.
- **Nullipara:** A mother who has never completed her pregnancy to a period of viability. (Mother may have history of abortion).
- **Parturient:** A mother who is in labor, about to give birth.
- **Puerpera:** A mother who has just given birth to a baby.
- **Antenatal period:** It is the period from the conception up to the birth of baby. It is the pregnancy period before the childbirth. Also known as prenatal or antepartum period. The duration of antenatal period is generally 9 months and 7 days or 280 calendar days or 40 weeks.
- **Intranatal period:** It is the period from start of true labor pains up to delivery of placenta and membrane. Also known as intrapartum period. The duration of intranatal period is different for primi and multi.
- **Postnatal period:** It is a period which begins after the birth of placenta and ends at 6 weeks after delivery. Also known as postpartum period or puerperium. The period is divided into immediate, early and remote puerperium. Immediate puerperium is for first 24 hours; early puerperium is from 2nd day to 7th day and remote puerperium is from 1 to 6 weeks after delivery.

PHYSIOLOGICAL AND PSYCHOLOGICAL CHANGES DURING PREGNANCY

The female reproductive tract and other bodily systems undergo progressive morphological and physiological changes during pregnancy. It also has an impact on woman's psychological well-being. All the changes in woman's body are due to the effect of specific hormones. These changes are temporary and do not produce any permanent deleterious effects on the woman's health.

Importance of Physiological Changes During Pregnancy

The physiological changes during pregnancy are necessary:

- To nurture the growing fetus without compromising mother's own health,
- To prepare mother's body for labor and
- To develop mother's breast for breastfeeding.

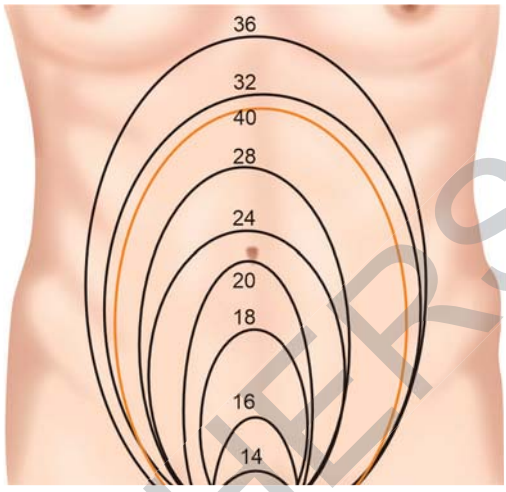

Fig. 3.1: The fundal height at various weeks of pregnancy.

PHYSIOLOGICAL CHANGES

The physiological changes occur in the maternal reproductive system, gastrointestinal system, cardiovascular system, hematologic system, respiratory system, urinary system, integumentary system, skeletal and nervous system, endocrine system, metabolism, maternal weight and breasts.

Changes in the Reproductive System (Fig. 3.2)

During pregnancy, the reproductive system undergoes several physiological changes to support the growing fetus and prepare the mother for childbirth. These changes include enlargement of the uterus, softening of the cervix, increased vaginal vascularity, and hormonal adjustments.

Vulva

The external genitalia become edematous and hyperemic. Superficial varicosities may appear especially in multipara. Libia minor becomes pigmented and hypertrophied.

Vagina

Estrogen causes the vaginal walls to become hypertrophied, edematous and more vascular. The increased blood supply of venous plexus gives bluish purple discoloration to vagina (Jacquemier sign). The length of anterior vaginal wall increases. The vaginal secretions become copious, thin and cloudy white, called leucorrhea, due to marked exfoliated cells and bacteria. The vaginal pH becomes acidic.

Uterus

The weight of uterus increases from 60 to 900 g to 1 kg during pregnancy. It is due to growth of the uterine muscles and connective tissues. The size of uterus increases from 7.5 × 5 × 2.5 to 30 × 23 × 20 cm. Due to estrogen and progesterone

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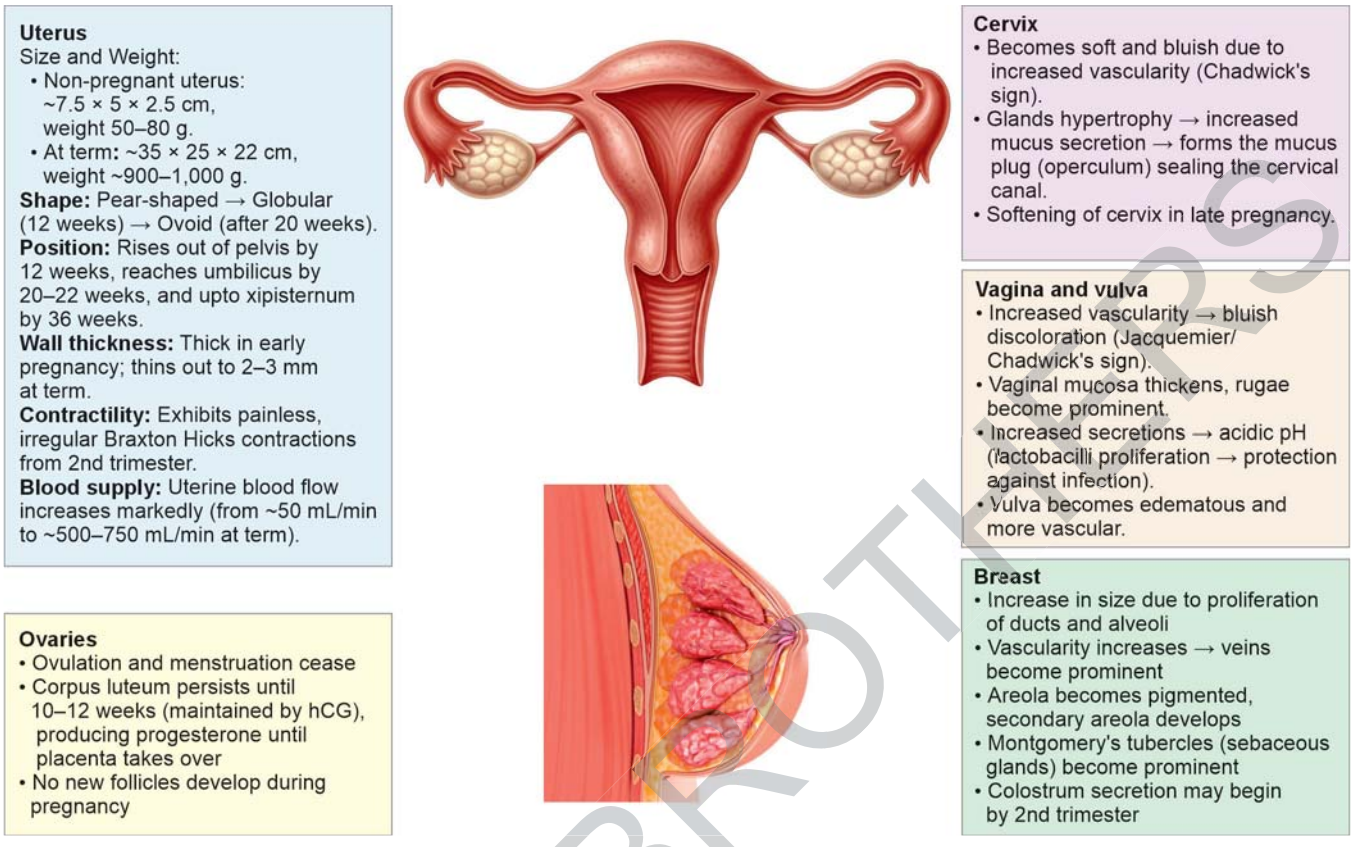

Fig. 3.2: Physiological changes in reproductive system and female breasts.

the endometrium (decidua) becomes thicker, richer and more vascular in the fundus and upper part of the uterus. Estrogen causes growth of the myometrium muscles. There is both hypertrophy and hyperplasia of muscle fibers. Up to first 20 weeks the uterus continues to grow in this way and later on after 20 weeks it stretches to accommodate the growing fetus and other products of conception. The stretching is due to effect of progesterone which encourages relaxation of smooth muscles. During pregnancy the muscle layer becomes more differentiated into inner circular layer, middle oblique layer and outer longitudinal layer. The inner circular layer is involved in stretching of lower segment and cervix during labor, middle oblique layer in contractions necessary to expel the fetus and outer longitudinal layer in contractions and retractions during labor.

The shape of the uterus changes throughout. The nonpregnant pyriform shape is maintained in early weeks of pregnancy. At 12 weeks of pregnancy the uterus rises out of the pelvis and becomes upright in position, it does not remain anteverted and anteflexed. It becomes globular in shape and the fundus may be palpated abdominally over the symphysis pubis. At around 20 weeks of pregnancy, it becomes globular in shape with rounded fundus. The fundal height rises at the rate of 1 cm per week between 18 and 30 weeks **(Fig. 3.1)**. The landmarks of fundal height are at 12 weeks it is at the level of symphysis pubis, at 16 weeks in between symphysis pubis and umbilicus, at 20 weeks at the level of umbilicus, at 36 weeks it reaches the level of xiphisternum. In between 37 and 40 weeks the regression of fundal height starts to 36 to 32 cm, due to engagement of presenting part. The lower uterine segment can be identified at 30 weeks. The spherical shape of uterus is maintained beyond 36 weeks of pregnancy. The blood supply to the uterus increases throughout the pregnancy **(Fig. 3.1)**.

Spontaneous Uterine Contractions

From very early weeks of pregnancy uterus undergoes spontaneous contractions. This can be felt by bimanual palpation in early weeks, when uterus feels firm at one moment and soft at other. These contractions are frequent, spasmodic, painless and without any effect on cervical dilatation. The intra uterine pressure remains below 8 mm/Hg. Generally, the mother is not conscious about these contractions in early term, but later on near term the contractions become frequent with increase intensity and thus produce some discomfort. Ultimately it merges into painful uterine contractions during labor.

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Table 3.2: Changes in female breasts during pregnancy.

Week	*Changes evident*
At 3 to 4 weeks	The mother develops prickling and tingling sensation in the breasts due to increased blood supply
At 6 weeks	Development of ducts and glands causes the breasts to enlarge
At 8 weeks	Vascularity is increased which results in bluish surface veins are visible on the breasts. Sometimes axillary tail becomes enlarged and painful
At 8 to 12 weeks	Sebaceous glands which are invisible in nonpregnant state becomes hypertrophied and are called Montgomery tubercles. Almost 5 to 15 Montgomery tubercles become more prominent on the areola. Primary areola is developed which is darken pigmented area around the nipples. The sebaceous glands secrete sebum which keeps the nipples soft and supple. Sticky secretions, colostrum, can be squeezed out from nipples
At 16 weeks	The thick and yellowish colostrum can be expressed. The secondary areola is developed which is further extension of pigmented area surrounding the primary areola
Late pregnancy	Colostrum may leak from the nipples. Progesterone causes the nipple to become more prominent and mobile

Cervix

The cervix remains 2.5 cm long throughout the pregnancy, but the hygroscopic properties of estrogen cause it to increase in width. Under the influence of estrogen, the endocervical cells secrete mucus which is thicker and viscous in pregnancy, which forms a cervical plug known as operculum. It acts as effective barrier against infection. In late pregnancy softening of cervix occurs due to progesterone effect.

Fallopian Tubes

The total length of the fallopian tubes is somewhat increased. The tubes become congested.

Ovary

The ovaries look bright orange, then yellow and finally pale. The estrogen and progesterone inhibit the ripening of primary follicles, and thus both uterine and menstrual cycle is suspended till the termination of pregnancy.

Changes in the Mammary Glands (Table. 3.2)

The changes in the breast are much evident in primigravida. These changes are result of increased hormonal activity. Estrogen develops the duct system of the breasts. Progesterone develops the glandular tissues. Prolactin stimulates the production of colostrum and milk. The breast enlarges in size due to hypertrophy and proliferation of ducts and alveoli and fat deposition in the breasts also adds to it.

Changes in the Gastrointestinal System (Fig. 3.3)

The gums become spongy and may bleed due to hygroscopic effect of estrogen. Gingivitis may cause dental problems.

Increased salivation, ptyalism, is common. Mother experiences change in sense of taste. It may lead to dietary changes, food craving and sometimes pica which is craving for unnatural substance.

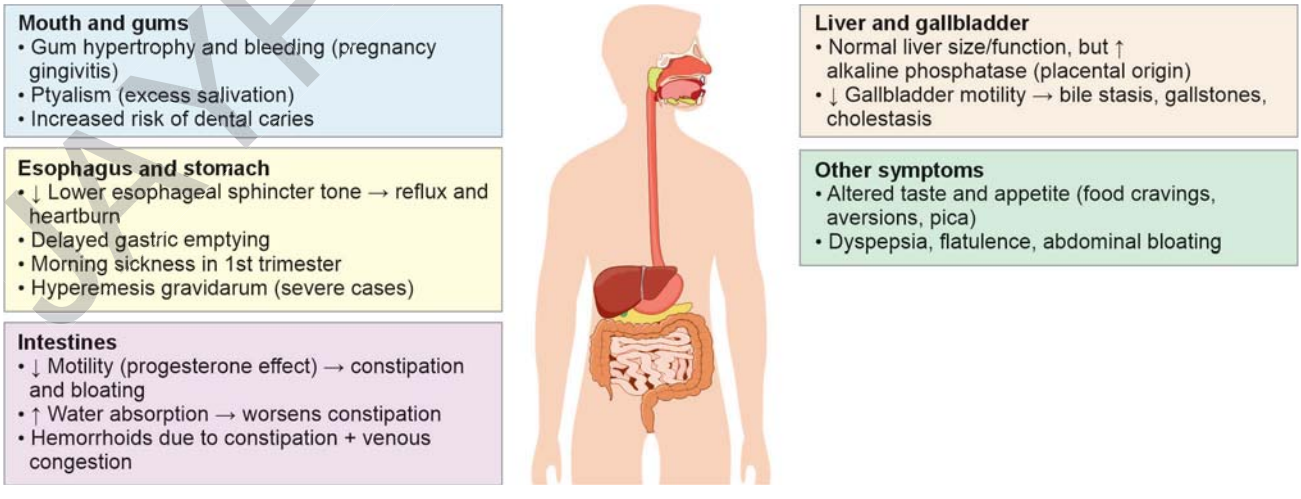

Fig. 3.3: Physiological changes in digestive system.

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Nausea and vomiting commonly occur in early pregnancy. It is due to raised estrogen and hCG level. It is usually triggered by strong or foul odors. It is considered to be within normal limits provided it does not adversely affect maternal health.

Progesterone causes relaxation of smooth muscles. Gastric emptying and peristalsis movement are slowed in order to maximize the absorption of nutrients. Relaxation of cardiac sphincter of stomach results in gastroesophageal reflux which causes heartburn. Constipation occurs due to sluggish motility of gut, delayed small bowel transit and increased water reabsorption. Hemorrhoids can be exacerbated which may exist as a result of relaxing effect of progesterone on vein walls.

Gall bladder distention and biliary stasis may predispose for gall stones in susceptible women. Hepatic function changes with increased level of alkaline phosphate and decrease in albumin.

Changes in the Cardiovascular System (Fig. 3.4)

The heart is pushed upward and outward due to elevation of diaphragm because of pressure of gravid uterus. The increase in workload may cause the heart to increase in size. The cardiac output starts increasing from 5th week and reaches its maximum by 34 weeks and then remains static. It is increased to meet the additional oxygen required due to increased metabolic activity during pregnancy. This also causes increase in the stoke volume and increase in pulse rate by 15 beats per minute. Due to smooth muscle relaxing effect of progesterone, even though the cardiac output is increased then also there is overall decrease in Diastolic blood pressure of woman. The mother may experience supine hypotension syndrome (postural hypotension). It is because during late pregnancy the gravid uterus produces a compression effect on inferior vena cava in supine position. This results in opening of collateral circulation. But in 10% women if collateral circulation fails to open, it may result in hypotension, syncope, tachycardia and paresthesia of fingers. Change in the position to lateral side can quickly restore the blood pressure to normal level.

The uterine blood flow is increased from 50 mL/min in nonpregnant state to about 750 mL/min near term. Out of it 80% goes to the placenta. It allows excretion of gases, waste products from the fetus and provision of nutrients to the fetus. Renal blood flow from 800 mL/min increases by 400 ml/min from 16th week. The blood flow through the skin and mucous membranes reaches a maximum of 500 mL/min by 36th week. It helps to eliminate extra heat generated by the fetal metabolism.

Changes in the Hematologic System (Fig. 3.5)

The total volume of red cells in the circulation increases in response to the extra oxygen requirements for maternal and placental tissues. It results in total increase in red blood cell volume of 18% by the end of pregnancy. The plasma volume increases from 10th week and reaches maximum level of 50% above nonpregnant level by 32 to 34 weeks and is maintained till term. The total plasma volume increases to the extent of 1.25 liters. As the plasma increase in much greater than the red cell mass, there is hemodilution effect which results in low hemoglobin level, hematocrit and red cell count. This effect is referred as physiological anemia in pregnancy. It occurs in spite of rise in total circulating Hb. The clotting factors, fibrinogen and platelets are increased leading to change in coagulation time.

Changes in the Respiratory System (Fig. 3.6)

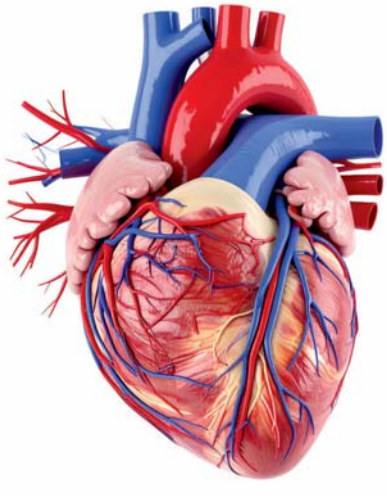
The change in the respiratory system takes place in order to maximize maternal oxygen intake and for exhale of

Heart rate
Increases by 10–15 beats/min.

Cardiac output (CO)
- Rises by 30–50% (peaks around 20–24 weeks)
- Due to ↑ stroke volume (early) and ↑ heart rate (later)

Blood volume
- Increases by 40–50% (plasma volume ↑ >RBC mass)
- Leads to physiological anemia of pregnancy (hemodilution)

Postural changes
Supine position (after 20 weeks) → supine hypotension syndrome (compression of IVC by gravid uterus → ↓ venous return, dizziness, hypotension).



Blood pressure
- Systolic: little/no change.
- Diastolic: falls by 10–15 mm Hg (lowest in 2nd trimester, returns near baseline at term)

Systemic vascular resistance (SVR)
Decreases due to progesterone and placental circulation

Heart sounds
Systolic ejection murmur common
Loud S1, split S2, and S3 may be heard

Venous system
- Venous pressure ↑ in lower limbs → varicose veins and edema
- Risk of hemorrhoids, DVT

Fig. 3.4: Physiological changes in cardiovascular system.

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Blood volume
- Total blood volume ↑ by 40–50%
- Plasma volume ↑ ~45–50%
- RBC mass ↑ ~20–30% (less than plasma) → physiological anemia of pregnancy (hemodilution)

Hemoglobin/hematocrit
- Hemoglobin and hematocrit ↓ slightly (nadir in 2nd trimester)
- Hb <11 g/dL considered abnormal (anemia)



White blood cells (WBCs)
- Mild leukocytosis (mainly neutrophils) – up to 12,000/mm³ (normal in pregnancy)

Platelets
- Slight ↓ in platelet count (gestational thrombocytopenia) but usually >100,000/mm³.
- Clotting function preserved

Coagulation factors
- Hypercoagulable state: ↑ fibrinogen (2–3x), ↑ factors VII, VIII, IX, X, XII.
- ↓ fibrinolysis.
- Protective against bleeding but ↑ risk of DVT/PE

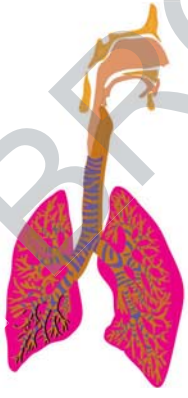
Iron metabolism
- Maternal requirement ↑ (about 1,000 mg total in pregnancy)
- Often leads to iron deficiency if supplementation not given

Fig. 3.5: Physiological changes in hematological system.

Anatomical changes
- Diaphragm rises by ~4 cm due to enlarged uterus
- Chest circumference ↑ (rib cage flares)
- Thoracic anteroposterior diameter increases

Functional residual capacity (FRC)
- ↓ by ~20% (due to ↓ expiratory reserve volume and ↓ residual volume)

Oxygen consumption
- ↑ by ~20–30% to meet maternal + fetal needs



Tidal volume (TV)
- ↑ by ~30–40%

Minute ventilation
- ↑ by ~40–50% (mainly due to increased TV, not RR)

Inspiratory capacity
- ↑ by ~15%

Arterial blood gases
- Mild respiratory alkalosis (pCO_2 ~30 mm Hg, pO_2 slightly ↑, HCO_3^- ↓)
- Facilitates CO_2 transfer from fetus → mother and O_2 from mother → fetus

Fig. 3.6: Physiological changes in respiratory system.

carbon dioxide from mother as well fetus through her. In the later months there is elevation of diaphragm by 4 cm, the ribs flare out to maintain capacity of thoracic cavity. The breathing becomes diaphragmatic. The respiratory rate does not alter. Respiration is made more efficient by progesterone acting on the respiratory center, deeper breathing and increased residual volume. The state of hyperventilation occurs due to increase in tidal volume. The mother often becomes conscious of a need to breath. Nasal congestion, stiffness of nose are common due to increased vascularity. Few expectant mothers may experience epistaxis.

Changes in the Urinary System (Fig. 3.7)

Both the kidneys enlarge in length by 1 cm. There is dilatation of ureters and renal pelvis. Renal plasma flow is increased by 75% from 16th week and is maintained up to 34 weeks. GFR is increased by 50% throughout the pregnancy. It results in decrease in maternal creatinine, uric acid and blood urea nitrogen. The renal tubule fails to reabsorb glucose and water-soluble vitamins. Ureters become atonic due to effect of progesterone. The bladder is hypertrophied and congestion occurs. In late pregnancy the bladder mucosa becomes edematous due to venous and lymphatic obstruction. Also, there is lowered osmotic threshold for thirst which increases water intake and thus, increased frequency of micturition occurs at 6 to 8 weeks of pregnancy which subsides at 12 weeks. Later on in last trimester, it reappears due to pressure on the bladder as the presenting part of fetus descends down in the maternal pelvis.

Changes in the Integumentary System/Skin (Figs. 3.8 and 3.9)

Increased activity of melanin-stimulating hormone causes deeper pigmentation of skin. Few women develop deep, patchy

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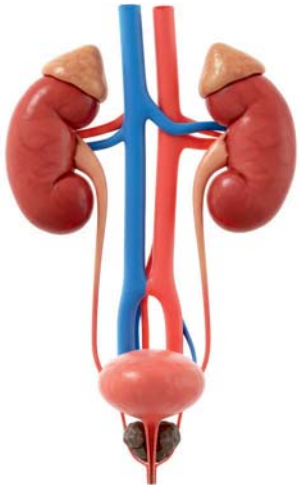
Kidneys
- Slight increase in size (~1–1.5 cm longer)
- ↑ Renal plasma flow (up to 50–80% by mid-pregnancy)
- ↑ Glomerular filtration rate (GFR) by ~40–50%

Bladder
- Early pregnancy: Increased vascularity and congestion → urinary frequency
- Later pregnancy: Pressure from enlarging uterus → reduced bladder capacity, urgency, nocturia
- Stress incontinence can occur

Electrolytes
- Mild sodium and water retention (due to RAAS activation) → expands plasma volume
- Mild respiratory alkalosis compensation also influences renal handling of bicarbonate



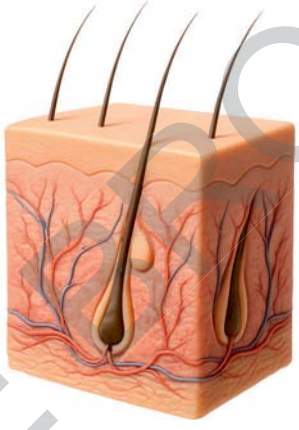
Ureters
- Dilatation (more on the right side due to dextrorotation of uterus and compression by right ovarian vein)
- Progesterone causes smooth muscle relaxation → urinary stasis → risk of hydronephrosis and UTIs

Renal function tests
- Serum creatinine and urea ↓ (due to ↑ GFR)
- Normal values in pregnancy: Creatinine ~0.4–0.6 mg/dL
- Glycosuria may occur (due to increased GFR exceeding tubular reabsorption capacity)

Fig. 3.7: Physiological changes in urinary system.

Pigmentation changes
- Linea nigra – dark line from symphysis pubis to xiphisternum.
- Chloasma (melasma, "mask of pregnancy") – brownish patches on face, more in sun-exposed areas.
- Areolar pigmentation increases, with formation of secondary areola.
- Vulva, axillae, perineum show hyperpigmentation

Hair and nails
- Hair: Often appear thicker (prolonged anagen phase)
- Nails: May grow faster, sometimes brittle



Vascular changes
- Spider angiomas and palmar erythema due to ↑ estrogen.
- Increased cutaneous blood flow → warmth and sweating
- Varicose veins (legs, vulva, rectum/hemorrhoids)

Connective tissue changes
- Striae gravidarum (stretch marks) – pink/purple lines over abdomen, breasts, thighs → later become silvery
- Skin elasticity altered

Glands
- Sweat and sebaceous glands become more active → ↑ sweating, acne flare in some women
- Montgomery's tubercles prominent in areola

Fig. 3.8: Physiological changes in integumentary system.

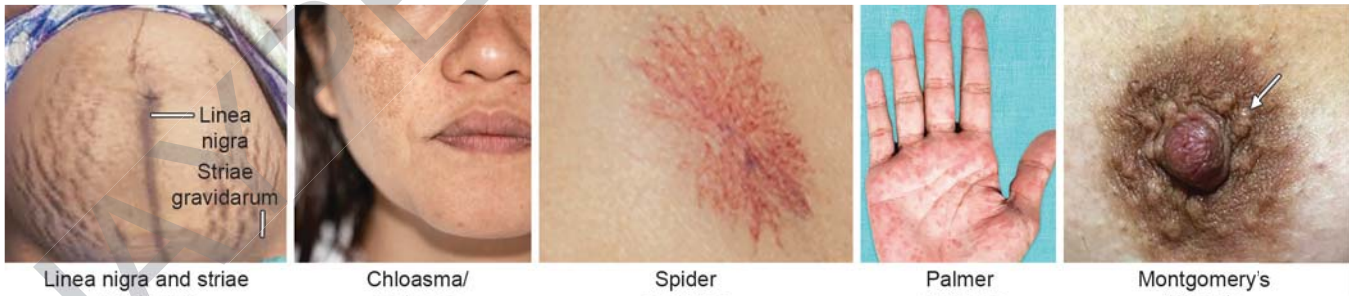


Fig. 3.9: Physiological changes in skin and breast.

butterfly shaped coloring on the face which is referred as chloasma/pregnancy mask. It appears on cheek, forehead and around the eyes. It is result of increase in progesterone level. It disappears after delivery. Mother may notice pigmented line running from symphysis pubis to umbilicus or higher level, termed as Linea nigra. It also disappears/faded after delivery. The breast skin also shows the changes especially in primigravida. The primary areola around the nipple darkens. The secondary areola becomes visible. The deposition of melanin toughens the area in preparation of breast feeding. The perineal

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area becomes dark in color. The stretching occurs in the collagen layer of the skin especially on gravid abdomen, thighs and sometimes on breast. In some women the area becomes thin and stretch marks appear as red strips of varying length and breadth, known as striae gravidarum, during pregnancy. It represents the scar tissues deeper in the layer of the cutis. Later it turns to silvery white in color after delivery. The increase in corticosteroids during pregnancy also contributes in its development. Small, dilated blood vessel visible under the skin, characterized by a central red spot with fine, radiating capillary branches resembling a spider's legs which is known as vascular spider may be seen on face, neck, arms and chest. Palmar erythema which is a condition characterized by reddening of the palms, particularly over the thumb and little finger side areas may be seen due to estrogen effect. The overall blood flow to the skin is increased leading to sweating.

Changes in Metabolism (Fig. 3.10)

The total metabolism is increased due to the need to grow fetus. The basal metabolic rate has increased by 30%.

Carbohydrate Metabolism

Transfer of increased amount of glucose is required for the fetus. Maternal insulin secretion is increased with plasma level of insulin. It helps in storage of fat. There is increased tissue resistance to glucose which ensures continuous supply of glucose to the fetus. The fetal consumption of glucose leads to maternal fasting hypoglycemia. Oral GTT may show abnormal pattern, and glycosuria is present in 50% of women. It is due to lowered renal threshold, increased GFR, decreased tubular reabsorption, and rapid absorption of CHO from gut.

Protein Metabolism

Positive nitrogen balance is maintained throughout the pregnancy. Blood urea level is decreased; however, blood uric acid and creatinine level remains unchanged. Amino acids are actively transported through the placenta to the fetus. Pregnancy is in anabolic state.

Fat Metabolism

During latter half of the pregnancy the plasma protein and lipoprotein are increased due to increase in estrogen, progesterone and hPL. Almost 3 to 4 kg fat is stored in maternal body during pregnancy with major deposition in breast, abdomen, hips and thighs.

Lipid Metabolism

Hyperlipidemia occurs with increase in HDL level. The total lipid is increased by 50% near term.

Iron Metabolism

The iron is transported actively to the fetus through the placenta. The iron requirement in pregnancy is considerable, and the daily requirement is actually increased in second half of the pregnancy. The total iron requirement during pregnancy is up to 1,000 mg. The iron absorption from gut is increased in later half of pregnancy. In the absence of iron supplement there is drop in hemoglobin, serum iron and serum ferritin. Thus, pregnancy is inevitable iron deficiency state. Despite maternal iron deficiency, the placenta transfers adequate iron to the fetus and thus the fetal Hb level at birth is more than maternal level and there is no correlation between hemoglobulin concentration of mother and fetus.

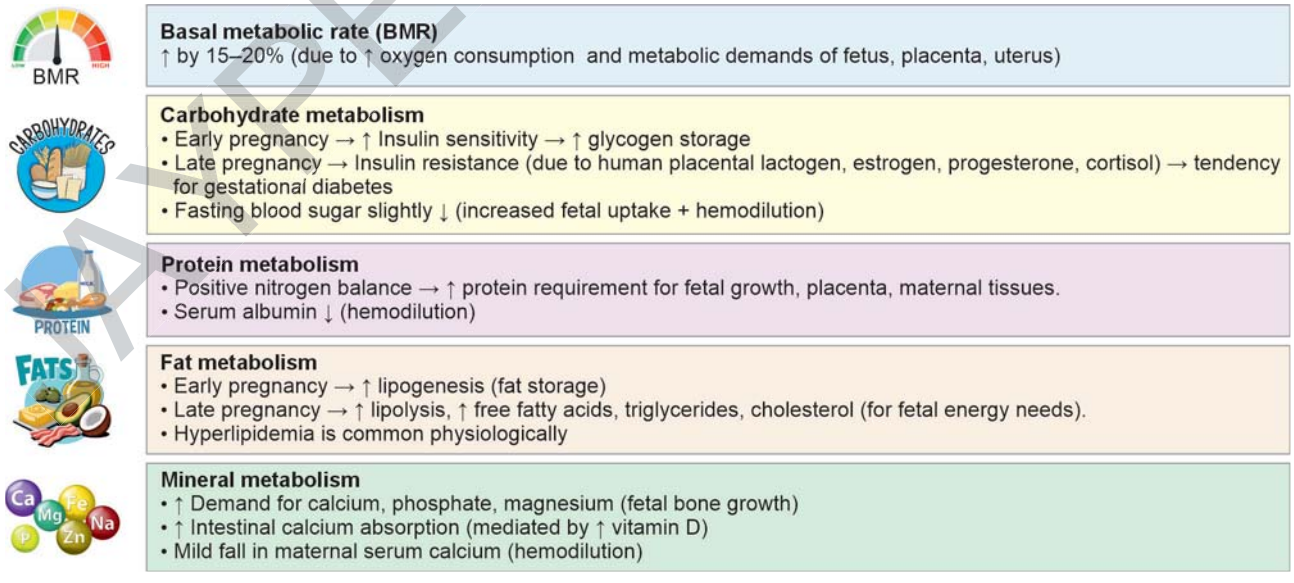

Fig. 3.10: Physiological changes in metabolism.

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Calcium Metabolism

During pregnancy there is increase in demand of calcium by the fetus, up to 1.5 g/day, especially in last trimester for bone mineralization of the fetus. Calcium absorption from kidneys and intestine are doubled. Maternal total calcium level falls.

Water Metabolism

Pregnancy is a state of hypervolemia. There is active retention of sodium, potassium and water. Almost 6.5 liters of water is retained in the body at the term during pregnancy. The water content of the fetus, placenta and amniotic fluid is about 3.5 liters. The multiple factors like increase in estrogen and progesterone, increase in renin-angiotensin-aldosterone activity, increased aldosterone leads to sodium retention and volume overload. Increased water intake due to lowered threshold for thirst causes polyuria in first trimester of pregnancy.

Changes in Endocrine System (Fig. 3.11)

Placental Hormones

The placenta produces variety of hormones like pituitary like hormones, hypothalamic like hormones, growth factors, protein and steroid hormones. Out of which protein and steroid hormones are of importance and syncytiotrophoblast is main site of production of these hormones. (For more details refer hormones in pregnancy chapter).

Pituitary Hormones

The anterior pituitary gland is enlarged. Adrenocorticotrophic hormone, melanocyte stimulating hormone and thyrotrophic hormone increases their activities. FSH and LH secretion is inhibited. Prolactin secretion is increased. Posterior pituitary produces increasing amount of oxytocin.

Thyroid Hormones

Thyroid activity is not markedly increased. There is production of more thyroxine binding globulin.

Adrenal Hormones

Corticosteroid production has increased. Excretion of sodium and chloride is increased. Aldosterone produced enhances the reabsorption of it.

Changes in the Skeletal and Nervous System (Figs. 3.12 and 3.13)

Progesterone and relaxin encourage relaxation of pelvis ligaments and muscles to increase their capacity. The mobility of pelvic joints has increased. There is softening of symphysis pubis. The sacrococcygeal joint loosens allowing coccyx to displace backward. Rolling gait is result of unstable pelvic joint. This can even result in backache and ligament pain. Posture may alter to compensate for a change in the center of gravity. The gravid uterus pulls the body forward and mother leans backward in order to balance. The walk of the mother is known as proud lady walk.

Compression of median nerve over the wrist joint leads to pain and paresthesia, pins and needles, in the hands and arms, known as carpel tunnel syndrome. It appears in later months of pregnancy. Similarly, compression of lateral cutaneous nerve of the thigh results in paresthesia and sensory loss over anterolateral aspect of the thigh.

Changes in the Body Weight (Table 3.3)

Continuous and appropriate weight gain throughout pregnancy is one of the favorable indicator of maternal and fetal health. In early weeks of pregnancy, the mother

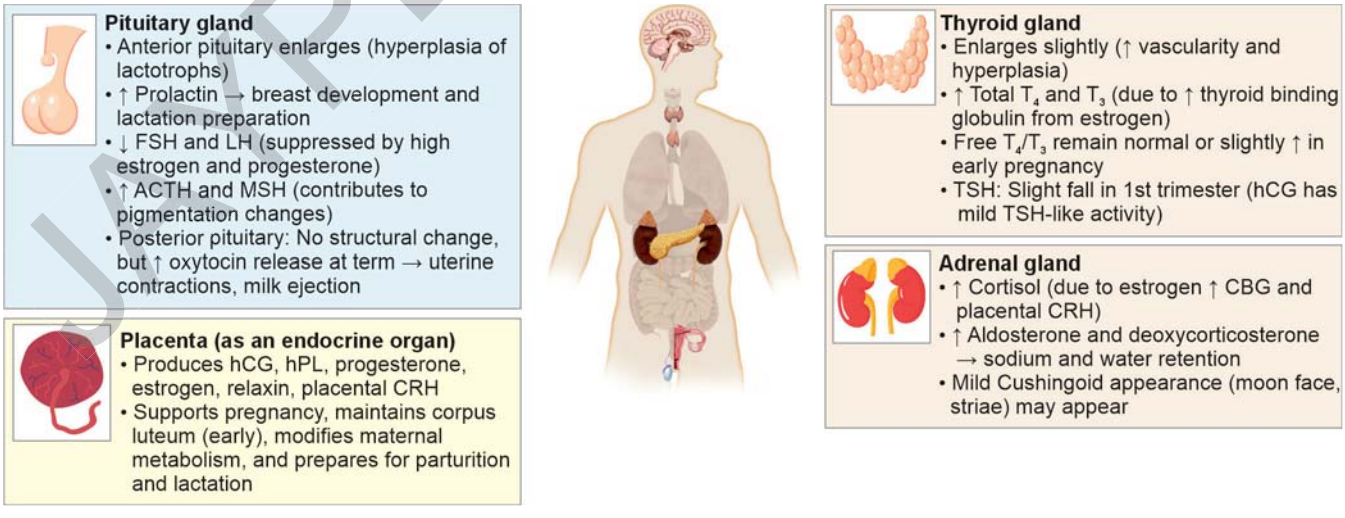

Fig. 3.11: Physiological changes in endocrine system.

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Postural changes
- Growing uterus shifts center of gravity forward
- Lumbar lordosis increases → backache common
- Pelvic joints and ligaments relax due to relaxin and progesterone

Musculoskeletal symptoms
- Backache, leg cramps, pelvic girdle pain
- Carpal tunnel syndrome may occur (due to fluid retention and nerve compression)

Pelvic changes
- Sacroiliac, sacrococcygeal, and pubic symphysis joints become more mobile
- Pelvic diameter slightly increases → facilitates childbirth

Bone metabolism
- ↑ Calcium demand for fetal skeletal growth
- ↑ Intestinal calcium absorption (vitamin D mediated)
- If maternal intake inadequate → maternal bone resorption ↑

Fig. 3.12: Physiological changes in skeletal system.

Neuroendocrine adaptations
- Hypothalamic–pituitary axis altered → ↑ prolactin, oxytocin regulation
- Increased sensitivity of hypothalamic oxytocin neurons near term → labor initiation

CNS structural/functional changes
- "Pregnancy brain" (subjective memory and concentration difficulties) – linked to hormonal and sleep changes
- Sleep disturbances due to hormonal shifts + mechanical discomfort
- Mood fluctuations from estrogen, progesterone, cortisol effects



Autonomic nervous system
- Sympathetic tone ↑ in late pregnancy → contributes to increased heart rate and cardiac output
- Vasomotor changes → postural hypotension possible

Pain perception
Pain threshold may rise during late pregnancy and labor (endogenous endorphins ↑)

Fig. 3.13: Physiological changes in nervous system.

Table 3.3: Weight gain during pregnancy.

Reproductive weight gain (6 kg)	Fetus of 3 kg, placenta of 500 g, amniotic fluid of 1 kg, uterus of 1 kg and breast 500 g.
Maternal weight gain (5 to 6 kg)	Accumulation of fat and protein of 3.5 kg, increase in blood volume 1.3 kg and increase in extracellular fluid of 1.3 kg.

is likely to lose weight due to nausea and vomiting. After that the weight gain is progressive. The total weight gain during normal single pregnancy is 11 to 12 kg (24 lb). It is distributed as 1 kg in first trimester, 5 kg in second trimester and again 5 kg in third trimester. Out of total 11 kg the weight is distributed as reproductive weight gain and maternal weight gain.

Ideally weight gain in pregnancy depends on prepregnant BMI. An obese mother should not gain more than 7 kg whereas underweight mother may be allowed to gain up to 18 kg. Many factors influence the overall weight gain during pregnancy. It includes maternal factors like dietary intake, overall health, addiction, health habits, minor ailments related to GIT, metabolic rate, edema along with fetal factors. Periodic weight checking in pregnancy helps to detect abnormalities like rapid weight gain, no weight gain, and falling weight. Although the maternal weight gain is associated with fetal weight, it is not the specific indicator as fetal weight is also dependent on other factors too.

PSYCHOLOGICAL CHANGES (FIG. 3.14)

During pregnancy, women experience various psychological changes due to hormonal fluctuations, physical discomfort, and emotional adjustments to impending motherhood. These may include mood swings, anxiety, excitement, and changes in body image, all of which are part of the natural process of adapting to pregnancy and preparing for parenthood. In the initial phase of pregnancy, the liable emotions are common due to hormonal changes. Libido is likely to be decreased. Some sorts of temperamental changes are found during pregnancy. She may experience mental irritability and sleep disturbances. The mother feels the need to nurture herself. In the second trimester mother often feels exclusive closeness with the fetus. In later months she may start to change her social contacts, often become closer to her

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First trimester
- Mixed emotions: Excitement, anxiety, uncertainty
- Concerns about pregnancy confirmation, miscarriage risk
- Fatigue, nausea, mood swings

Second trimester
- Emotional stability improves as discomforts lessen
- Positive feelings: Acceptance, happiness, anticipation
- Fetal movements → Stronger maternal–fetal bonding
- Increased self-image as a pregnant woman

Third trimester
- Increased physical discomfort → Irritability, anxiety
- Concerns about labor, childbirth pain, fetal well-being
- Dependency on family members rises
- Sleep disturbances and fear of complications

General psychological adaptations
- Heightened maternal instincts and protective behavior
- Concerns about body image and sexuality
- Role transition: Preparing to become a mother
- Possible mood disorders: Antenatal anxiety, depression

Fig. 3.14: Psychological changes in pregnancy.

own parents, and socialize more with the couples who have children. During the last trimester the mother becomes aware of her responsibilities. She feels ready for beginning her new experience.



Role of Nurse/Midwife

A nurse midwife must have a thorough understanding of the physiological and psychological changes during pregnancy. This knowledge enables her to guide and educate the mother during antenatal visits, monitor the normal progression of changes according to the gestational age, identify any deviations or abnormalities, and recognize the psychological impact these changes may have on the pregnant woman. With this understanding, she can provide appropriate health advice to help the mother prevent anxiety and fear caused by the unknown and support her in coping positively with these changes.

DIAGNOSIS OF PREGNANCY

Pregnancy is typically diagnosed during the mother's first visit to the clinic, usually following a history of one or two missed menstrual periods. The diagnosis of pregnancy is based on a combination of subjective and objective signs and symptoms. Depending on the month or trimester of the pregnancy, the mother may exhibit a variety of signs and symptoms.

The diagnosis of pregnancy is based on

1. Presumptive/subjective signs
2. Clinical examination/objectives signs
3. Special investigations/immunological tests

DIAGNOSIS IN THE FIRST TRIMESTER OF PREGNANCY

Presumptive/Subjective Signs (Fig. 3.15)

These are the signs which are presumed of pregnancy in the absence of further information.

Cessation of Menstruation

In normally menstruating woman, the abrupt cession of cyclic and regular periods is strong suggestive of pregnancy. It is also called as amenorrhea which means absence of menstruation. Amenorrhea in pregnancy occurs because high levels of progesterone and estrogen inhibit ovulation and suppress the menstrual cycle. However, the cyclic bleeding may occur up to 12th week until the decidual space

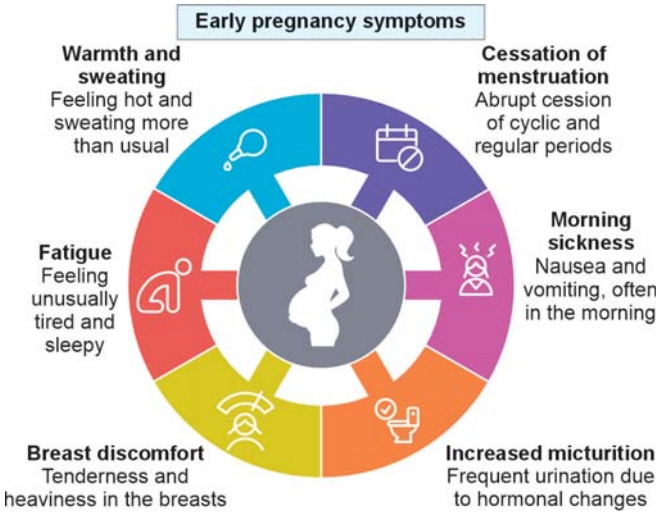

Fig. 3.15: Presumptive signs of pregnancy.

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is obliterated by fusion. This bleeding is usually scanty, lasting for shorter duration. It is termed as placental sign.

Morning Sickness

It is characterized by nausea with or without vomiting. It is more common in primigravida. It usually appears soon after the missed period, between 4th and 7th week of pregnancy and lasts up to 3rd month. Almost 70% of mother experience nausea in the early morning hours. Sometimes it may be with vomiting. It may occur at any time of the day or night. It is associated with increased level of hCG.

Increased Frequency of Micturition

The mother experiences increased urinary frequency between 8 and 12 weeks of pregnancy and it also reappears in last 6 weeks of pregnancy. In the first trimester it is due to resting of bulky uterus on the fundus of the urinary bladder due to exaggerated anteverted position of the uterus, congestion of bladder mucosa and also due to stretching of bladder base.

Breast Discomfort

Early in pregnancy mother experiences heaviness, tingling, pricking sensation, discomfort or tenderness in the breasts. It is generally evident till 8th week of pregnancy. This is result of hormonal rise, particularly estrogen and progesterone that prepare the breast for milk production. This surge in level results in increased blood flow to the breasts. The discomfort subsides after few weeks.

Fatigue

It is common for mother to feel tired, or even exhausted, during pregnancy, especially in the first 12 weeks or so. Hormonal changes taking place in the body at this time can make the mother to feel tired, nauseous and emotional. It is mainly caused by increased levels of progesterone which relaxes the body's muscles and has a sedative effect, leading to tiredness and drowsiness. The morning sickness, increased urination and breast discomfort also adds to it.

Feeling of Warmth and Sweating

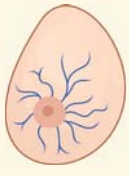
Some mothers may experience a slight rise in body temperature and excessive sweating during the first trimester. This occurs due to increased blood circulation to the skin and heightened metabolic activity.

Clinical Examination/Objective Signs

Breast Examination/Changes (Table 3.4)

The changes that occur in breasts are valuable and informative, especially in primigravida. The changes are evident between 6 and 8 weeks. As pregnancy advances the breasts enlarge, feel nodular, the areola and nipples enlarge. Striae on the breasts during pregnancy occur during the second or third tirimester due to stretching of the skin and breakdown of elastic fibers as the breasts enlarge. The delicate veins are visible under the skin due to the vascular enlargement. The nipples and the primary areola become more pigmented. Montgomery tubercles, tiny protuberances around the nipples, are prominent. Thick yellowish or clear secretions, known as colostrum, can be expressed out by squeezing the nipples from 12th week onwards.

Table 3.4: Changes in breast during pregnancy.

 **Increase in size**	Due to growth of ducts and glandular tissue
 **Tenderness/soreness**	Due to growth and increased blood flow to the breast tissues
 **Prominent veins**	Due to increased vascularity
 **Areolar changes**	Darkening, enlargement, development of secondary areola
 **Montgomery's tubercles**	Sebaceous glands on areola become prominent

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 **Nipple changes**	Larger, more pigmented and erectile nipples
 **Colostrum secretion**	Thick, yellowish or clear pre-milk secretions, from 12th week onwards
 **Striae (stretch marks)**	Due to stretching of the skin and breakdown of elastic fibers as the breasts enlarge

Per Abdominal Examination

During the first trimester, the uterus remains a pelvic organ and can be felt as a small suprapubic bulge on abdominal examination.

Pelvic Examination

Various signs can be elicited in pelvic examination.

- **Jacquemier sign/Chadwick's sign:** It is dusky bluish discoloration of vestibule and anterior vaginal wall with cervix at about 8th week. It is due to enhanced blood flow to the pelvic organs, and local vascular congestion under the influence of raised estrogen and progesterone. It is more pronounced as pregnancy advances.
- **Vaginal sign:** The vaginal walls become softened and copious and nonirritating discharge appears in the 6th week. It is known as vaginal sign. It results due to the increased levels of estrogen and progesterone and circulatory changes.
- **Osiander sign:** The increased pulsation of the uterine arteries felt through the lateral fornices during the pelvic examination at 8th week of gestation, which is termed as Osiander sign. It is caused by increased blood flow through the uterine arteries.
- **Cervical sign/Goodell's sign:** It is softening of cervix at 8th week. The pregnant cervix feels like lips of the mouth while in nonpregnant state it is like tip of the nose. On per speculum examination the bluish discoloration of cervix is visible which is due to increased vascularity.
- **Uterine sign:** The size of the uterus progressively enlarges as pregnancy advances. At 6th week the uterus enlarges to the size of hen's egg. On the 8th week it is of size of cricket ball and at 12th week it becomes the size of fetal skull. There may be asymmetrical enlargement of uterus in case of lateral implantation of embryo, which is called as Piskacek's sign. Later on, as the pregnancy advances the symmetry is restored. The pregnant uterus feels soft and elastic.
- **Hegar's sign:** It refers to the softening of the lower uterine segment which makes the uterus and cervix feel separate. It is elicited by bimanual examination between 6th and 10th week. Two fingers of gloved right hand are inserted into the anterior fornix of vaginal and the left hand is kept on the abdomen, just behind the uterus. The fingers of both the hands almost meet due to softening and elongation of isthmus. This is called Hegar's sign **(Fig. 3.16)**. It is caused by increased vascularity and hormonal, estrogen and progesterone effects.
- **Palmer's sign:** It is presence of regular and rhythmic uterine contractions which can be elicited during the bimanual examination during 4 to 8 weeks. For this, the uterus is cupped in between external and internal fingers. During a contraction, the uterus feels firm and well defined, and then softens and becomes less defined during relaxation. Initial months the contraction phase lasts for 30 seconds and then later relaxation phase increases as the pregnancy advances. Palmer's sign occurs due to increased uterine muscle irritability under the influence of early pregnancy hormones, mainly estrogen.

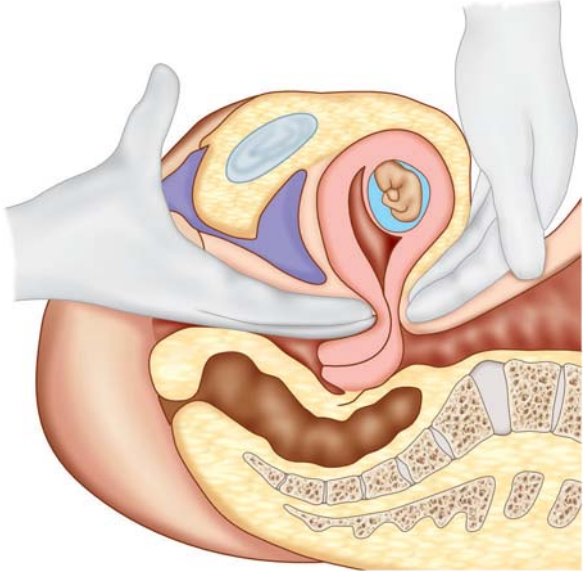

Fig. 3.16: Hegar's sign.

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Laboratory Investigations/Immunological Tests

- **Obstetric ultrasonography:** This is the most reliable test by which the pregnancy can be diagnosed as early as 5th week of intrauterine life, as the gestational sac can be identified. The USG can be abdominal or transvaginal. With it the gestational sac can be visualized at 4.5 to 5 weeks of gestation. The embryo can be seen by the time the gestational sac is about 5 to 6 weeks. The fetal poles can be identified at 5.5 to 6 weeks. The fetal cardiac pulsation can be felt around 7th week by transvaginal sonography pregnancy ultrasound is a test that uses high-frequency sound waves to image the developing fetus as well as the mother's reproductive organs **(Fig. 3.17)**.
- **Urine pregnancy test:** It is the most common diagnostic assay used at home. It is a rapid, one step, chromatographic immunoassay for the qualitative detection of human chorionic gonadotropin (hCG) in a woman's urine. This test uses specific antibodies to detect presence of hCG in the urine, since hCG is ideal marker of pregnancy as it rises rapidly and consistently in early pregnancy and can be detected in woman's urine. Traces of hCG can be seen in urine 7 to 10 days after fertilization. The test card contains anti: hCG particles on it. To improve the accuracy of result the mother is advised to use first and early morning urine sample as it is concentrated and contains high level of hCG than at other times of the day **(Fig. 3.18)**.
- **Immunological tests:** Blood test can detect pregnancy earlier than urine pregnancy test. Two types of pregnancy blood test, qualitative and quantitative hCG test are done. The qualitative test checks the presence of hCG in blood and quantitative blood test measures the specific level of it and are more accurate. The hCG concentration in blood is higher than urine and so the blood test can be positive earlier than the urine test or even when urine test is still negative. Blood test can detect hCG level as low as 1 mlU/mL.



Fig. 3.17: Depiction of obstetric ultrasound.



Fig. 3.18: Depiction of positive pregnancy test by UPT.

DIAGNOSIS IN THE SECOND TRIMESTER OF PREGNANCY

Presumptive/Subjective Signs

- **Amenorrhea:** It continues in the second trimester too.
- **Quickening:** It is feeling of life. The mother during 16th to 20th week of pregnancy starts getting perception of active fetal movements in the womb. The quickening is felt earlier at 16th week by multipara and at 18th week by primigravida.

Clinical Examination/Objective Signs

Skin Changes (Fig. 3.8)

The butterfly like pigmentation around the cheeks called as chloasma appears around 24 weeks. Darkening of the skin occurs particularly in the region of armpits, midline of lower abdomen, Linea nigra) and breasts. Stretch marks called striae gravidarum appears on the lower abdomen, hips and thighs.

Enlargement of Abdomen

The progressive enlargement of uterus caused the progressive enlargement in the abdomen. The uterus grows out of the pelvis and becomes palpable abdominally in the suprapubic region at 12th week. It reaches at the level of umbilicus at 24th week.

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Breast Changes

The enlargement continues with prominent veins. The secondary areola appears at about 20th week. The Montgomery tubercles become more prominent. The colostrum becomes thick and yellowish in color by 16th week. Striae may be visible on the breasts.

Per Abdominal Examination

Inspection reveals the fullness in the lower abdomen. The stretch marks, striae, and Linea nigra are visible. Palpation helps to feel the soft and pyriform uterus arising out of pelvis. The fundal height can be used to assess the gestation age with progressive enlargement of uterus. The height of the fundus in midway between symphysis pubis and umbilicus represent 16th week of pregnancy. The uterine fundus at the level of umbilicus corresponds to 24th gestation week and the fundus at the midway between umbilicus and rib cartilage represents 28th week of pregnancy.

The painless periodic contractions, Braxton Hicks' contractions, can be felt by 20th week. At the same time, rocking the uterus between the palpating hands reveals the feeling of ballottement. This is called external ballottement. Active fetal movements can be felt as well the fetal parts can be palpated at around 20 weeks.

Auscultation helps to identify the fetal heart sound at around 18 to 20 weeks. It resembles a tick-tick of watch under pillow. The FHR varies between 140 and 160 beats per minute. Uterine souffles, soft systolic murmur, due to increased blow flow through the dilated uterine vessels and fetal souffles, soft blowing murmur, due to rush of blood through umbilical artery can be heard.

Vaginal examination

The bluish discoloration of vulva, vagina and cervix is more evident. Cervix feels soft. The vaginal discharge appears creamy white. The tapping of cervix during per vaginal examination reveals the presence of body which moves away from the examination finger. This is called internal ballottement which can be felt after 16th week.

Special Investigations/Immunological Test

Ultrasonography

In second trimester of pregnancy the USG not only detects fetal skeletal and fetal organs, but it reveals the location placenta, quantity of amniotic fluid and state of internal os of cervix. The real time sonography can detect multiple pregnancies and fetal abnormalities too.

DIAGNOSIS IN THE THIRD TRIMESTER OF PREGNANCY

Presumptive/Subjective Signs

- **Amenorrhea:** It continues throughout the pregnancy.
- **Frequency of micturition:** It reappears in the last trimester when the fetal head/presenting part engages in the pelvis.
- **Mechanical discomfort:** The enlargement of uterus and abdomen persist which produces mechanical discomfort like palpitation and dyspnea.
- **Lightening:** It is sense of relief of pressure symptoms which is obtained due to engagement of presenting part especially fetal head. It is experienced at 38th week.
- **Feeling of active fetal movements:** These become more prominent and sometimes cause discomfort.

Clinical Examination/Objective Signs

- **Skin changes:** The cutaneous pigmentary changes and striae gravidarum are more prominent in last trimester.
- **Uterine shape:** The uterine shape changes from cylindrical to spherical beyond 36th week. The umbilicus becomes everted.
- **Fundal height:** The fundal height continues to grow. At 32 weeks the fundus reaches at the junction of upper and middle third part between umbilicus and ensiform cartilage. At 36th week it is up to the level of ensiform cartilage and later at 40 weeks it comes down to 32 weeks level due to engagement of presenting part.
- **The Braxton Hicks' contractions:** These becomes more evident.
- **Fetal movements:** These are easily felt and can be visualized on abdominal inspection.
- **Abdominal palpation:** The palpation of fetal parts is very easy. Lie, position, and presentation of the fetus can be determined.
- **Auscultation:** FHS is heard distinctly on auscultation.

Special Investigations/Immunological Test

Ultrasonography

It gives conclusive evidence of pregnancy. The fetal lie, presentation is confirmed by USG. It allows for the estimation of fetal weight and helps detect any structural abnormalities in the fetus. Additionally, USG assists in determining placental localization, the quantity and distribution of amniotic fluid, as well as the condition of the internal cervical os.

DIFFERENTIAL DIAGNOSIS OF PREGNANCY

Differential diagnosis is the process of differentiating between two or more conditions which share similar signs

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or symptoms. The differential diagnosis of pregnancy or pregnancy is to be differentiated from the conditions like distended bladder, uterine fibroid, ovarian cyst and pseudocyesis.

Role of Nurse/Midwife

Role of a nurse midwife in diagnosis of pregnancy

A nurse midwife is instrumental in the early detection and confirmation of pregnancy. By conducting thorough assessments, she ensures timely diagnosis and initiation of essential antenatal care, while also providing emotional support and guidance to the expectant woman.

- Collects detailed history related to the mother's menstrual cycle, symptoms of early pregnancy.
- Performs physical examination to identify probable and presumptive signs of pregnancy.
- Assists in or conducts pregnancy tests, including urine tests for hCG.
- Refers for and interprets relevant investigations like ultrasound or blood tests when needed.
- Provides emotional support and guidance, confirming pregnancy with sensitivity and offering initial counseling.
- Documents findings and ensures timely registration for antenatal care.

THE FETUS IN UTERO AND FETOPELVIC RELATIONSHIP

The fetus lies inside the uterus in a closed sac filled with liquor amni. It has enough freedom of movement until the later months of pregnancy, when it becomes relatively fixed. The way the fetus is positioned in relation to the mother's pelvis helps to determine the plan for the delivery.

FETOPELVIC RELATIONSHIP (FIG. 3.19)

Fetopelvic relationship refers to the relationship between the fetal presenting part and the maternal pelvis.

DESCRIPTION OF FETUS IN UTERO

There are various terms which are used to describe the relationship between the fetus in uterus and the mother.

Lie (Figs. 3.20A to D)

The lie refers to the relationship of the long axis of the fetus to the long axis of the centralized uterus or maternal spine.

The most common lie is longitudinal/vertical (99.5%) because of the ovoid shape of the uterus. The lie is called longitudinal when the long axis of fetus corresponds to the long axis of centralized uterus/maternal pelvis. The lie is longitudinal in vertex and breech presentation.

The lie is transverse when the long axis of fetus is perpendicular to the long axis of uterus/spine.

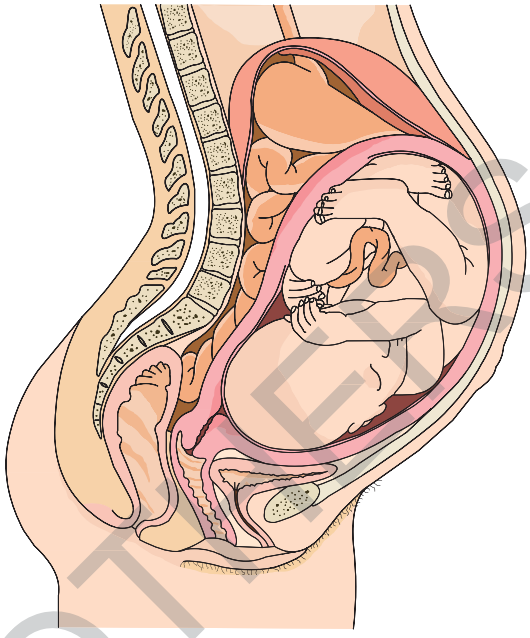
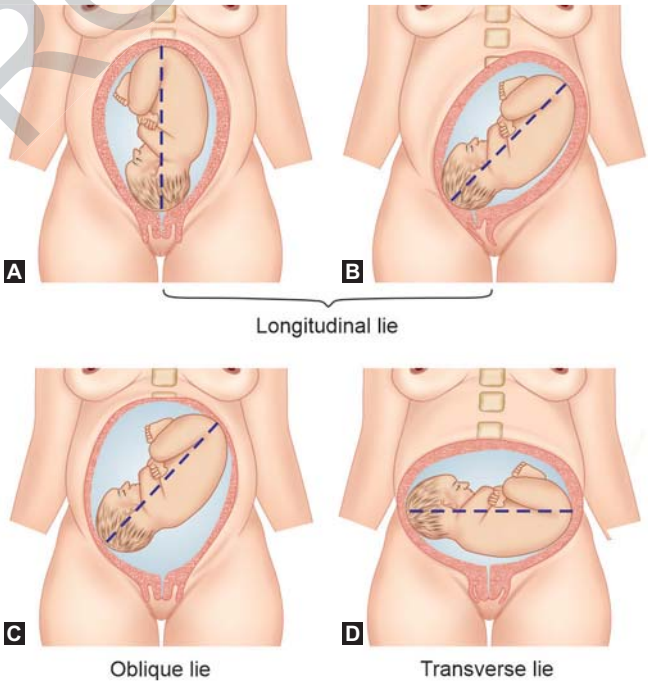


Fig. 3.19: Depiction of fetopelvic relationship.



Figs. 3.20A to D: Lie; (A) Longitudinal lie; (B) The fetus appears to be in an oblique position relative to the maternal spine, but it actually remains in a longitudinal lie relative to the uterine axis. Correcting the uterine obliquity restores the fetus to a longitudinal lie as shown in (A); (C) Oblique lie; (D) Transverse lie.

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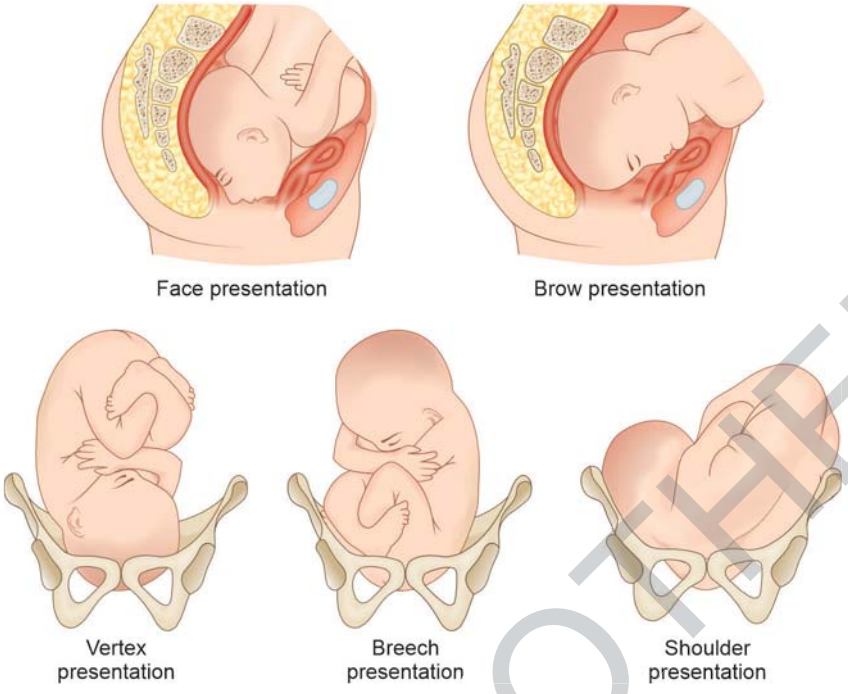

Fig. 3.21: Fetal presentation.

The lie is called oblique when the fetal long axis crosses the maternal long axis obliquely at an angle other than right angle.

Sometimes the lie is unstable until labor sets in, when it becomes either longitudinal or transverse.

Presentation (Fig. 3.21)

The part of the fetus which occupies the lower pole of the uterus (pelvic brim) is called the presentation of the fetus. This becomes the leading fetal part that enters the pelvic brim first and negotiates the maternal passage during labor.

Accordingly, the presentation may be cephalic (96.5%), podalic/breech (3%) or shoulder and other (0.5%).

When more than one part of the fetus present, it is called compound presentation.

Presenting Part (Fig. 3.22)

The presenting part is defined as the part of the presentation which overlies the internal os and is felt by the examining finger through the cervical opening. It is the most dependent part of the fetus.

In cephalic presentation the presenting part may be vertex (most common), brow or face, depending upon the degree of flexion of the head.

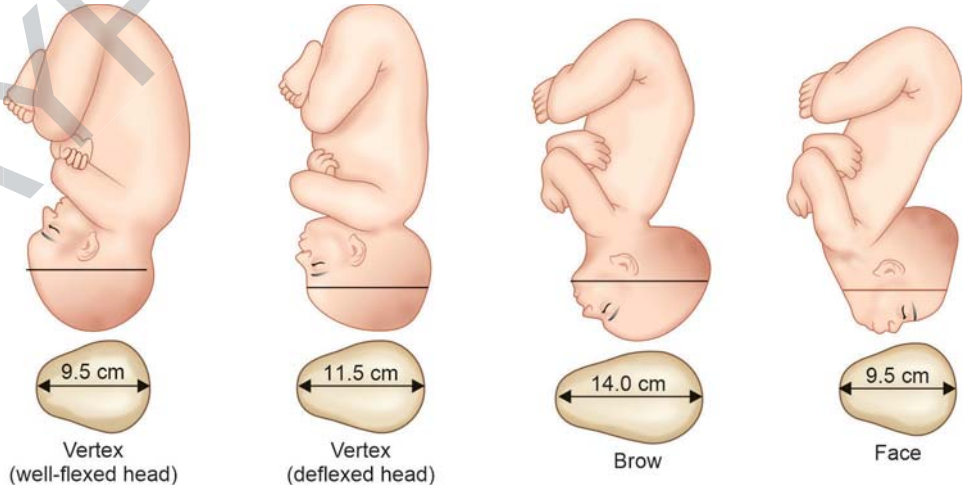

Fig. 3.22: Varieties of cephalic presentations in different attitudes.

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Essentials of Midwifery/Obstetrics and Gynecology (OBG) Nursing

Salient Features

- This comprehensive textbook of Midwifery/Obstetrical and Gynecological Nursing I and II is designed to benefit nursing students at the diploma, undergraduate, and postgraduate levels.
- It is aligned with the revised syllabus of Midwifery/Obstetrical and Gynecological Nursing as outlined by the Indian Nursing Council in the Competency-Based Curriculum for BSc Nursing and also corresponds to the MSc Nursing syllabus. The content is organized unit-wise in accordance with these syllabi.
- It covers historical and contemporary perspectives of midwifery and provides comprehensive content on normal midwifery, normal newborn, and abnormal midwifery and high-risk newborns. In addition, it includes special topics in obstetrics and various procedures performed in obstetrics.
- A dedicated unit covers family welfare services and essential gynecological topics, ensuring comprehensive coverage of the subject.
- The comprehensive roles and responsibilities of a nurse midwife are clearly outlined under every relevant topic and subtopic, providing a practical and clinical perspective.
- Nursing diagnoses and objectives are included for the care of the mother in both normal and abnormal midwifery conditions. The application of relevant nursing theories in maternal care is also incorporated to enhance theoretical understanding and clinical practice.
- The book is enriched with colorful illustrations, diagrams, charts, and tables to aid in visual learning and better understanding.
- The content is thorough, insightful, and illustrative, covering all significant aspects of midwifery and gynecological nursing. It is designed to meet the academic needs of both students and teachers across various levels of nursing education.

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